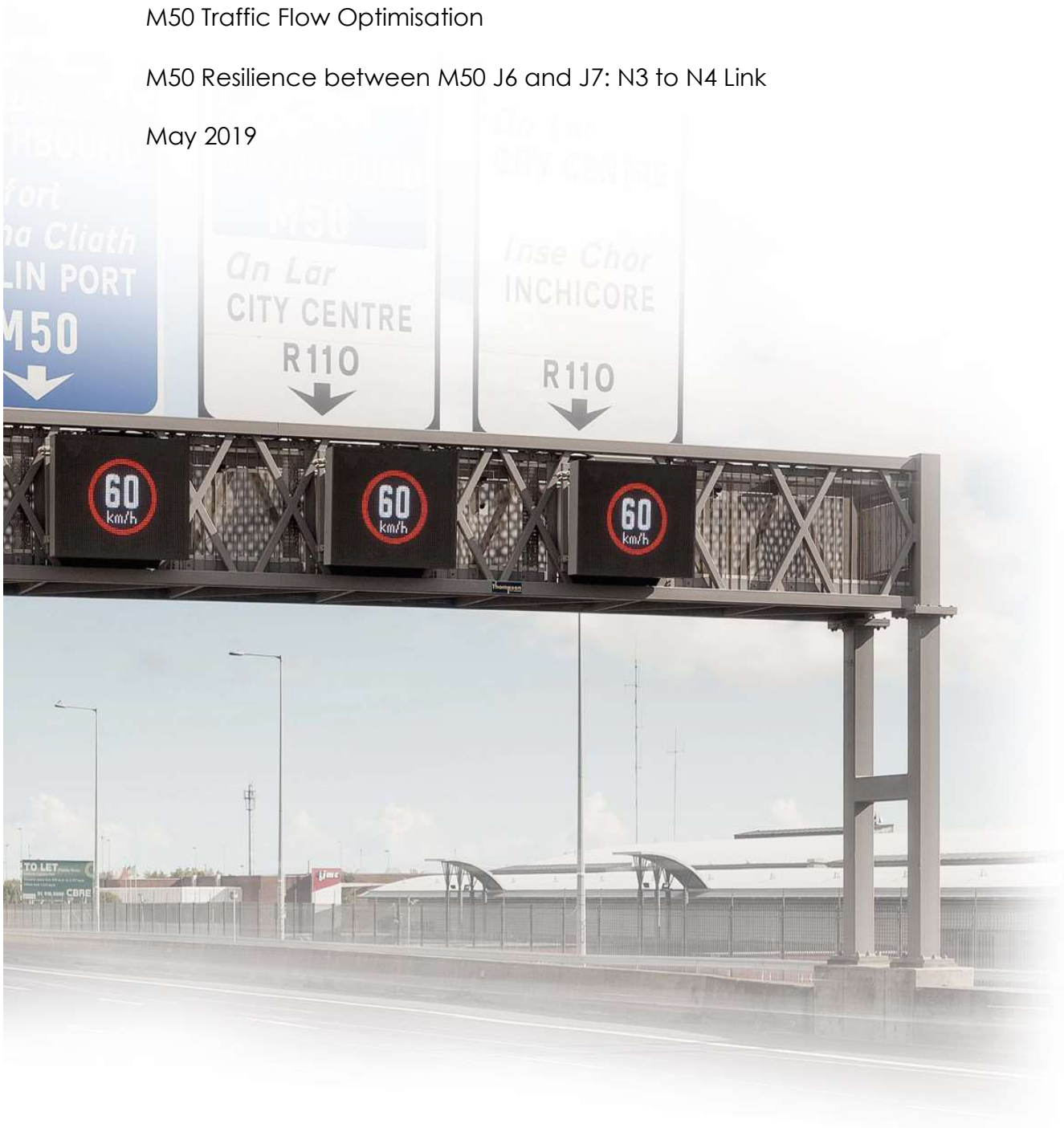


enhancing Motorway Operation Services

M50 Traffic Flow Optimisation

M50 Resilience between M50 J6 and J7: N3 to N4 Link

May 2019



enhancing Motorway Operations Services

M50 Resilience between M50 J6 and J7

Scoping Study

May 2019

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enhancing Motorway Operation Services

M50 Resilience between M50 J6 and J7

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1. INTRODUCTION

1.1 Purpose of this Report

Transport Infrastructure Ireland (TII) has recently developed a comprehensive diversion route network for the M50 Motorway ring road around Dublin. Occasional motorway closures arise due to major incidents. A coherent diversion route strategy is necessary as part of a traffic management regime under the motorway operations system. These measures are currently in place around most of the M50, with the exception of the West Link Bridge crossing of the River Liffey valley between Junction 6 Blanchardstown on the N3 radial route and Junction 7 Palmerstown on the N4 radial route.

This report, outlines the need for improved alternatives to the M50, discusses the existing alternative orbital routes between Junctions 6 and 7 on the M50 and proposes options that could be considered as part of wider orbital transport network improvements in Dublin.

1.2 The need for M50 Diversion Routes

In 2015 an Interagency Incident Coordination Group (IICG) for the M50 was established to provide a forum for communication between key stakeholders in relation to co-ordination of resources and incident management on the M50. In addition, the IICG can be convened in the event of a major incident so that the decision makers from each agency can coordinate a combined multiagency response. The agencies involved in the IICG include:

- An Garda Síochána;
- Dublin Fire Brigade;
- The four Dublin Local Authorities;
- TII; and
- The Motorway Traffic Control Centre.

One of the first initiatives by the IICG was the identification of the need for emergency diversion routes to provide alternative routes to traffic in the case of an M50 closure. The majority of these routes have been implemented and signs are now in place on all available routes between the M1 (Junction 3) and Junction 12 on the M50 with the exception of the section between the N3 (Junction 6) and the N4 (Junction 7). Signage for the section between Junction 12 on M50 and Junction 17 (M11) is scheduled for completion by Dun Laoghaire Rathdown County Council in Q3 2019.

There remains a need to for an adequate diversion route between the N3 and N4.

In 2018, there were a total of 1,164 recorded incidents on the M50 of which 541 were traffic collisions. The wider network impacts of major incidents on the M50 are severe. The resulting delays on the wider transport network last much longer than the actual incident duration.

2. Existing Orbital Routes between M50 Junction 6 and 7

2.1 Route 1: Castleknock and Chapelizod East of M50

There is only one possible diversion route east of the M50 that does not traverse the city centre, due to the required crossing of the Liffey and also the location of the Phoenix Park. The L-3100 College Road / Tower Road skirts around the western side of the park and passes through the villages of Castleknock and Chapelizod via the steep and narrow Knockmaroon Hill as shown on Figure 1.

This route is 7.65 Km long, compared to 3km along the M50. At Knockmaroon Hill the road is less than 6m wide with a gradient in excess of 7% and as a result there is a 3.5 Tonne weight restriction. At Chapelizod just north of where this route crosses the River Liffey there is a very sharp turn with an angle in excess of 120 degrees that is difficult for all traffic. These deficiencies mean that this route is not considered suitable as a diversion route for the M50.

2.2 Route 2: R121 - N3 J3 at Blanchardstown to N4 J4 at Lucan

West of the M50, the first existing regional route connecting the N3 to the N4 is the R121 that links Blanchardstown to the village of Lucan via Clonsilla and Westmanstown as shown on Figure 1. This diversion route is 14 Km long of which 9.6 Km is off the N3 and N4 national routes.

Initially on Blanchardstown Road South this route has a 12m carriageway, with a lane for cars and a dedicated lane for busses in each direction. It narrows progressively from North to South, reaching a minimum width of 6m in the rural area south of Clonsilla with no provisions for cyclists or footpaths in places.

In plan, the road geometry is irregular, with numerous sharp bends in different places that restrict visibility for drivers. The most severe bend is where the route descends steeply to the junction with the Strawberry Beds Road, which is located on a very sharp hairpin bend as shown in the following photograph. There is a 3 Tonne limit on the route at this point.

The other major constraint along this route is at the railway level crossing and narrow bridge over the Royal Canal at Clonsilla. This location and Clonsilla village are now effectively bypassed to the east as the main traffic flow is directed further along Luttrellstown Road to a relatively new bridge over the railway and canal at Porterstown.

At the southern end the R121 crosses the River Liffey at Lucan Bridge and passes through the centre of the village to the Newcastle Road that links to Junction 4 on the N4. The streets in Lucan are narrow and busy with regular local congestion. The Newcastle Road is narrow and winding. For all the above identified deficiencies this route is not satisfactory as a diversion route for the M50.

2.3 Route 3: R149 & Laraghcon Link - N3 J4 at Clonee to N4 J4 at Lucan

Route 3 as shown on Figure 1, is the next westward existing route linking Junction 4 of the N3 at Clonee to Junction 4 of the N4 at Lucan through two regional roads, R149 and R121, and a local road connection at Laraghcon that bypasses the hairpin junction on the R121 to connect to Lucan village from the north. This diversion route is 19.2 Km long of which 8.5 Km is off the N3 and N4 national routes.

The diversion route includes a length of 5.2 Km along the R149, which has a 5.5m carriageway and a 2m wide footpath in the Clonee area. The alignment is reasonably good but with a few sharp bends

including two at junctions. Unlike for the R121 to the east, on the Laraghcon Link that branches off the R149 to the northwest of Lucan, this route crosses the Royal Canal and railway at Collins Bridge without a level crossing. This route avoids some of the most severe constraints of the R121 north of the River Liffey, but it is not a suitable diversion route for traffic from the M50.

2.4 Route 4: R149 – M3 J4 at Clonee to N4 J5 at Leixlip or M4 J6 at Leixlip West

The northern section of Route 4, as shown on Figure 1, is the same as for Route 3, but it avoids Lucan Village to the west and passes either through Leixlip Village instead to Junction 5 or continues further west to reach the M4 at Junction 6 via the three regional roads R149, R148 and R449. These diversion routes are, proceeding east to west 22.5 and 29.2 Km long of which 12.5 Km to 16.4 Km is off the N3 and N4 national routes.

At the northern edge of Leixlip, the R149 makes a sharp turn at the junction beside Confey Bridge that spans over the Royal Canal and Dublin-Sligo Railway line. The bridge is too narrow for two-way traffic and there is a traffic signal shuttle that severely constrains the traffic capacity with resultant frequent queuing.

The R149 joins the R148 in Leixlip Village where there are further severe traffic capacity constraints and several right-angled turns at the junction on the Main Street and at either end of the River Liffey Salmon Leap Bridge.

The alternative route to the west of Leixlip bypasses the bottleneck at Confey Bridge but the southbound traffic queue can back up to block the next junction just 120m to the north. This longer route follows local road towards Collinstown around the northern side of the major Intel factory via Kellystown Lane (L1014), which is a very narrow rural road that includes a single-track bridge over the River Rye that greatly restricts traffic capacity.

At Collinstown this route joins the R148, former N4 Galway Road to link back eastward for 1km in front of the Intel factory complex. It then joins the R449 dual carriageway link towards the M4 at Junction 6, which has high traffic capacity and a good road alignment. Overall, while the R149 can provide a moderately good traffic route for most of the length, the difficulties in the Leixlip area preclude it from being a suitable diversion route for the M50.

2.5 Route 5: R157 - M3 J5 at Dunboyne to M4 J7 at Maynooth

Route 5 as shown on Figure 1 is the fifth and last possible alternative route that links from Junction 5 of the M3 at Dunboyne to Junction 7 of the M4 at Maynooth via the three regional roads R157, R148 and R406.

This diversion route is 38.9 Km long of which 14.7 Km is off the N3 and N4 national routes.

From M3 Junction 5 the initial 3km length of the R157 forms a western bypass of Dunboyne and has an unusually wide 10m single carriageway cross section with hard shoulders and an overall carriageway width of 16m.

Southwest of Dunboyne the R157 is a more typical 6 to 6.5m wide with numerous sharp bends with restricted visibility, including 3 right-angled turns at junctions such as the one below where the route turns to skirt the boundary of the Carton Estate near Maynooth.

