# Appendix A.7.3

Road Safety Audit Stage F Report (Part 1) National Roads Authority **N6 Galway City Transport Project** Road Safety Audit Stage F (Part 1)

Issue 2 | 26 August 2015

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

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

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**Appendix A** Drawings and documents

#### Appendix B

Audit Team Approval

# 1 Introduction

Arup, Dublin has been appointed to conduct a Stage F Road Safety Audit on the preliminary routes of the proposed N6 Galway City Transport Project. Six alternative options all connect the R336 on the west of the city to the existing N6 on the east of the city, utilising different corridors which vary in the extent to which the existing road infrastructure is reused. The options are colour coded for reference and detailed in Section 2 of this report. Whilst all are uniquely assessed, there are sections of each that may overlap with another option. A plan showing the location of the scheme in the context of the surrounding road network is presented in Figure 1.



Ordnance Survey Ireland EN 0002815 © Ordnance Survey Ireland/Government of Ireland

#### Figure 1: Route Options

The audit was completed on the  $30^{th}$  of April 2015 in the Arup Dublin office and included a site visit on the  $1^{st}$  and  $2^{nd}$  of April 2015.

The weather during the site visit was dry and sunny and the road surface was dry.

The audit team members were as follows:

- Thomas Connell (Team Leader)
- Kieran Malone (Team Member)
- Edel Casserly (Team Member)

An Audit Team Statement and feedback form is included at the end of the report.

This Stage F audit has been carried out in accordance with the relevant sections of NRA HD 19/15. The team has examined only those issues within the design relating to the road safety implications of the scheme, and has therefore, not examined or verified the compliance of the design to any other criteria.

## 2 **Summary of Route Options**

The scheme options, as detailed in public consultation materials from January and February of 2015 were refined following the consultation and are the subject of this audit (Stage 2 Route Options). These options are described below.

## 2.1 The Green Route Option

The Green Route Option proposes to connect to the existing R336 to the west of Bearna and follow an outer route north to the N59 before crossing the River Corrib to the north of Menlough Castle. The Green Route Option proceeds northeast through Menlough towards Ballindoody and southeast to Coolagh before it terminates at the existing N6 to the east of the city.

#### **2.2 The Blue Route Option**

The Blue Route Option proposes completion of the Bearna Inner Relief Road. It would then travel towards the north of Knocknacarra and continue on to Dangan before crossing the River Corrib midway between the existing Quincentenary Bridge and Lough Corrib. It crosses through the townland of Castlegar and Ballybrit before joining the existing N6 at Coolagh to the east of the city.

### **2.3** The Red Route Option

The Red Route Option proposes a new link road from the existing R336 to the east of Bearna to the existing Western Distributor Road and then reuses the existing road network along the R338 and N6. This option is closest to the city and involves cut and cover tunnels / bridges to create a two-tier system whereby national traffic is segregated from local traffic.

## 2.4 The Orange Route Option

The Orange Route Option is similar to the Red Route Option from the connection of the R336 to Knocknacarra and then follows the Blue Route Option towards the proposed N59 link road interchange. It then utilises a bored tunnel to connect from the Letteragh area on the west to the Terryland area on the east, before re-joining the Red Route Option at Terryland. This option then follows the Red Route Option as far as the existing N6 at Coolagh to the east of the city.

## 2.5 The Yellow Route Option

The Yellow Route Option is similar to the Blue Route Option as far as Menlough. The Yellow Route Option then proceeds southeast and connects to the Red Route Option at Castlegar. This option then follows the Red Route Option as far as the existing N6 at Coolagh to the east of the city.

## 2.6 The Pink Route Option

The Pink Route Option is similar to the Blue Route Option varying only where it travels from the Bearna Inner Relief Road to Knocknacarra, where it travels to the north of Galway Racecourse and in the Briarhill area.

## 2.7 N59 Link Road

The N59 Link Road is associated with the Blue, Orange, Yellow and Pink Route Options and connects the N59 to the north and Bothar Stiofan to the south, with each of the proposed route options.