For this route to reach Junction 7 on the M4 involves crossing through Maynooth town centre where there is regular traffic congestion which is a critical constraint for diverting the traffic away from the M50. In 2018 design has commenced for the Maynooth Eastern Relief Road which will bypass the constraints in the town centre. Thus the R157 could become a reasonably suitable alternative route for some traffic that might otherwise use the M50 to get around the edge of Dublin. However at a distance of 14 Km west of the M50 it is too far out to be of much use for diversion of traffic away from the orbital motorway, except in the most extreme circumstances and for very limited volumes of traffic.

2.6 Summary of the Existing Alternative Routes

All the mentioned constraints, lengths and several advantages and disadvantages discussed have been summarised in Table 1. The colour code reflects the map included in Figure 1 overleaf.

A review of the existing road network within a range extending for 3 Km east of the M50 and 14 Km westward has considered 5 possible existing alternative routes. The review has found that that 4 of the routes are unsuitable, and that the fifth and longest diversion at Maynooth might have limited suitability once a new Eastern Relief Route is developed in the town.

Therefore the West Link section of the M50 between the N3, Junction 6 and N4, Junction 7 is, and will remain, very vulnerable to major traffic disruption if closure is necessary in the absence of a suitable alternative route.

Existing Alternative Route	Junction linked	Relevant Geographical Areas	Regional Roads	Length of each regional road sections [km]	National Roads	Length of each national road sections [km]	Total Length of Route [km]
Route 1	J1 of the N3 - J1 of the N4	Castleknock and Chapelizod East of M50	Local Road	7.6	N/A	N/A	7.6
Route 2	J3 of the N3 - J4 of the N4	Blanchardstown -Clonsilla - Lucan	R121	8.7	N3	2.5	15.9
					N4	4.7	
Route 3	J4 of the M3 - J4 of the N4	Clonee - Lucan	R149	5.2	M3	5.9	19.2
			Local Road	2.1			
			R121	1.2	N4	4.7	
Route 4A	J4 of the M3 - J5 of the M4	Clonee - Weston	R149	8.5	M3	5.9	22.5
			R148	1.5	M4	6.6	

Existing Alternative Route	Junction linked	Relevant Geographical Areas	Regional Roads	Length of each regional road sections [km]	National Roads	Length of each national road sections [km]	Total Length of Route [km]
Route 4B	J4 of the M3 - J6 of the M4	Clonee - Leixlip	R149	8.5	M3	5.9	29.2
			R148	2.5			
			R449	1.7	M4	10.5	
Route 5	J5 of the M3 - J7 of the M4	Duboyne - Maynooth - Carton	R157	11.9	M3	9.6	38.9
			R148	1.3			
			R406	1.6	M4	14.5	

Table 1 - Summary Table of the Existing Alternative Routes lengths

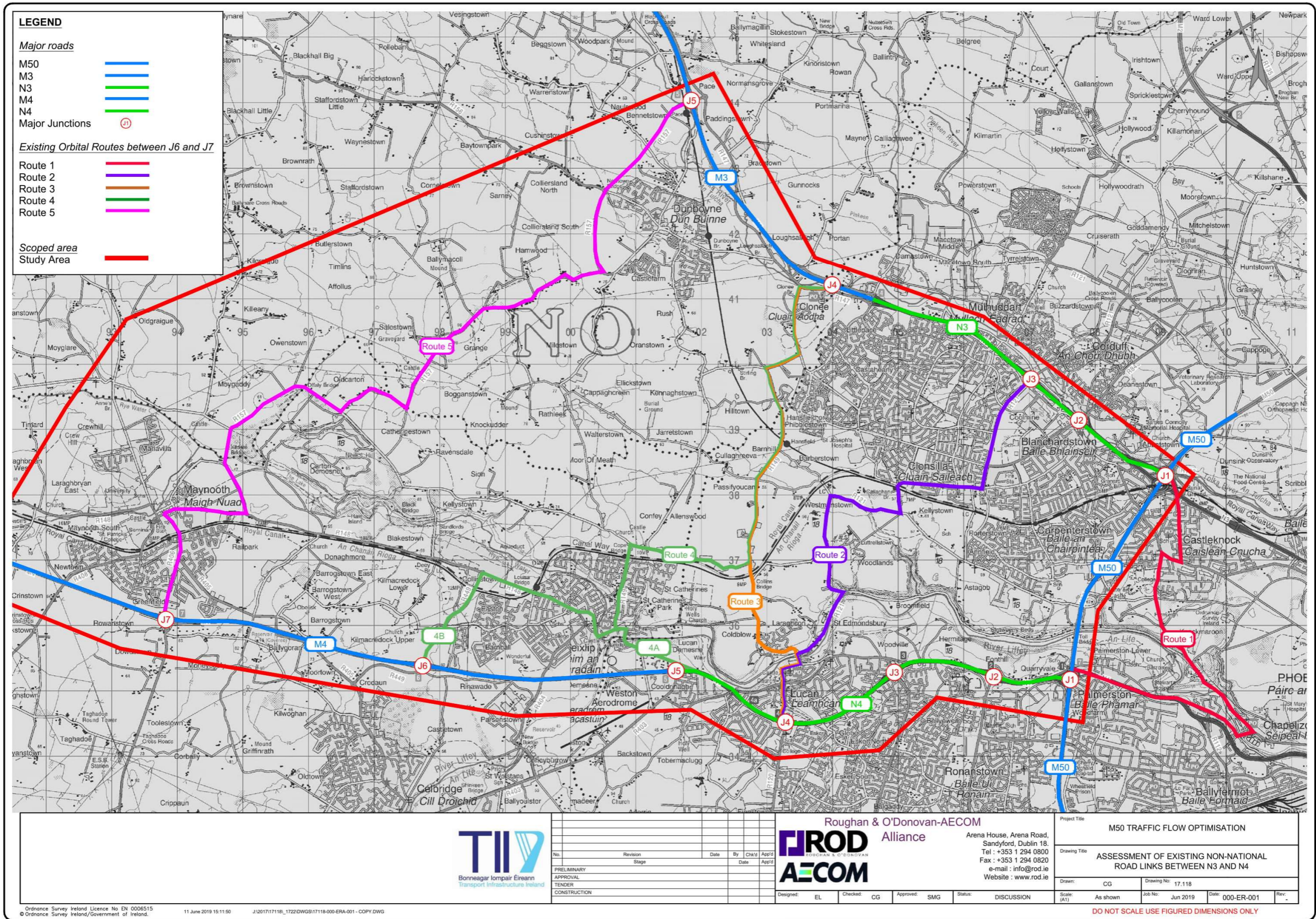


Figure 1: Existing Alternative Routes

3. CONSTRAINTS

The constraints found in the study area informed the identification of a number of possible options for new orbital routes between the N3 and N4 corridors. The types of constraints identified have been included in the Study Area & Constraints Map in Appendix A.

3.1 Environmental

3.1.1 Environmental Background

The study area extends west of the M50 for 14 Km to Maynooth, and includes a range of places of environmental interest. The institution responsible in Ireland for the protection of habitats and species and many other environmental issues is The National Parks and Wildlife Service. The NPWS is part of the Heritage Division of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and its role is:

- To secure the conservation of a representative range of ecosystems to maintain and enhance populations of flora and fauna in Ireland.
- To designate and advise on the protection of habitats and species identified for nature conservation (Natural Heritage Areas (NHA), Special Areas of Conservation (SAC) and Special Protection Areas (SPA) having particular regard to the need to consult with interested parties.
- To make the necessary arrangements for the implementation of National and EU legislation and policies for nature conservation and biodiversity including the EU Habitats and Birds Directives, and for the ratification and implementation of the range of international Conventions and Agreements relating to the natural heritage.
- To manage, maintain and develop State-owned National Parks and Nature Reserves.
- To promote awareness of natural heritage and biodiversity issues through education, outreach to schools and engaging with stakeholders.

Conserving species in their natural habitats requires a strategic approach to succeed. One of these is to ensure the adequate conservation of habitats where many of the plants and animals live.

The NPWS distinguishes the Protected Sites into three main categories:

- Natural Heritage Areas (NHA)
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)

The basic designation for wildlife is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. To date, 75 raised bogs have been given legal protection, covering some 23,000 hectares. These raised bogs are located mainly in the midlands. A further 73 blanket bogs, covering 37,000ha, mostly in western areas are also designated as NHAs.

The Special Areas for Conservation are prime wildlife conservation areas in the country, considered to be important on a European as well as Irish level. Most Special Areas of Conservation (SACs) are in the countryside, although a few sites reach into town or city landscapes, such as Dublin Bay

A Special Protection Area (SPA) is a designation under the European Union Directive on the Conservation of Wild Birds. Under the Directive, Member States of the European Union (EU) have a duty to safeguard the habitats of migratory birds and certain particularly threatened birds. Ireland

is required under the terms of the EU Birds Directive (2009/147/EC) to designate Special Protection Areas (SPAs) for the protection of endangered species of wild birds,

- Listed rare and vulnerable species such as those mentioned above.
- Regularly occurring migratory species, such as ducks, geese and waders.
- Wetlands, especially those of international importance, which attract large numbers of migratory birds each year.

In Ireland, a programme to identify and designate SPA sites has been in place since 1985 and a review of the Irish network of SPA sites had identified a number of sites that required re-notification.

3.1.2 Environmental constraints within the Study Area

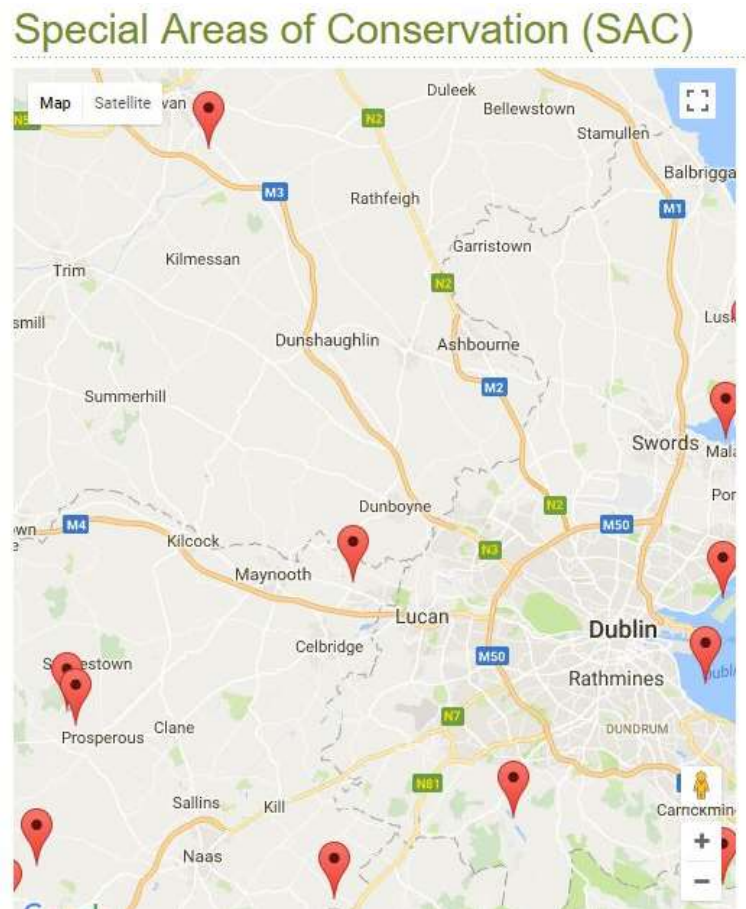


Figure 2 - Special Areas of Conservation (SAC) in the Greater Dublin Area

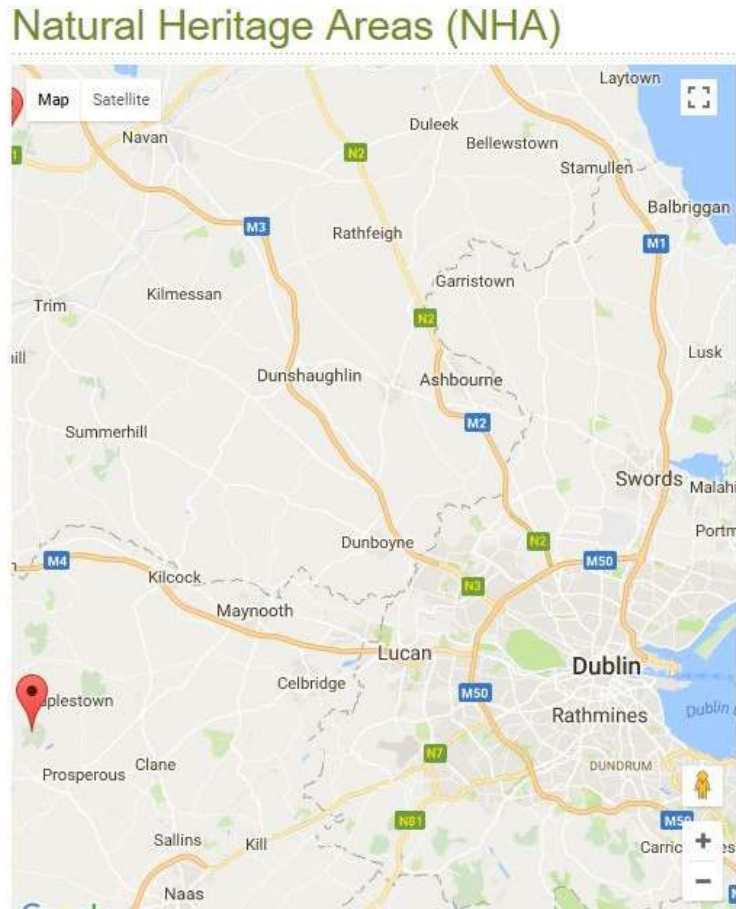


Figure 3 - Natural Heritage Areas (NHA) in the Greater Dublin Area

River Liffey

The River Liffey between Dublin and Leixlip is not designated as either an SAC or an NHA.

Rye Water SAC

As shown in Figure 2 the only relevant Special Area for Conservation in the study area is the Rye Water Valley/Carton SAC, shown in greater detail in Figure 4. This is located between Leixlip and Maynooth on a small tributary to the River Liffey at Leixlip.

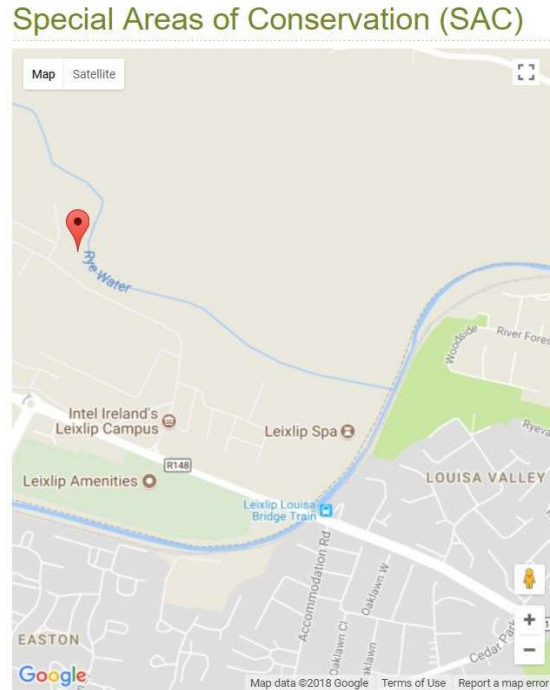


Figure 4 - Rye Water Special Areas of Conservation (SAC) west of Leixlip

Rye Water Valley/Carton SAC is located between Leixlip and Maynooth, in Counties Meath and Kildare, and extends along the Rye Water, a tributary of the River Liffey. The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- [7220] Petrifying Springs
- [1014] Narrow-mouthed Whorl Snail (*Vertigo angustior*)
- [1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*)

The conservation importance of the site lies in the presence of several rare and threatened plant and animal species, and the presence of petrifying springs, a habitat type listed on Annex I of the E.U. Habitats Directive. The woods found on Carton Estate and their birdlife are of additional interest.

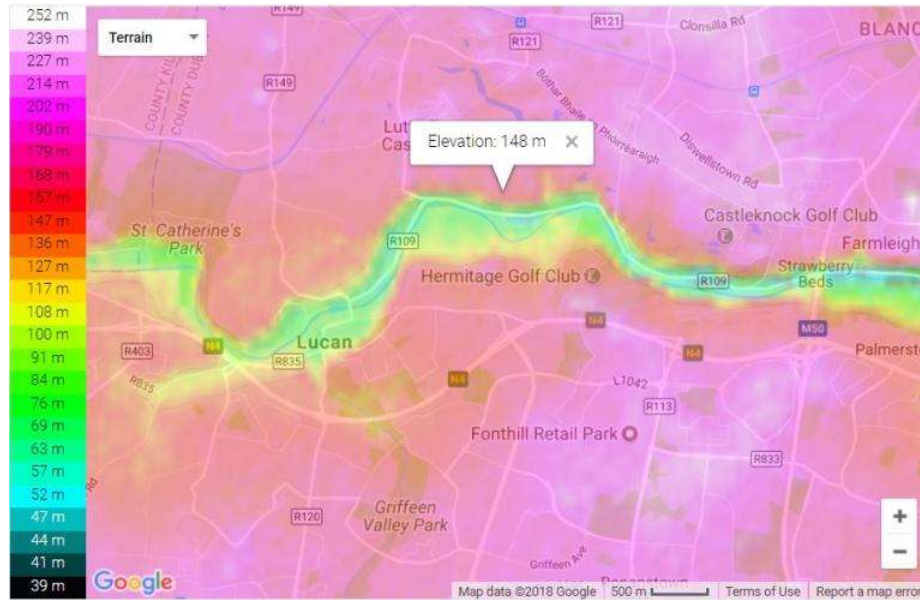


Figure 6 - Highest elevation differences around Lucan



Figure 7 - M50 West Link Bridge across the Liffey Valley at Strawberry Beds

3.2.2 Liffey Valley at Leixlip

West of Lucan the Liffey Valley is not as deep as further east, with a considerably lower level difference of 25m at the eastern edge of Leixlip. The valley flattens out somewhat in this area and a new north-south road link could cross the river on a low-level and reasonably short bridge.

3.2.3 Rye Water Valley

The Rye Water Valley cuts deeply into the terrain as it descends towards the River Liffey at Leixlip.

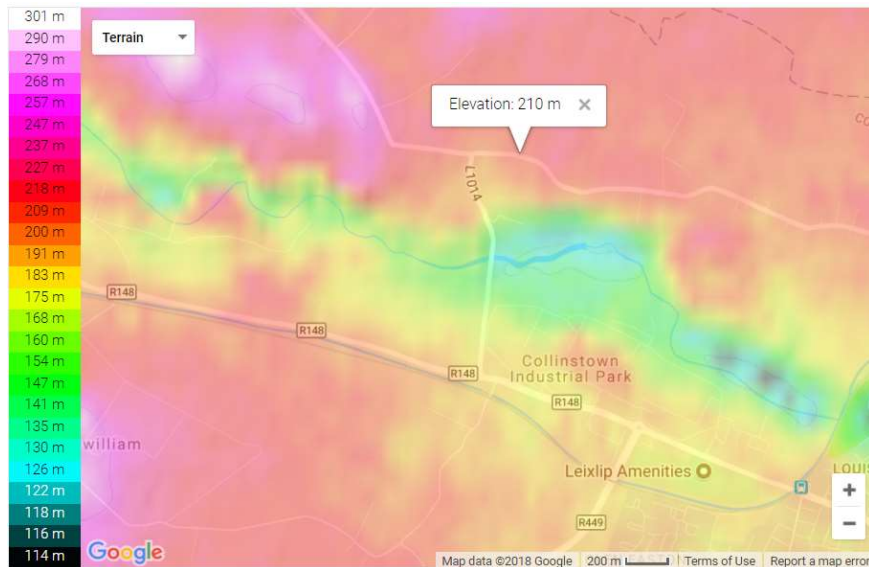


Figure 8 - Highest elevation differences around Collinstown / Leixlip

3.3 Recreational Sites

A number of recreational sites have been identified within the study area, such as parks, sport facilities and resorts as follows and included in the Constraints Map:

- Castleknock Golf Club
- Hermitage Golf Club
- Porterstown Park Pitches
- Luttrellstown Castle Hotel & Golf Club
- Westmanstown Golf Club
- Lucan Golf Club
- Liffey Valley Regional Park / St. Catherine's Park (Leixlip/Lucan)
- Grange Golf Club (Bogganstown)
- Carton House & Demesne

3.4 Royal Canal and Sligo Railway Line

The Royal Canal and Sligo Railway Line run parallel each other across the study area from Blanchardstown westward to Leixlip, north of the River Liffey valley.

A new orbital road will need to cross the canal and railway with careful selection of suitable places for a bridge. In some places there is a local or regional road along the canal bank, such as at the north-western edge of Leixlip, which will complicate the provision of a new bridge for an orbital route.

In mid-2019 Kildare County Council has sought planning approval for the proposed Maynooth Eastern Ring Road, which will have a bridge over the canal and railway at the eastern edge of the town to form a new single carriageway road connecting from the M4 Junction 7 as far as the R157 Dunboyne Road.

3.5 Existing Urban Areas

Within the study area have been identified six major urban areas that may affect the design of a future road link between the N3 and the N4: Blanchardstown, Lucan, Leixlip, Maynooth, Dunboyne and Clonee.

All of these former villages have now grown into large suburban areas with populations of between 15,000 (Leixlip) and 120,000 (Blanchardstown). Provision of a suitable new road between these urban areas that can connect through them to the N3 and N4 corridors is very constrained in terms of traffic capacity and potential impacts on residential communities.

3.6 Commercial / Industrial Sites

There are two important commercial / industrial sites within the study area:

- Liffey Valley at Lucan North
- Intel at Collinstown, Leixlip

These sites can constrain the design of a route for a new orbital road link, and they should generally be skirted where possible. An example for Collinstown is shown in Figure 9 where a northward extension of the R449 is not feasible without demolition of buildings at the Intel campus.



Figure 9 - Intel Site and other facilities at Collinstown - Obstacle for Northward extension of the R449

3.7 Major Road Links to Northeast & Southwest

A relevant consideration is the potential for a new orbital route to connect with other similar orbital links around the Dublin area, including:

- N3 J4 Castaheany eastward to N2 J3 Cherryhound Link via Ballycoolin (Fingal);

- R113 Fonthill Road from N4 J2 Liffey Valley southward to N7 J1a Newlands Cross (South Dublin);
- R136 from N4 J3 Ballydowd southward to N7 J2 Kingswood (South Dublin);
- Proposed Link from N4 J5 Leixlip southward to N7 J4a at Rathcoole West (South Dublin).

3.8 Existing Junctions on N3/M3 & N4/M4

There are varying degrees of available traffic capacity at the existing junctions along the radial routes that will be a factor in route selection. Some existing junctions have fairly small traffic capacity and may be already overloaded. It is desirable that an M50 diversion route can cater for as large a volume of traffic as possible and to avoid obvious bottlenecks.