# 3 Safety Assessment

As part of the route selection process, a safety assessment of the preliminary design of each route option is required in order to establish a preferred route option from a safety perspective. A number of criteria have been selected to assess the route options and the associated assessment methodology is outlined at the beginning of each sub-heading. Following each assessment the route options are ranked as follows: Preferred (P), Intermediate (I) and Least Preferred (LP). The Audit Team has taken the view that each of the following assessments is of an equivalent standing.

## 3.1 Route Length / Collision Risk

The length parameter is a measure of each route option mainline length from its tiein to the existing R336, west of Galway City, to its tie-in to the existing N6 east of Galway City. Annual Average Daily Traffic (AADT) flows for design year 2034 have been gathered for each route and then averaged in order to arrive at an approximate AADT for each route in its entirety. The route option mainline length, AADT and number of days in a year are then multiplied to arrive at the number of vehicle kilometres travelled on each route in a given year (M.veh.km).

The M.veh.km is then divided by the collision risk for the appropriate road type (0.03 x 10<sup>6</sup> or 0.11 x 10<sup>6</sup>) in order to arrive at a yearly collision rate for each route option.

 Route
 Days
 Dual
 AADT
 M / veh /
 Sing
 AADT
 M / veh /
 Coll.
 Coll
 Yearly
 Ra

Route	Days in vear	Dual Carr (km)	AADT Dual	M / veh / km Dual	Sing Carr (km)	AADT Sing	M / veh / km Sing	Coll. Risk Dual	Coll Risk Sing	Yearly Coll Rate	Ra nk
	365.2	16.16	0.40.67	2058131	(KIII)	10000	1632302	Dual	ong	Rate	
Green	5	1	34867	11	4.100	10900	3	0.03	0.11	7.97	LP
Blue	365.2 5	14.47 0	30133	1592579 52	2.400	14550	1275453 0	0.03	0.11	6.18	Р
Red	365.2 5	12.47 3	47957	2184807 38	2.600	23150	2198439 8	0.03	0.11	8.97	LP
Orange	365.2 5	12.51 2	42457	1940288 30	2.350	12000	1030005 0	0.03	0.11	6.95	Ι
Yellow	365.2 5	13.15 3	30371	1459063 31	4.300	13000	2041747 5	0.03	0.11	6.62	Ι
Pink	365.2 5	13.94 5	29683	1511877 26	2.100	11050	8475626	0.03	0.11	5.47	Р

#### Figure 3.1: Overall route option length/collision risk

Note: The collision risks values of 0.03 and 0.11 per million vehicle kilometres is given in Table 13 of the National Roads Authority report titled "<u>Contributory</u> factors analysis for road traffic collisions" and are specific to dual carriageway and single carriageway roads respectively.

**Conclusion:** The Pink and Blue Route Options potentially offer the lowest collision rates per year and as a result are the most preferred. The Green Route Option and Red Route Option potentially offer the highest collision rates per year and are therefore the least preferred.

## **3.2 Travel Time**

The travel time parameter is a measure of each route option mainline length from its tie-in to the existing R336, west of Galway City, to its tie-in to the existing N6 east of Galway City. The risk of collision increases with the length of time spent travelling. From this it is determined that the greater the length of time spent travelling, the greater the risk of collision occurrence.

Travel times for each route option are based on indicative speed limits provided by the design team. It has been indicated that the Green Route Option will have a speed limit of 100 km/h along most of its length while the maximum speed limit on the remainder of the routes will be 80 km/h or less. The reduction in travel speed required in order to negotiate roundabouts has not been included in the following calculations.