Table 2: Review of existing junctions on N3/M3 and N4/M4

Junction Name	Junction Type	Comments
N3 J2 Snugborough	Hybrid diamond junction with a 5-arm signal junction on the southern side at Blanchardstown Village.	Capacity is limited and there is regular congestion, which indicates that this junction is not suitable for a diversion route from the M50.
N3 J3 Blanchardstown	Diamond junction with the addition of a loop in one quadrant as part of recent major capacity enhancement.	Capacity is reasonably high, but so are traffic demands. This junction is suitable for connection to a new orbital route linking southward to the N4.
N3 J4 East Castaheany / Clonee	Two half-junctions on either side of the village connected by a pair of 1 Km long two-way link roads.	Originally the layout on the eastern side was a dumbbell with a pair of roundabouts, but these were replaced with signal junctions and a one-way northbound 3 lane link on the bridge for additional capacity.
N3 J4 West Clonee	Dumbbell roundabout layout	Recently as part of the M3 Clonee to Kells PPP scheme the northbound merge ramp was relocated to connect directly from the southern roundabout rather than from the Dunboyne Road junction as previously arranged.
M3 J5 Dunboyne	Full rotary junction	The junction has very high traffic capacity and low demand. It also has a very high-quality link southward along the R157 Dunboyne Western Bypass.
N4 J2 Liffey Valley	Hybrid dumbbell junction with partial signalisation	Located only 1 Km west of M50 Junction 7 and beside the very busy Liffey Valley shopping centre, which causes considerable traffic pressure. The R113 orbital route links southward from here to the N7 that is currently used for M50 diversions.
N4 J3 Ballydowd (Lucan East)	Hybrid diamond junction with traffic signals	This junction was modestly upgraded as part of the Lucan Bypass Improvement Scheme through provision of an additional traffic lane on the bridge and a new footbridge on the eastern side. This junction serves most of the eastern Lucan area which causes considerable traffic pressure.
N4 J4 Newcastle Road (Lucan Central)	Diamond junction with traffic signals	Upgraded as part of the Lucan Bypass Improvement Scheme.
N4 J5 Leixlip East / Lucan West	Combination of a diamond and dumbbell layout	This is the junction identified by Fingal County Council for the southern terminus of a new orbital route from Hansfield to Leixlip. It is also identified by South Dublin County Council for the northern end of a new orbital route to extend southward to the N7 at Rathcoole.
M4 J6 Celbridge / Leixlip West	High-capacity rotary junction	Provides high-quality access for both the Intel factory to the north and the former HP plant to the southeast (now closed) which had combined employment of about 6,000 people at one stage.
M4 J7 Maynooth	Combination of a diamond and dumbbell layout	Main access junction for the town of Maynooth with a population of 15,000 people, therefore high demand for its use.

4. POTENTIAL NEW LINK ROUTES

Eleven routes have been considered, broadly accounting for the constraints identified in Section 3, that have the potential to act as a diversion route to the M50 and therefore enhance its resilience between Junctions 6 and 7.

4.1 Route A: N3 J3 Blanchardstown to N4 J2 Liffey Valley via Porterstown

From East to West, the first route option is Route A (Figure 10). It links Junction 3 of the N3 with Junction 2 of the N4. The total length of road section is 5.1 Km of which 3.3 Km is along existing roads at the northern end (Blanchardstown Road South and Porterstown Link Road) with a new 1.8 Km link required across the River Liffey valley to connect to the N4 at Junction 2.

Despite its proximity to the M50, which is consequently a benefit in terms of shorter diversion length, there are a series of major constraints on this route: the crossing of the River Liffey, with very steep gradients on each side of the valley, and busy traffic conditions in the urban area of Blanchardstown.

This corridor was previously identified for Metro West, which is no longer proposed as part of the Dublin Regional Transport Strategy. To cross the 50m deep Liffey Valley on this route would be a major challenge, which for Metro West was proposed to involve a high-level bridge similar in scale to the existing 400m long West Link Bridge. This option will have traffic capacity limitations at N4 Junction 2, which is already very busy due to the Liffey Valley Shopping Centre adjoining.

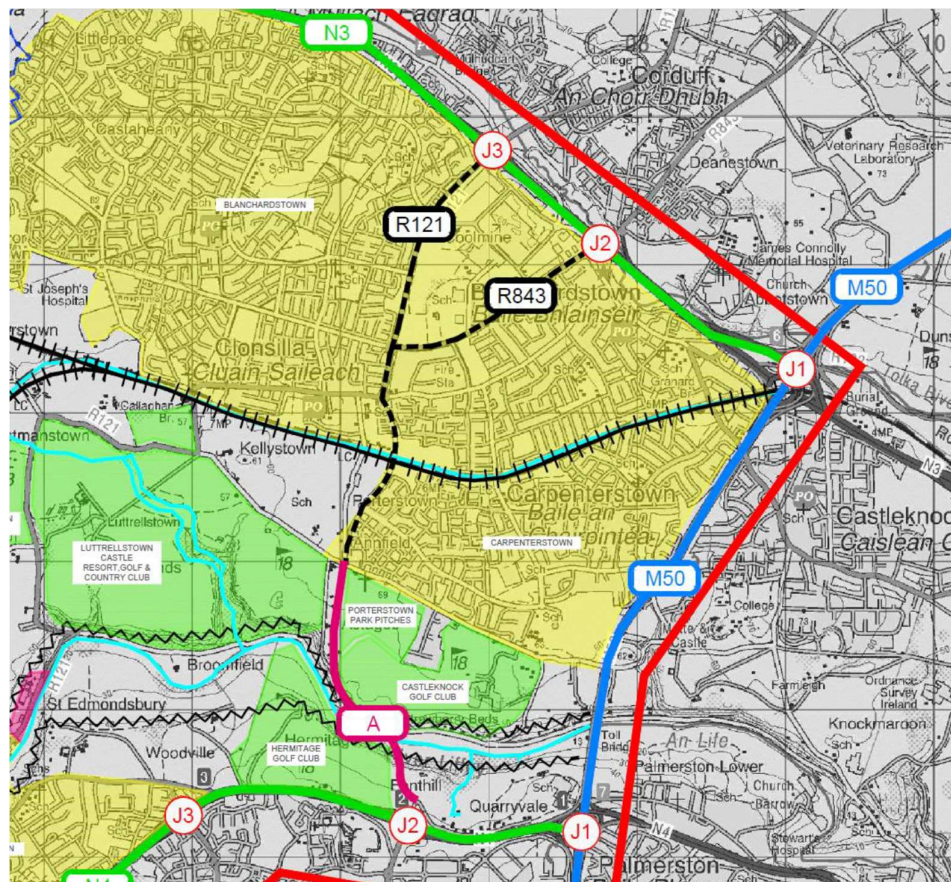


Figure 10: Route A

4.2 Route B: N3 J3 Blanchardstown to N4 J3 Ballydowd via Porterstown

The northern part of Route B (Figure 11) follows the same existing roads as Route A at the northern end, but it links to N4 Junction 3 instead of junction 2. The constraints are mainly the same as for Route A, but Route B has the additional advantage of linking Blanchardstown directly to the village of Lucan. The total length of this route is 5.3 Km long, with 3.2 Km of which is along existing roads and 2.1 Km of new road would be required.

This option will have traffic capacity limitations at N4 Junction 3, which is already busy due to the link southward along the R136 road that provides an orbital route to the N7 at Junction 2 Kingswood. The required bridge over the River Liffey for Option C would be similar to that for Options A and B.

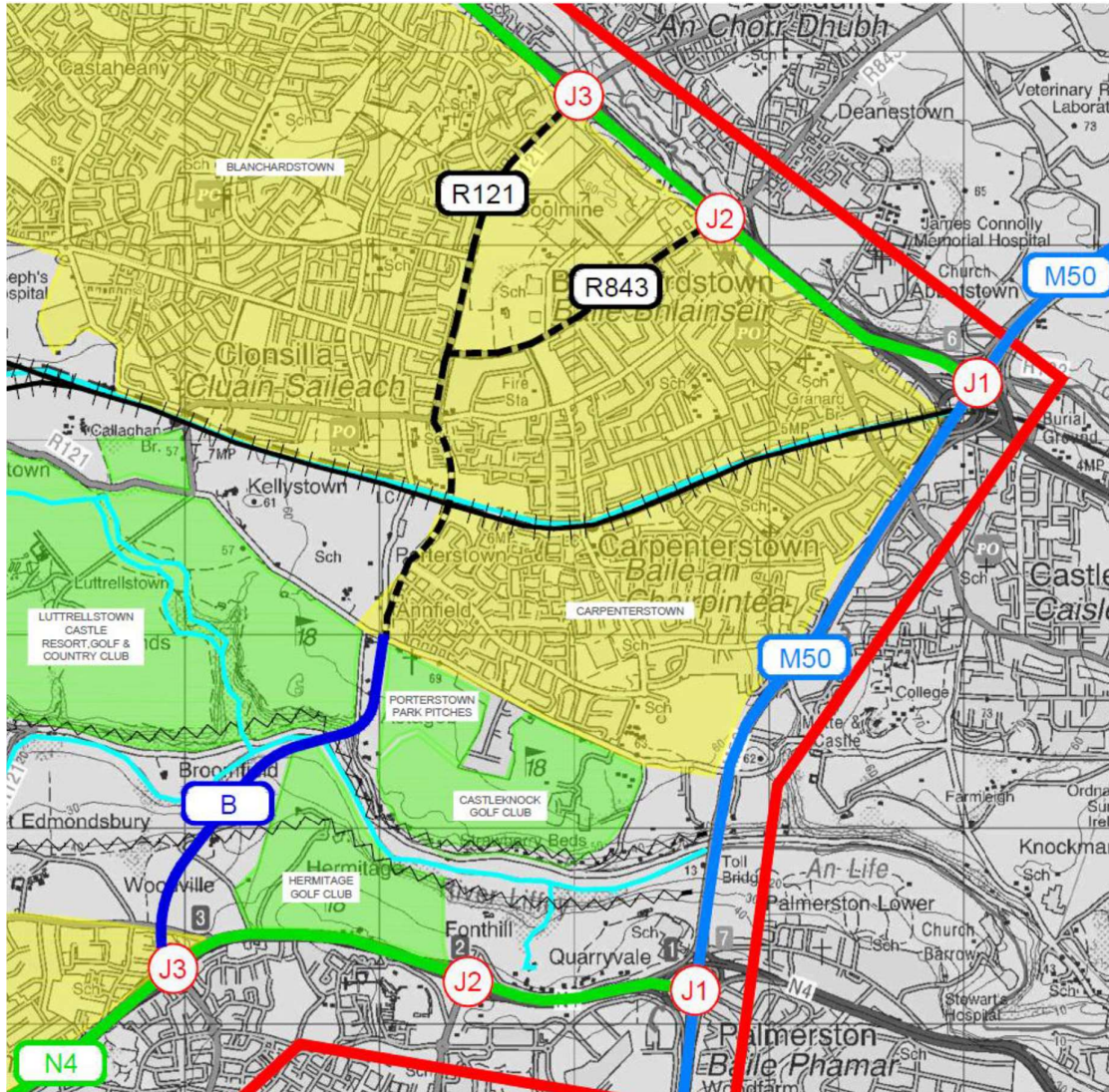


Figure 11: Route B

4.3 Route C: N3 J4 Castaheany to N4 J3 Ballydowd via Lutrelstown

Route C links N3 Junction 4 with N4 Junction 3. It is 6.5 Km long, with 4.3 Km of new road required. This route has mainly the same constraints as Route B: steep gradient in places, and a major bridge crossing of the River Liffey. In addition, there will need to be a revised main road corridor through the new urban area in the Hansfield SDZ, which has not been planned for to date. There would be 2 railway crossings and a canal crossing as shown in Figure 12.

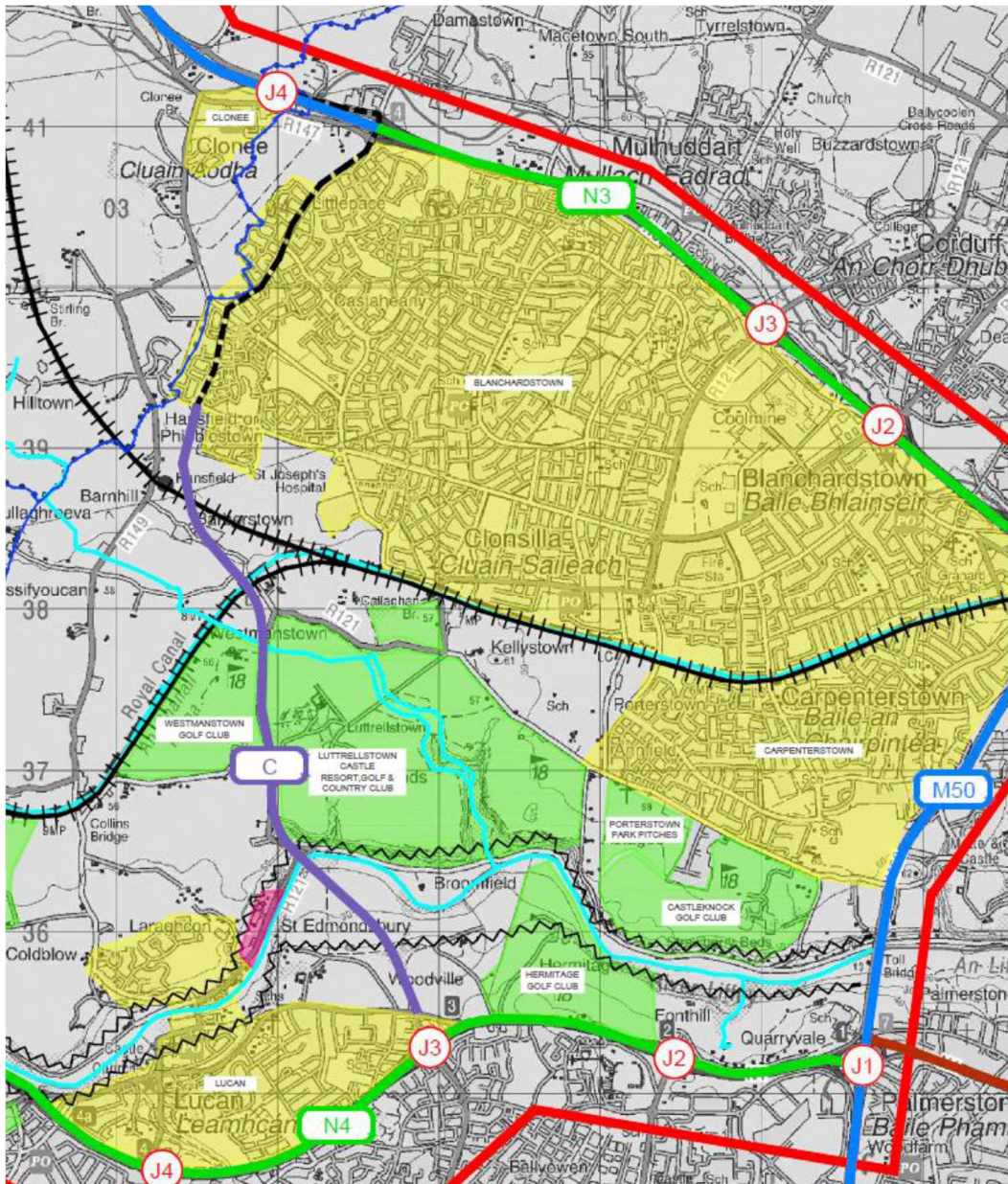


Figure 12: Route C

Route C would follow the existing R121 regional road corridor (Clonsilla to Lucan) over a length of 1.4 Km along the eastern boundary of the Westmanstown Sports Centre and Golf Club, which would entail road widening and encroachment into the frontage properties. The required bridge over the River Liffey for Option C would be similar to that for Options A and B.

4.4 Route D: N3 J4 Castaheany to N4 J3 Ballydowd via Westmanstown

Route D (Figure 13) is a variant of Route C which takes a longer way around the western side of Westmanstown Gold Club and does not involve widening of the existing R121 Regional Road. The total length of route is 7.5 Km, which is 1 Km longer than Route C, with 5.3 Km of new road. An advantage of this route is that it avails of a road reservation across the Hansfield SDZ lands.

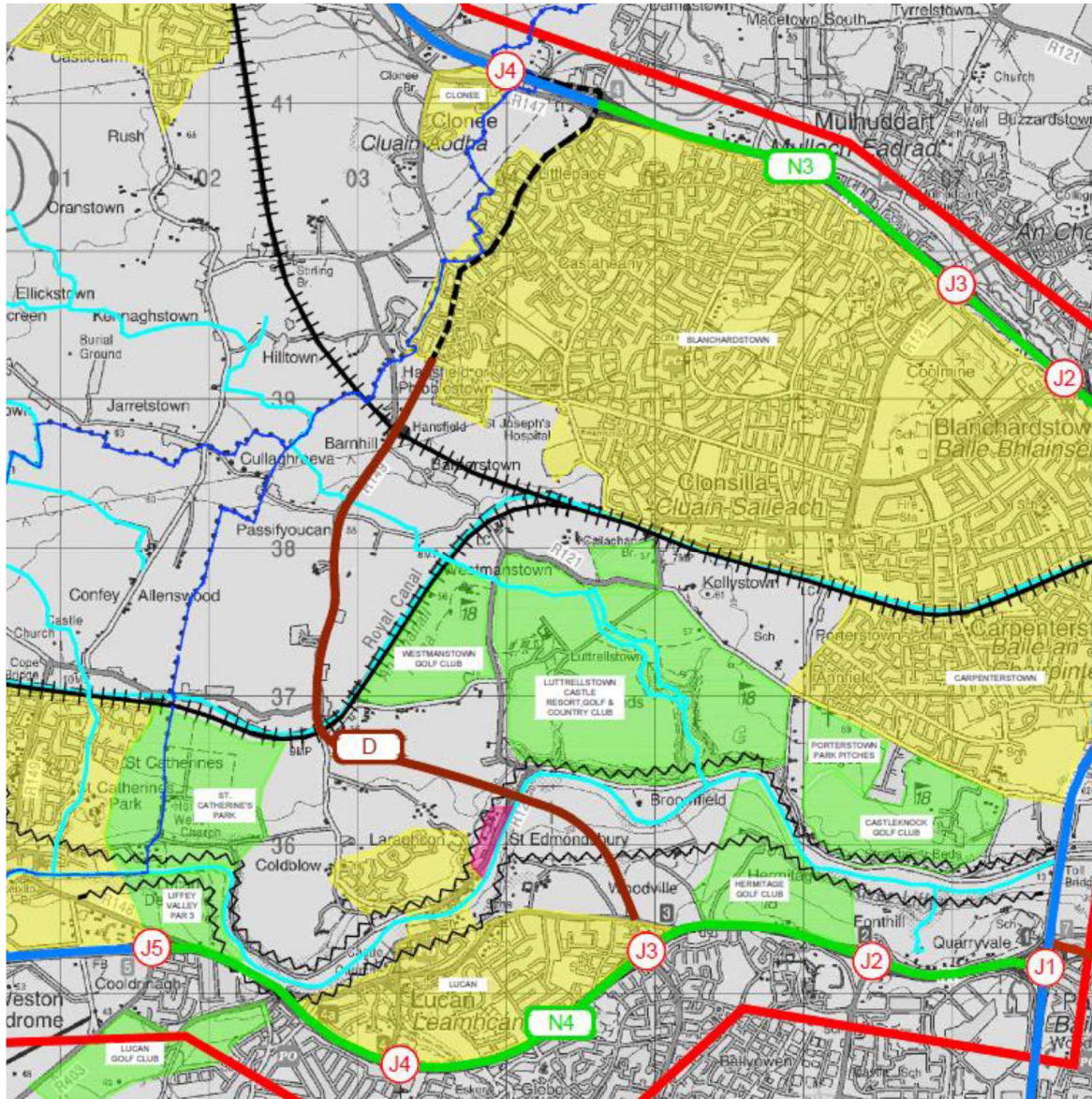


Figure 13: Route D

4.5 Route E: N3 J4 Castaheany to N4 J5 Leixlip

Route E (Figure 14) links junction 4 of the N3 with junction 5 of the N4 and generally follows the indicative route as shown on the Fingal County Council Development Plan from Hansfield to east of Leixlip. However, in the vicinity of Leixlip Route E stays entirely inside the Fingal County area and does not extend over the county boundary into County Kildare.

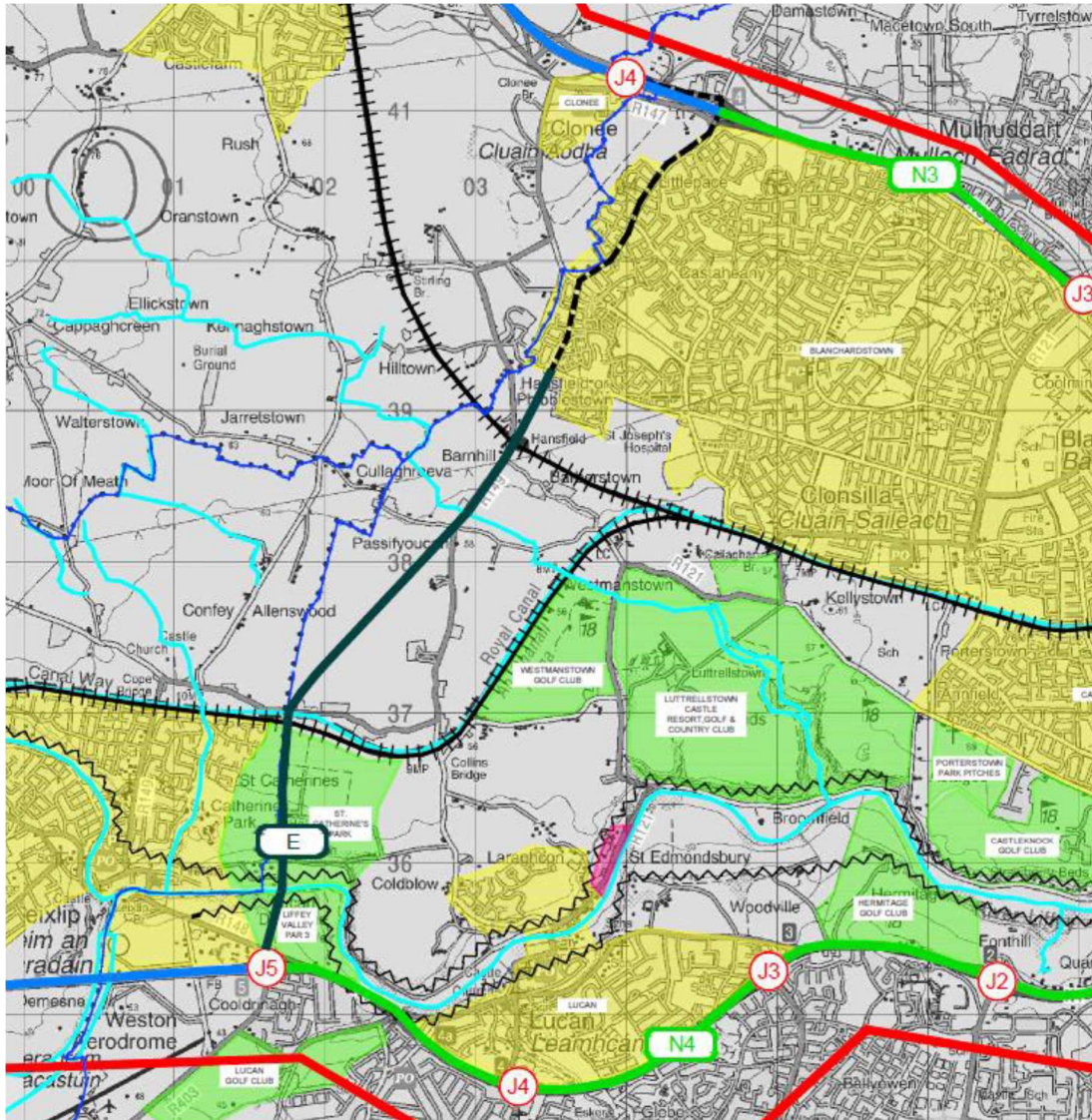


Figure 14: Route E

This route would traverse through the middle of the Liffey Valley Regional Park (St. Catherine's Park) along the line of the county boundary. A route could potentially be provided that avoids the sports pitches in the park, but may affect a small facility building, and a part of a car park. The proposed route could be arranged such that the park activities can continue on either side with the use of 'Green Bridges' and reduced level of carriageway.