Route	Total	Distance	Distance	Distance	TT	TT	TT	Total	Rank
Option	Distance (m)	@ 100 km/h	@ 80 km/h	@ 50 km/h	(mins) 100	(mins) 80	(mins)	Travel Time	Order
	(111)				km/h	km/h	km/h	(TT)	
								(mins)	
Green	20161	18548	1613	0	11.13	1.21	0.00	12.34	Ι
Blue	16870	0	15183	1687	0.00	11.39	2.02	13.41	LP
Red	15073	0	9044	6029	0.00	6.78	7.24	14.02	LP
Orange	14862	0	13376	1486	0.00	10.03	1.78	11.82	Р
Yellow	17453	0	17453	0	0.00	13.09	0.00	13.09	Ι
Pink	16045	0	14441	1605	0.00	10.83	1.93	12.76	Ι

**Figure 3.2: Overall route option travel times** 

**Conclusion:** The Orange Route Option and Green Route Option potentially offer the shortest travel times and as a result are the most preferred. The Red Route Option and Blue Route Options potentially offer the longest travel times and are therefore the least preferred.

### **3.3** Access Control

The access control parameter is a measure of the potential for collisions occurring at various access types to the mainline from its tie-in to the existing R336, west of Galway City, to its tie-in to the existing N6 east of Galway City. Each access type has been assigned a weighting based on the potential for collision occurrence:

- GSJ (grade separated junction) weighting = 1
- R'bout low (roundabout low speed) weighting = 1
- R'bout high (roundabout high speed) weighting = 2
- Signals (at grade signalised junction) weighting = 3
- Priority / LILO (priority/left in left out direct access) weighting = 4

Note: The weighting of the above access types is based on the information provided in Figure 3 of the International Road Assessment Programme report titled

NDUBNTS03DUBLIN, JOBSV32000233985-0014. INTERNAL14-03 DESIGNI4-03-03 INFRASTRUCTURE\12. SAFETY AUDITS\12.1 STAGE F AUDIT\GCOB4.03-12.1-000 (RSA-STAGE F PART 1)\_ISSUE 2.DOCX

Route Option	GSJ	Wt.	Rbout (low)	Wt	Rbout (high)	Wt.	Signals	Wt.	Priority/ LILO	Wt.	Totals	Rank Order
Green	4	1	0	1	4	2	0	3	0	4	12	Р
Blue	3.5	1	2	1	3	2	0	3	1	4	15.5	Р
Red	4.75	1	0	1	0	0	5	3	10	4	59.75	LP
Orange	4	1	0	1	2	2	1	3	1	4	15	Р
Yellow	3	1	0	1	5	2	2	3	1	4	23	Ι
Pink	3.5	1	1	1	3	2	2	3	1	4	20.5	Ι

"Development of Risk Models for the Road Assessment Programme" published in February, 2012.

#### Figure 3.3: Overall route option access control

**Conclusion:** When the number of accesses and associated weighting is applied to each route, the Green Route Option, Blue Route Option and Orange Route Option offer the lowest totals which could potentially result in the lowest number of collision occurrences and consequently are the most preferred. The Red Route Option offers the highest total which could potentially result in the highest number of collision occurrences and is therefore the least preferred.

### **3.4** Number of Structures

The number of structures parameter is a measure of the potential for increased severity of collisions from its tie-in to the existing R336, west of Galway City, to its tie-in to the existing N6 east of Galway City. The number and type of structure has been assessed for each section of the route. The table below summarises the totals and ranks them in order as follows:

Note: Section 1 relates to the number of structures per route option in section 1 and are ranked from 1 - 6 (low to high).

Section 2 (i) relates to the number of structures per route option in section 2. The totals are ranked from 1 - 6 (low to high).

Section 2 (ii) relates to the combined length of structures (bridge, tunnel, viaduct) per route option in section 2. The combined lengths are ranked from 1-6 (shortest length to longest length).