At the northern bank of the River Liffey Route E would skirt around the Leixlip Wastewater Treatment Plant on the eastern side. As the valley is less deep at this location the required road bridge over the River Liffey for Option E would be at a lower level and shorter than for Options A to D. The terrain on

the approaches is less steep so that a new road can descend to enable a shorter span of less than 100m.

South of the River Liffey Route E would traverse across the northwest corner of the Liffey Valley Par 3 Golf Course, with some loss of effective space for the golf activity. In terms of traffic capacity, this route is the same as Options C and D at the northern N3 end where it connects to Junction 4.

4.6 Route F: N3 J4 Castaheany to N4 J5 Leixlip

Route F (Figure 15) is very similar to Route E and directly represents the indicative route as proposed by Fingal County Council in the Development Plan. Route F (Figure 51) is 6.8 Km long, of which 4.7 Km requires a new road link from Hansfield to Leixlip. It links Junction 4 East on the N3 with Junction 5 of the N4, and the constraints are largely the same as for Route E.

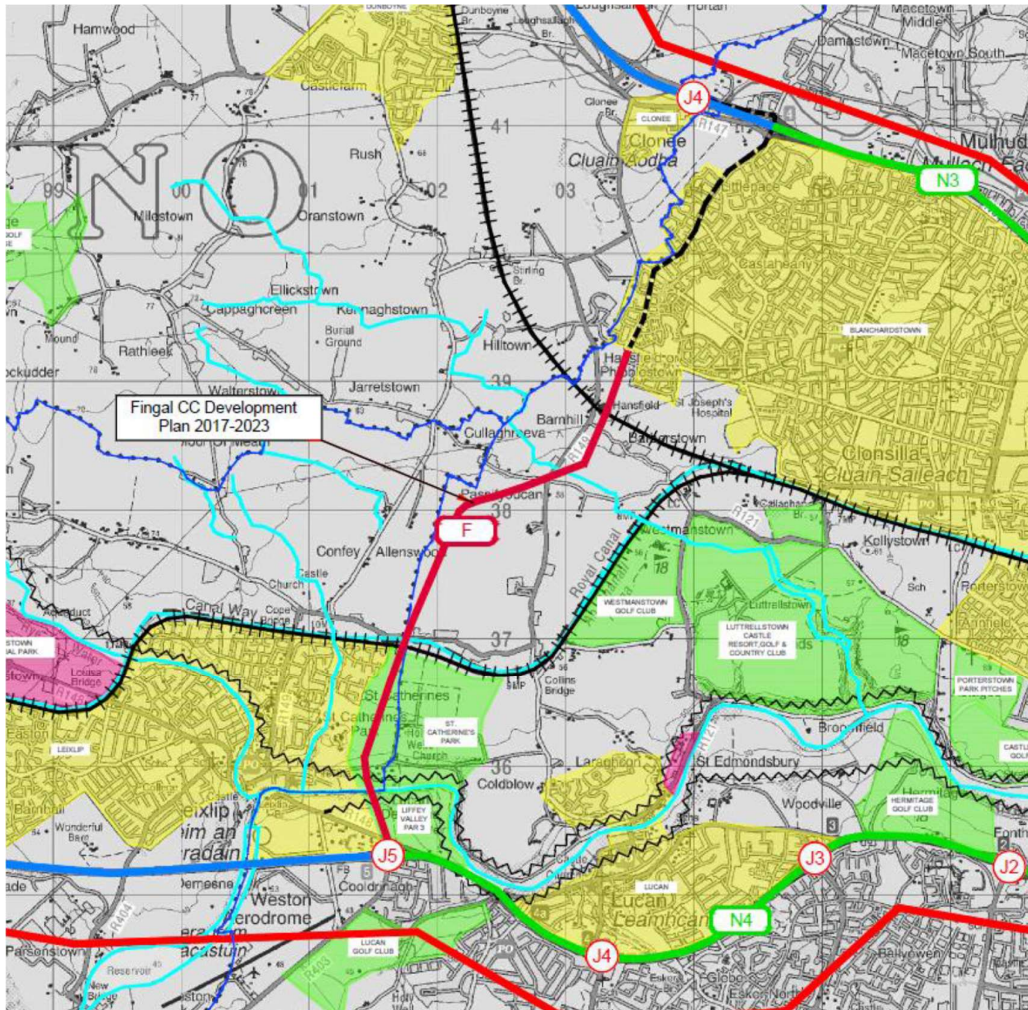


Figure 15: Route F

However, at Liffey Valley Park the route follows the western boundary within St. Catherine's Park alongside the edge of a housing estate in Leixlip. It would also impact on several playing pitches in the park. On the other hand, it avoids impacts on the utility building and car park that are affected by Option E.

Route F skirts the wastewater treatment plant on the western side to cross the River Liffey upstream of the Route E crossing point. Immediately to the northwest of the treatment plant the route would cut across the corner of the grounds of the Liffey Valley Hotel in an area of woodland. On the southern side of the river Route F then avoids the golf course and crosses agricultural land to connect to N4 Junction 5.

4.7 Route G: M3 J4 Clonee to N4 J5 Leixlip

Route G (Figure 16) links Junction 4 West of the M3 to Junction 5 of the N4. It avoids use of the Ongar Road through a residential area and instead has a new road link within County Meath to connect to the M3 west of Clonee village. The total length of new road is 7 Km. The constraints on Route G are mainly the same of Route F in the Leixlip area.

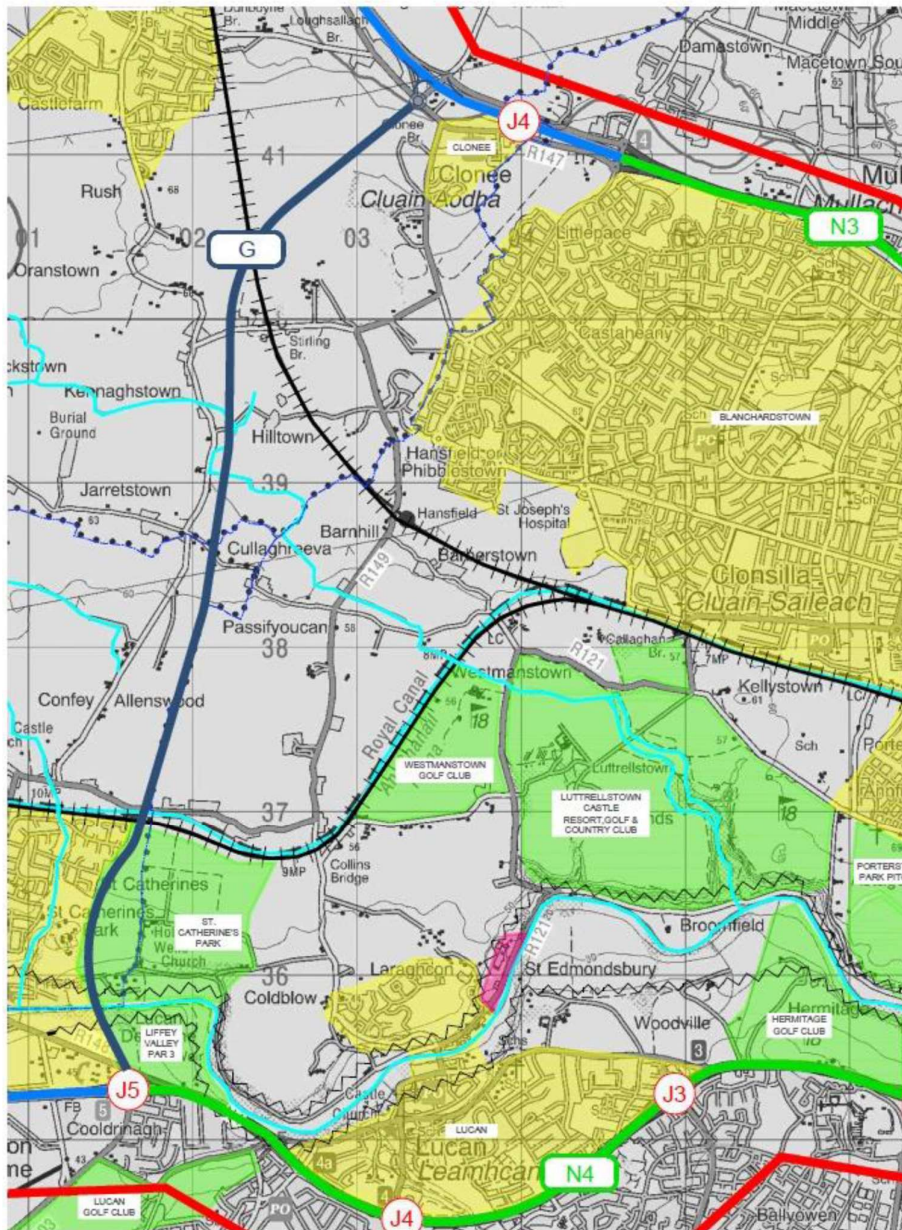


Figure 16: Route G

4.8 Route H: M3 J5 Dunboyne to M4 J5 Leixlip

Route H (Figure 17) links Junction 5 of the M3 with Junction 5 of the M4. The overall length of the route is 9.5 Km, of which the northern 2.5 Km is constituted by an existing road on the Dunboyne Western Bypass. From the southern end of the bypass on the R157 it follows a green-field route over 5 Km before converging with Routes F and G for the final 2 Km.



Figure 17: Route H

4.9 Route I: M3 J5 Dunboyme to M4 J6 Celbridge

Route I (Figure 18) links Junction 5 of the M3 at Dunboyme with Junction 6 of the M4 at Celbridge. The length of the Route is 13.5 Km of which 10.4 Km is new road. There are few constraints along the route which crosses agricultural land and avoids one golf course at Grange. The main constraint is the crossing of the Rye Water Special Area for Conservation to the west of Leixlip, which will require a careful design approach for a new bridge to avoid impacts. In any event an Environmental Impact Assessment would be required for this option.

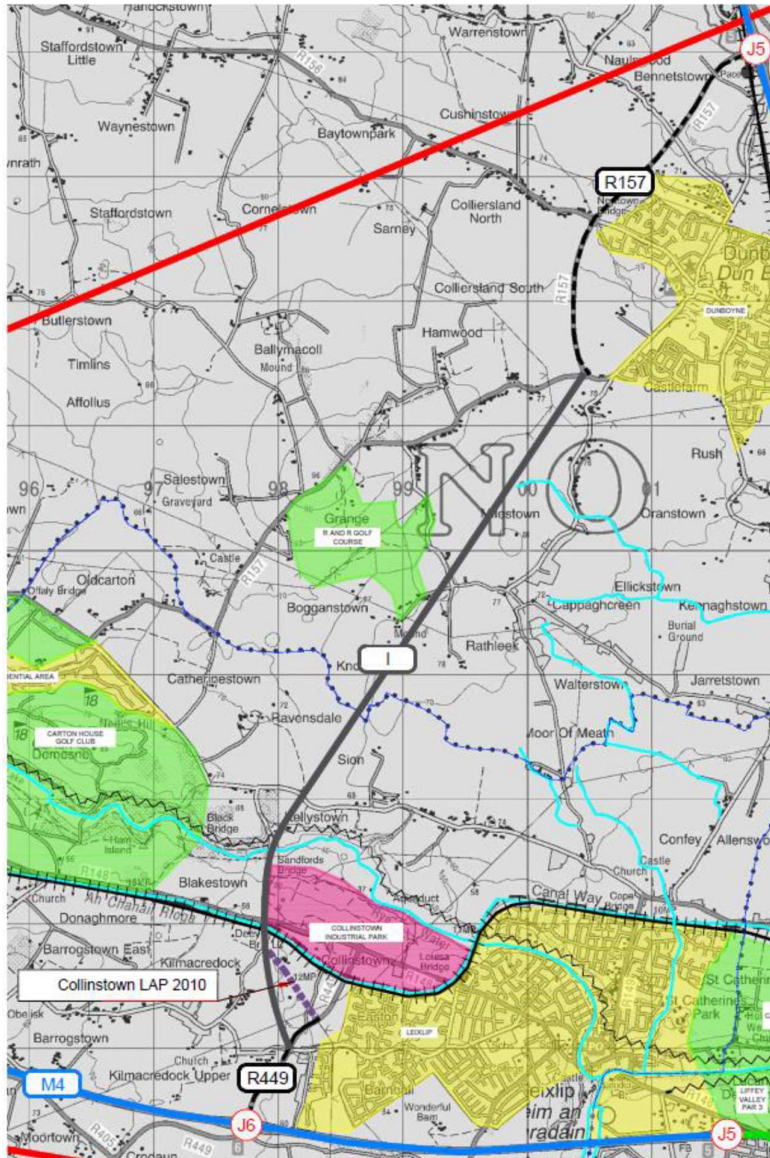


Figure 18: Route I

The southern part of the new route will link to the R449 dual carriageway at Collinstown by following a new road reservation as proposed in Collinstown LAP 2010. It will require a bridge to cross over the Royal Canal and Sligo Railway Line at this location.

4.10 Route J: M3 J5 Dunboyne to M4 J7 Maynooth

Route J (Figure 19) links Junction 5 of the M3 with Junction 7 of the M4 and replaces the existing R157 regional road over a length of 13.5 Km long. It passes around the northern side of Carton Demesne at the eastern side of Maynooth. There is an eastern ring road proposed around Maynooth that will then cater for the route to skirt around the town and link to the M4 at Junction 7. Planning approval is underway for this route, which should be completed within the next two years. On Route J the Rye Water SAC is skirted around the western edge. Route J requires 7 Km of new road, apart from the Maynooth Eastern Ring Road that is already separately funded.

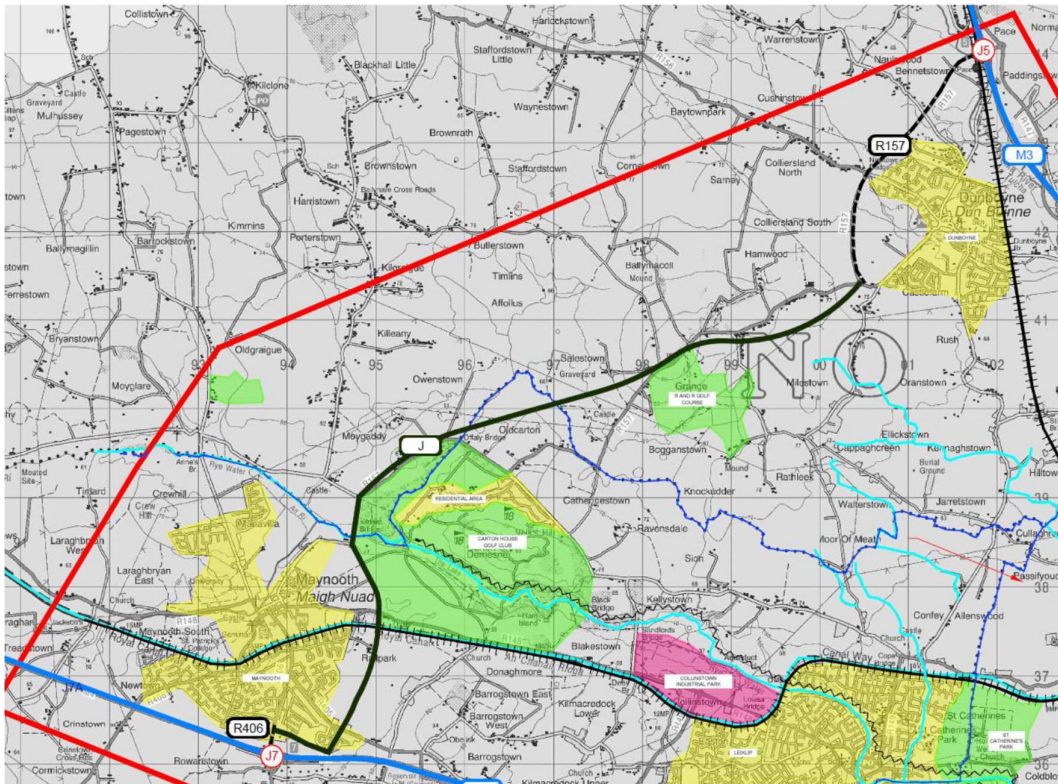


Figure 19: Route J

4.11 Route K: M3 J5 Dunboyne to Potential New M4 J7A Maynooth West

Route K (Figure 20) is an alternative of Route J with a potential new Junction 7A on the M4 west of Maynooth. Such a new junction could enable the completion of a ring road around Maynooth on the western side of the town with a new junction to relieve traffic pressure on Junction 7. This would provide a direct access route to Maynooth University as an alternative to the current route through the town centre.

This option is 14.3 Km long, consisting of 2.5 Km of existing road at Dunboyne, 7 Km of new rural road to replace the R157 for the connection to Maynooth, and 4.8 Km of ring road around the northern and western sides of the town. Route K requires 12 Km of new road, including extension of the Maynooth Ring Road.

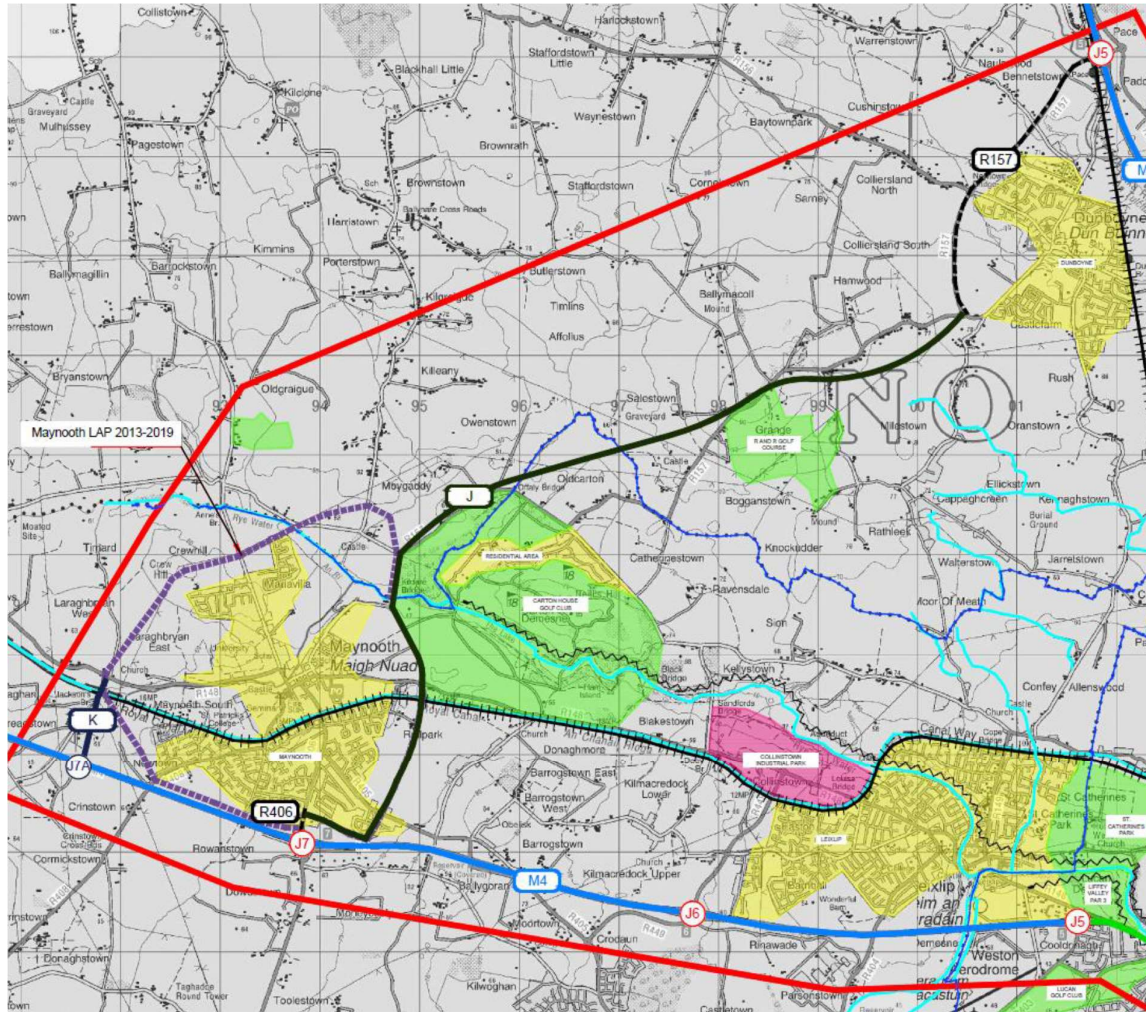


Figure 20: Route K

4.12 Summary Table of the Diversion Routes

The lengths of the diversion route for each option are shown below in Table 3.

Table 3: Summary Comparison Table of the Diversion Route Options

Route Option	Junctions linked	Diversion Lengths (km)			
		Total	Non-National Roads	National Roads	New Road
A	N3 J2 - N4 J2	4.2	3.1	2.8	1.8
	N3 J3 - N4 J2	5.1	3.1	3.7	1.8
B	N3 J2 - N4 J3	6.2	3.1	4.4	2.1
	N3 J3 - N4 J3	7.0	3.1	5.3	2.1
C	N3 J4 - N4 J3	12.4	2.9	8.8	4.3
D	N3 J4 - N4 J3	13.4	2.9	8.8	5.3
E	N3 J4 - N4 J5	16.4	2.9	12.6	4.5
F	N3 J4 - N4 J5	16.6	2.9	12.6	4.7
G	N3 J4 - N4 J5	15.6	0.0	12.6	6.5
H	M3 J5 - N4 J5	22.3	3.2	16.2	6.4
I	M3 J5 - M4 J6	26.8	4.0	20.1	6.2
J	M3 J5 - M4 J7	34.1	3.5	24.1	10.0
K	M3 J5 - M4 J7a	37.9	3.2	26.5	11.6

5. Policy Review & Wider Demand for Travel

5.1 Policy Review

The need to enhance orbital transport accessibility in the Dublin Metropolitan Area, west of the M50 and between the N3 and N4 corridors is recognised in regional transport policy documents and various local authority development plans.

The **National Transport Authority Transport Strategy for the Greater Dublin Area 2016 – 2035** clearly refers to a future link between the N3 and N4 radial routes to be developed within to enhance orbital accessibility for all modes in this region of the Dublin Metropolitan Area.

Objective OBJ MT43 of the **Fingal Development Plan 2017-2023** is to “support and facilitate the TII, Meath County Council and Kildare County Council in the planning and delivery of the N2 upgrade north of Ashbourne and a possible link between the M3 and N4”. The relevant Map from the Fingal Development Plan is shown in Figure 21. This indicates a proposed road link at the south-western extremity of the county from the Ongar Road in the Hansfield area towards Leixlip and Junction 5 on the N4/M4.