Route Option	Section 1	Section 2 (i)	Section 2 (ii)	Totals / 3	Rank Order
Green	6	3	2	3.67	Ι
Blue	3	5	4	4.00	LP
Red	4.5	2	5	3.83	LP
Orange	4.5	1	6	3.83	LP
Yellow	1.5	4	1	2.17	Р
Pink	1.5	6	3	3.50	Ι

Figure 3.4:	Overall	route option	number of	of structures
-------------	---------	--------------	-----------	---------------

**Conclusion:** The Yellow Route Option offers the fewest number of structures which could potentially result in the lowest number of collision occurrences and consequently is the most preferred. The Blue, Red and Orange Route Options give the greatest number of structures which could potentially result in the highest number of collision occurrences and are therefore the least preferred.

## 3.5 Geometry

A preliminary mainline alignment design has been developed for each of the route options. The preliminary design also accounts for the junctions and link roads associated with each route. The following evaluation has been carried out on the mainline from its tie-in to the existing R336, west of Galway City, to its tie-in to the existing N6 east of Galway City.

The preliminary alignment design of each route option has been assessed using the following criteria:

- Horizontal alignment this is an assessment of the percentage of each route which does not meet desirable minimum curvature.
- Vertical alignment this is an assessment of the percentage of each route which does not meet desirable minimum curvature or includes vertical gradients in excess of desirable minimum.
- The bendiness of each route has been assessed

The table below summarises the totals and ranks them in order as follows:

Route Option	Horizontal Ranking	Vertical Ranking	Bendiness	Rank Order
Green	Р	Р	Ι	Р
Blue	Ι	Р	Р	Р
Red	LP	LP	Ι	LP
Orange	LP	Р	Ι	Ι
Yellow	I	Р	Ι	Ι
Pink	Ι	Р	Р	Р

#### **Figure 3.5: Overall route option geometry**

**Conclusion:** The Green, Blue and Pink Route Options are identified as potentially the safest in terms of geometry and are consequently the most desirable, while the Red Route Option is potentially the least safe in terms of geometry and is therefore identified as the least desirable.

## 3.6 Attractiveness

The attractiveness of each route option is a measure of the potential for road users within the central urban area to use the expressway in order to access the National Road Network.

Route Option	Rank Order
Green	LP
Blue	I
Red	Р
Orange	I
Yellow	I
Pink	Ι

#### **Figure 3.6: Overall route option attractiveness**

**Conclusion:** The Red Route Option is located closest to the central urban area and consequently is the most preferred. The Green Route Option is furthest from the central urban area and is therefore the least preferred.

## **3.7 Consistency of Standards**

The consistency of standards with the adjacent road network is a measure of whether the tie-in locations are of a similar or different format to the existing road network.

<b>Route Option</b>	Tie In	Tie in format	Rank Order	
Graan	East	1	т	
Green	West	0	1	
Dlug	East	1	т	
Diue	West	0	1	
D 1	East	1	т	
Reu	West	0	1	
Orongo	East	1	т	
Orange	West	0	1	
Vallow	East	1	т	
Yellow	West	0	1	
Direla	East	1	т	
FILK	West	0	1	

#### Figure 3.7: Overall route option consistency of standards

*Note:* 1 = Similar *tie-in format,* 0 = Different *tie-in format* 

In the case of all six options the eastern tie-in to the N6 is a match with the existing cross-section. The location of the western tie-in varies across all six options and the format of tie-in also varies be it via roundabouts or signalised junctions.

**Conclusion:** The rank order of each route option is the same.

## **3.8 Proportion Online**

The proportion of online construction for each route option is a measure of the disturbance to road users that will be created during construction and the potential for collisions during these phases.

Route Option	% Online *	Rank Order
Green	2	Р
Blue	3	Р
Red	80	LP
Orange	20	Ι
Yellow	15	Ι
Pink	3	Р

#### Figure 3.8: Overall route option proportion online

\* It should be noted that the percentages shown in the above table have been estimated by overlaying each route option on OS Discovery Series mapping.

**Conclusion:** The Green Route Option, Blue Route Option and Pink Route Option involve the least amount of online construction which could potentially result in the lowest number of collision occurrences and consequently are the most preferred. The Red Route Option involves the greatest amount of online construction which could potentially result in the highest number of collision occurrences and is therefore the least preferred.