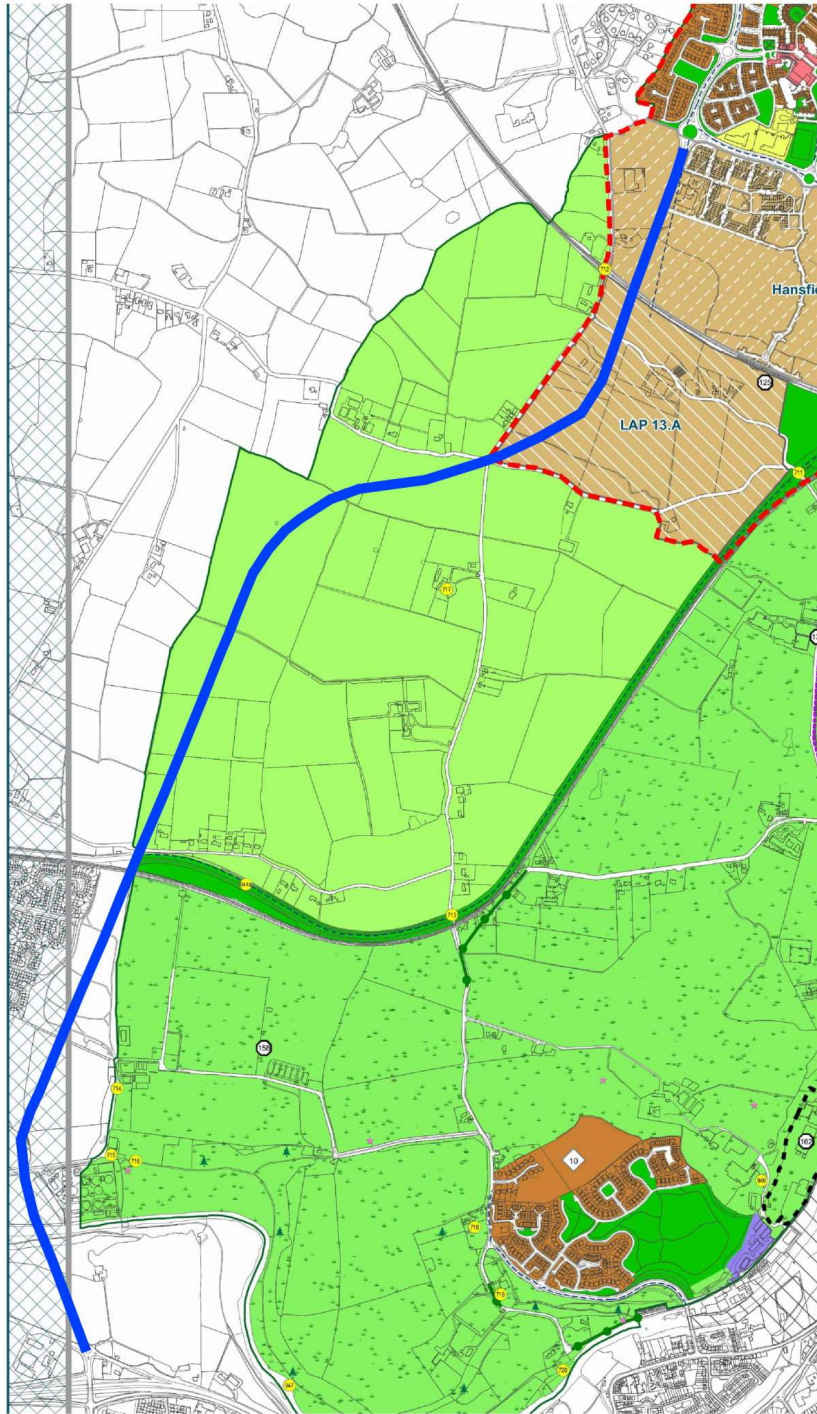


Figure 21: Extract from Fingal Development Plan 2017-2023 zoning map indicating an N3-N4 link alignment

The **South Dublin County Council Development Plan 2016-2022** includes an objective (Table 6.6) for a “Western Dublin Orbital Route (north)” which is a new high capacity road from Tootenhill to the Leixlip Interchange (with a provision to make a further connection to the N3).

The **Kildare County Development Plan 2017-2023** (Table 6.1) refers to examining options; in consultation with South Dublin County Council, Fingal County Council, Meath County Council, TII and other statutory agencies for the delivery of an orbital link road from the M4 to the M3.

The **Hansfield SDZ Planning Scheme** (April 2006) outlines development proposals for the Hansfield Strategic Development zone at the south-western edge of the Greater Blanchardstown Area, immediately to the south of Ongar and west of Clonsilla. Under the future roads proposals in the SDZ a reservation has been facilitated within the lands to cater for a future road link to the N4.

5.2 Public Transport Links

Linking between the N3 and N4 corridors by public transport is not an easy task due to very limited existing services.

There is a railway corridor along the Dublin to Sligo line that provides an oblique connection between Leixlip and Blanchardstown, but this does not properly provide a north-south link between the main population centres of Blanchardstown on the northern side and Lucan/Clondalkin on the southern side, or Tallaght further south.

The absence of a suitable local or regional road connection, apart from the M50 motorway, has precluded the provision of an orbital bus service to link the major suburbs west of the M50 that have a combined population of about 300,000 people. Such a service could reduce the existing very high car-dependency for such trips at present, which places additional traffic pressures on the M50.

A few examples of possible trips using existing services have been considered and are included in Appendix B. The outcome of this analysis comparing car and public transport in terms of travel time shows remarkable differences with public transport trips that are 3 to 4.5 times more than those by cars.

If a suitable north-south were provided this would enable new public transport services with accordingly reduced travel time differences that could encourage a modal shift away from car trips along the M50 with consequent benefits for traffic pressures on the motorway in normal conditions.

5.3 Demand for orbital travel west of the M50

The *N4 & N7 Corridor Study*, completed by TII and South Dublin County Council in February 2017, developed a coordinated plan for investment in road infrastructure to protect the strategic function of the National Roads, whilst supporting population and employment growth in the South Dublin area. As part of this study, a demand analysis of link between the N3 and N4 (as per the Fingal Development Plan alignment) was undertaken. The analysis found that the link, referred to in the study as the “Ongar Link Road Scheme”, would result in benefits to the strategic road network and particularly the M50.

The *Dublin Orbital Movement Study Options Report* undertaken by the NTA in 2015 as part of the development of the Transport Strategy, identified a potential commuter trip demand in the region of 4,000 – 5,000 trips between the settlements of Blanchardstown and Tallaght, crossing the River Liffey. The demand analysis undertaken as part of the study noted that this substantial orbital demand indicated the potential for orbital public transport services. This is due to the significant employment and population centres on the corridors as shown in Figure 22

6. Summary & Conclusions

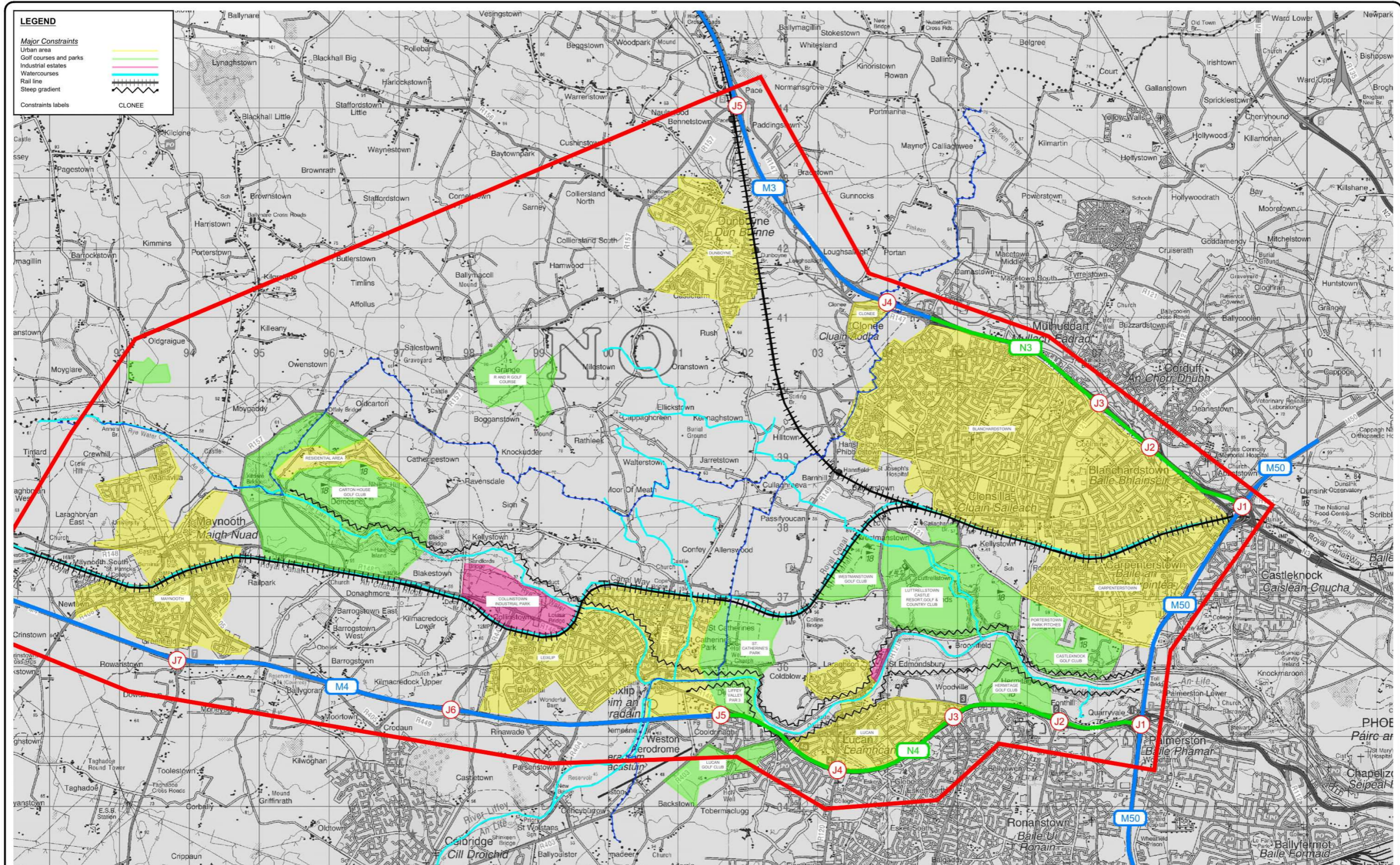
The need for an alternative diversion route for traffic between the N3 and N4 in Dublin to provide alternative routes for traffic in the case of an M50 closure was identified by the M50 Interagency Incident Coordination Group (IICG). Diversion routes have been identified for all other sections on M50 as part of measures to improve network resilience along the corridor. The existing alternatives to the M50 that cross the River Liffey have a combination of poor alignment, insufficient width, problematic junctions, excessive diversion lengths and other issues that make them unsuitable for an M50 diversion route.

From a constraints study and options analysis, 11 no. potential route options were identified as having the potential to offer a satisfactory diversion route for M50 traffic between the N3 and N4.

Regional and local transport policies support the need for the development of an orbital transport corridor west of the M50 in Dublin. This is supported by technical reports and demand analysis by TII and the NTA confirming the existing and future demand for such a route for both private car traffic and public transport. Therefore there is an opportunity to address the resilience of the M50 by progressing with these policy objectives.

It is recommended that these options be considered as part of the development of the West Dublin Orbital corridor and that addressing the resilience of the M50 form part of the project objectives for such a scheme. Further studies will be required to determine the function and cross-section of route required to service the needs for an orbital route west of the M50.

APPENDIX A: STUDY AREA AND CONSTRAINTS MAP



LEGEND

Major Constraints

- Urban area
- Golf courses and parks
- Industrial estates
- Watercourses
- Rail line
- Steep gradient
- Constraints labels

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<p>TII Bonneagar Iompair Éireann Transport Infrastructure Ireland</p>	<p>Revision</p> <table border="1"> <tr> <th>No.</th> <th>Stage</th> <th>Date</th> <th>By</th> <th>Chkd</th> <th>App'd</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		No.	Stage	Date	By	Chkd	App'd							<p>Roughan & O'Donovan-AECOM Alliance</p> <p> </p> <p>Arena House, Arena Road, Sandyford, Dublin 18. Tel : +353 1 294 0800 Fax : +353 1 294 0820 e-mail : info@rod.ie Website : www.rod.ie</p>		<p>Project Title</p> <p>M50 TRAFFIC FLOW OPTIMISATION</p>
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