### **3.9 Pedestrians and Cyclists**

The proportion of each route option offline is a measure of the potential safety benefits to pedestrians and cyclists who would continue to use the existing network while bypassing traffic would utilise the new road.

Route	% Offline *	Rank Order
Green	98	Р
Blue	97	Р
Red	20	LP
Orange	80	Ι
Yellow	85	Ι
Pink	97	Р

#### Figure 3.9: Overall route option proportion offline

\* It should be noted that the percentages shown in the above table have been estimated by overlaying each route option on OS Discovery Series mapping.

**Conclusion:** The Green Route Option, Blue Route Option and Pink Route Option involve the least amount of online construction which could potentially result in safety benefits for pedestrians and cyclists and consequently are the most preferred. The Red Route Option involves the greatest amount of online construction which could

potentially result in a greater risk of collision for pedestrians and cyclists and is therefore the least preferred.

# 3.10 Consistency of Junction Types / Number of Junctions

The consistency of junction type parameter is a measure of the potential for road users to become confused by the road layout from its tie-in to the existing R336, west of Galway City, to its tie-in to the existing N6 east of Galway City. The junction types are as follows and each has been assigned a weighting based on the likelihood of collision occurrence:

Route Option	Standard	Weight	Ref.	Non Standard	Weight	Ref.	Sub Total	Total Weight	Rank Order
Green	1	1	N6	-	-	-	1		
	1	1	N17	-	-	-	1		
	1	1	N84	-	-	-	1		Р
	1	1	N59	-	-	-	1		
	1	1	R336	-	-	-	1	5	
Blue	1	1	N6	-	-	-	1		
	-	-	-	1	2	N17	2		
	-	-	-	1	2	N84	2		т
	1	1	N59	-	-	-	1		I
	1	1	Bearna	-	-	-	1		
	1	1	Bearna	-	-	-	1	8	
Red	1	1	Briarhill	-	-	-	1		
	1	1	Ballybrit	-	-	-	1		
	1	1	Ballybrit	-	-	-	1		
	1	1	N17	-	-	-	1		
	1	1	N84	-	-	-	1		
	-	-	-	1	2	Bodkin	2		тр
	1	1	N59	-	-	-	1		LP
	1	1	Bothar Stiofan	-	-	-	1		
	1	1	Clybaun	-	-	-	1		
	1	1	Ballymoneen	-	-	I	1		
	1	1	Cappagh	-	-	I	1		
	1	1	R336	-	-	I	1	12	
Orange	1	1	Briarhill	-	-	-	1		
	1	1	Ballybrit	-	-	-	1		
	1	1	Ballybrit	-	-	-	1		т
	-	-	-	1	2	N84	2		1
	1	1	N59	-	-	-	1		
	1	1	WDR	-	-	-	1		

*Note: 1* = *standard junction format, 2* = *Non-standard junction format* 

Route	Standard	Weight	Ref.	Non Standard	Weight	Ref.	Sub Total	Total Weight	Rank Order
Option								U	
	1	1	Bearna	-	-	-	1		
	1	1	Hospital	-	-	-	1		
	1	1	Rahoon	-	-	-	1	10	
Yellow	-	-	-	1	2	N6	2		
	-	-	-	1	2	N17	2		
	1	1	N84	-	-	-	1		
	1	1	N59	-	-	-	1		т
	1	1	WDR	-	-	-	1		1
	1	1	Bearna Access	-	-	-	1		
	1	1	R336 Link	-	-	-	1		
	1	1	R336	-	-	-	1	10	
Pink	-	-	-	1	2	N6	2		
	-	-	-	1	2	N17	2		
	1	1	N84	-	-	-	1		
	1	1	N59	-	-	-	1		Ι
	1	1	WDR	-	-	-	1		
	1	1	Bearna	-	-	-	1		
	1	1	Bearna	-	-	-	1	9	

#### Figure 3.10: Overall route option consistency of junction types

**Conclusion:** The Green Route Option consists of five number junctions, all of which are of a standard format and consequently is the most preferred. The Red Route Option includes the greatest number of junctions with standard and non-standard formats and is therefore the least preferred.

## **4 Forecast reduction in traffic collisions**

A cost benefit analysis report for the "Phase 2 Route Selection" process has been produced. The following extract from the report addresses the potential safety benefits that can be expected from each route option. The results of the safety assessment are presented in the following table. The results show the discounted safety benefits in 2009 prices, exclusive of residual value.

ROUTE OPTION	SAFETY COSTS (€M)	SAFETY BENEFITS (€M)	DISCOUNTED SAFETY BENEFITS (€M)	
Do Minimum	13,522	-	-	
Red	12,853	669	263	
Orange	13,142	381	157	
Yellow	13,057	465	191	
Blue	13,411	111	58	
Pink	13,342	180	85	
Green	13,575	-53	-5	

#### Figure 4.1: Discounted Safety Benefits (2009)

In terms of safety benefits, the Red, Yellow and Orange Route Options are forecast to have significant safety benefits to the network, with high levels of traffic transferred on to newer, safer roads. The Blue and Pink Route Options also provide benefits but somewhat reduced, due to reduced volumes on these routes. The Green Route Option is forecast to have marginal benefits, or potential disbenefits, due to lower forecast vehicle kilometres on this newer, safer scheme option with associated higher vehicle kilometres on the existing, less safe, network.

It should be noted that the safety benefits outlined at this comparative stage do not incorporate benefits from potential works that may be carried out on the existing network as part of the reallocation of road space. For example, it is anticipated that the off-line options (Blue, Pink, Green) will result in a reduction in traffic levels on the existing N6. This would provide the opportunity for some of the road space on the existing N6 to be reassigned for more vulnerable road users e.g. pedestrians and cyclists. Schemes such as this would have associated safety benefits which have not been included in the calculations above. However, this approach is appropriate for the route selection phase of the project. A more detailed safety analysis will be carried out during design phase of the project.

# 5 Summary of Assessments

The following table includes all rank orders from the assessments in Section 3 to this report.

Route	Green	Blue	Red	Orange	Yellow	Pink
Route Length / collision risk	LP	Р	LP	Ι	Ι	Р
Travel time	Ι	LP	LP	Р	Ι	Ι
Access control	Р	Р	LP	Р	Ι	Ι
Number of structures	Ι	LP	LP	LP	Р	Ι
Geometry	Р	Р	LP	Ι	Ι	Р
Attractiveness	LP	Ι	Р	Ι	Ι	Ι
Consistency with adjacent road network	Ι	Ι	Ι	Ι	Ι	Ι
Proportion online	Р	Р	LP	Ι	Ι	Р
Pedestrians and cyclists	Р	Р	LP	Ι	Ι	Р
Consistency of junction types/number of junctions	Р	Ι	LP	Ι	Ι	Ι
Rank Order	Р	Р	LP	Ι	Ι	Р

#### Figure 5.1: Overall route option summary of findings

# 6 Conclusion

It is the Audit Teams conclusion that the route options as presented rank as follows in terms of road safety:

- 1. Pink
- 2. Green & Blue
- 3. Yellow
- 4. Orange
- 5. Red

Note:

The Pink route is deemed the safest due to four  $\frac{P}{P}$ , six  $\frac{I}{I}$  and zero  $\frac{LP}{I}$ .

The Green and Blue routes are deemed next safest due to five  $\frac{P}{P}$ , three  $\frac{I}{I}$  and two  $\frac{LP}{P}$ .

The Yellow route is deemed next safest due to one  $\mathbf{P}$  and, nine  $\mathbf{I}$  and zero  $\mathbf{IP}$ .

The Orange route is deemed next safest due to two  $\frac{\mathbf{P}}{\mathbf{P}}$ , seven  $\frac{\mathbf{I}}{\mathbf{I}}$  and one  $\frac{\mathbf{LP}}{\mathbf{P}}$ .

The Red route is deemed least safe due to one  $\frac{P}{P}$ , one  $\frac{I}{I}$  and eight  $\frac{LP}{I}$ .

# 7 Audit Team Statement

We certify that we have examined the drawings and documents listed in Appendix A to this Report. The examination has been conducted in accordance with NRA HD19/12 with the sole purpose of identifying any features of the design that could be removed or modified in order to improve the safety of the scheme. The Auditors have not been involved with the scheme design.

Mr. Thomas Connell; BE, MCIHT

Signed thank Concell Date 26.08.2015

#### Mr. Kieran Malone; BA, BAI, CEng MIEI

Signed Kiera Holo Date 26.08.2015

#### Ms. Edel Casserly; BE, CEng, MIEI

Signed	Edel Guserly
Date	26.08.2015

Appendix A

Drawings and documents

# **A1**

Drawings and documents received for the Stage F Road Safety Audit on possible road components of the Galway City Transport Project as follows:

Figure 7.3.1.0 – Stage 2 Red Route Option, Mainline Plan/Profile, Key Plan \_11; Figure 7.3.1.1 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 0+000 to 1+650, Sheet 1 of 9\_11;

Figure 7.3.1.2 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 1+650 to 3+300, Sheet 2 of 9\_I1;

Figure 7.3.1.3 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 3+300 to 4+950, Sheet 3 of 9\_I1;

Figure 7.3.1.4 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 4+950 to 0+350, Sheet 4 of 9\_I1;

Figure 7.3.1.5 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 0+350 to 0+250, Sheet 5 of 9\_I1;

Figure 7.3.1.6 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 0+250 to 1+900, Sheet 6 of 9\_11;

Figure 7.3.1.7 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 1+900 to 2+050, Sheet 7 of 9\_11;

Figure 7.3.1.8 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 2+050 to 1+750, Sheet 8 of 9\_I1;

Figure 7.3.1.9 – Stage 2 Red Route Option, Mainline Plan/Profile – Ch. 1+750 to 3+530, Sheet 9 of 9\_I1;

GCOB-SK-R-276\_I1 - Route Options Study, Options: Green, Yellow, Orange Plan Layout, Sheet 1 of 2

GCOB-SK-R-277\_I1 - Route Options Study, Options: Green, Yellow, Orange Longsections, Sheet 2 of 2

GCOB-SK-R-278\_I1 - Route Options Study, Options: Blue, Pink Plan Layout, Sheet 1 of 2;

GCOB-SK-R-279\_I1 - Route Options Study, Options: Blue, Pink Longsections, Sheet 2 of 2;

GCOB-SK-R-295\_I2 - Route Options Study, Options: Yellow, Pink Plan Layout, Sheet 1 of 2;

GCOB-SK-R-296\_I2 - Route Options Study, Options: Yellow, Pink Longsections, Sheet 2 of 2;

N6 Galway City Transport Project, Public Consultation Jan/Feb 2015 Brochure

GCOB-4.04-11.1 (CBA Report v4)\_Issue 1.pdf

Appendix B

Audit Team Approval

# **B1**

Paul Batty
Corporate House
Ballybrit Business Park
Ballybrit
Galway

Date: 10/05/2015

Our Ref: 676439/4287/Stage F

#### re: N6 M/N6 Galway City Outer By-Pass

#### APPROVAL OF ROAD SAFETY AUDIT TEAM, Stage F

Dear Paul Batty,

The following members of the proposed road safety audit team are approved to carry out the Stage F road safety audit of N6 M/N6 Galway City Outer By-Pass.

- 1. Thomas Connell Arup Leader
- 2. Edel Casserly Arup Member

A copy of all audit reports, design team response and exception reports must be uploaded through RSAAS. Successful upload of these reports and completion of the audit approval process is necessary for any further audit approval on this scheme.

Yours sincerely,

Lucy Curtis

Regional Road Safety Engineer roadsafetyaudits@nra.ie