



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Project Appraisal Audit

Galway City Ring Road Scheme

Audit 3.0: Version 1
Phase 3: Design and Environmental Evaluation

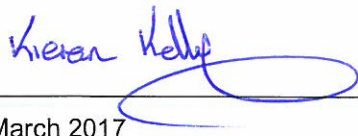


Project Appraisal Audit Record


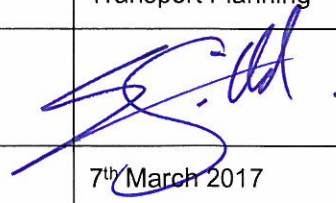
Project Details

Project:	Galway City Ring Road Scheme	Route No:	N6
Road Authority:	Transport Infrastructure Ireland	Region:	West
Phase:	Phase 3: Design and Environmental Evaluation		

Submission Record

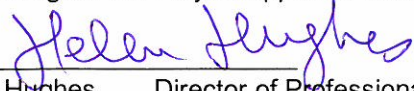
PAG Deliverables submitted for Independent Audit by	Kieran Kelly
Signature	
Date	1 st March 2017

Audit Record

Project Appraisal Audit has been carried out by or on behalf of the Strategic & Transport Planning Section	
Project Appraisal Audit Report Reference:	Galway City Ring Road Scheme Audit 3.0 Version 1
Name	Eoin Gillard, Head of Strategic & Transport Planning
Signature	 
Date	7 th March 2017

Audit Closeout

The findings of the Project Appraisal Audit have been accepted and the Audit is now closed.


 Helen Hughes Director of Professional Services

Date: 20/3/17

Galway City Ring Road Scheme

Project Appraisal Audit

Phase 3: Design and Environmental Evaluation

Deliverables Audited

Document	Revision	Issue Date	Author
Project Brief	1	1 st March 2017	ARUP-SYSTR
Traffic Modelling Report	2	1 st March 2017	ARUP-SYSTR
Cost Benefit Analysis Report	3	1 st March 2017	ARUP-SYSTR
Project Appraisal Balance Sheet	1	1 st March 2017	ARUP-SYSTR
Preliminary Business Case	2	1 st March 2017	ARUP-SYSTR

Project Appraisal Audit History

Version	Date	Summary
Version 0	9 th January 2017	Substantive and data issues which require addressing prior to compliance
Version 1	7 th March 2017	Audit Process Closed

Project Appraisal Audit Team

Details	Organisation	Role
Eoin Gillard	Transport Infrastructure Ireland	Head of Strategic & Transport Planning
Declan Keenan	Transport Infrastructure Ireland	Transport Planner

Galway City Ring Road Scheme

Project Appraisal Audit

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1 Introduction

1.1 *Scope of this Project Appraisal Audit*

As part of the procedures being employed within TII, the Strategic & Transport Planning Section undertakes Technical and Procedural Audits covering issues of Project Appraisal on all major projects at all Phases with a value above €20m. These audits are undertaken at two levels:

- **Outline Project Audits** to ensure that a project has been undertaken in accordance with the Public Spending Code and that PAG Deliverables have been prepared as per current Guidance; and
- **Detailed Project Audits** that examine the quality of technical work undertaken and making a subsequent judgement on the acceptability of the analysis.

The Project Appraisal Audit for the Galway City Ring Road Scheme has been undertaken as a **Detailed Project Audit**. The audit examines:

- Sufficiency of Information Provided for the Audit;
- Data Collection;
- Key Assumptions;
- Scope and Quality of Technical Analysis; and
- Presentation of Results.

1.2 *Presentation of Findings*

The identification of issues within the audit can be classified as follows:

- **Substantive Issues**, which require corrective action. The audit can suggest the detailed action required to address the issue, although there should be freedom for the design team to use alternative approaches in order to achieve the required level of analysis. Nevertheless, the resulting outputs would be subject to a supplementary audit following completion;
- **Data Issues**, where insufficient information has been provided for the purpose of undertaking the Audit, or where particular elements of analysis have not been undertaken; and
- **Comments**, which may identify particular assumptions, technical approaches or supporting policy references which may be deemed inadequate but may not influence the result of the analysis. The main function is to highlight such issues for attention in subsequent project stages, or for future projects. A large number of comments would warrant a review of the documentation prior to compliance.

2 The Audit Process

2.1 Audit Team and Timetable

The Quality Assurance procedure has been carried out by an independent Audit Team chaired by Eoin Gillard, Head of Strategic & Transport Planning in TII.

Audit Team

- Eoin Gillard (Head of Strategic & Transport Planning, TII)
- Declan Keenan (Transport Planner, TII), Auditor

Project Team

- David Conlon (ARUP-SYSTRAN), Appraisal Team
- Andrew Archer (ARUP-SYSTRAN), Appraisal Team
- Eileen McCarthy (ARUP-SYSTRAN), Appraisal Team

TII Regional Management

- Kieran Kelly, TII Regional Manager

2.2 Previous Audits

Audit 3.0: Version 0 was issued on 9th of January 2017 and highlighted several substantive issues that required addressing prior to compliance.

Subsequent to this audit, a revised tranche of documents alongside an audit response was submitted to TII. Following this, TII undertook an additional review of the Business Case documents. This Audit Version 3.1 forms an examination of the documents submitted in March 2017.

2.3 Information Audited

The table below outlines the information provided to the audit team and the date of issue. The Project Appraisal Audit has examined this information for the purpose of generating the audit findings.

Information Issued for Audit 3.0: Version 1

Document	Revision	Received by STP	Issued By
Provided for Audit			
Project Brief	1	1 st March 2017	KK
Traffic Modelling Report	2	1 st March 2017	KK
Cost Benefit Analysis Report	3	1 st March 2017	KK
Project Appraisal Balance Sheet	1	1 st March 2017	KK
Preliminary Business Case	2	1 st March 2017	KK

3 Audit Findings

3.1 Substantive Issues

The table below outlines the substantive issues noted by the Audit Team, and provides instructions to the design team.

Issue	Findings of Audit – Version 0: 10 th January 2017	Design Team Response – 1 st March 2017	Findings of Audit – Version 1: 7 th March 2017
A.1 Cost Analysis Report: Sensitivity Analysis	The <i>Common Appraisal Framework (CAF) for Transport Projects and Programmes</i> (March 2016) as included in PAG Unit 6.1 requires as a minimum sensitivity tests upon costs, demand, benefits and complementary proposals. A number of elements of the Galway Transport Strategy (GTS) would represent complementary measures i.e. proposals that are not committed but have the capacity to enhance or reduce the economic return. We have reviewed Appendix B of the GTS have consider that this does not adequately address this requirement. Additional sensitivity tests are required.	CBA now includes for impacts (Highway only) of the implementation of the GTS.	No further action required.
A.2 Cost Analysis Report: Safety Benefits	The results of the safety appraisal conflicts with the scheme objectives set out within the Project Brief. Following review of the COBALT input sheet, it is clear that the <i>Combined Local Collision Rate Subsection</i> has not been populated or utilised within the analysis. This table within the COBALT Scheme Input sheet, can be populated with locally calculated collision rates for some / all links in the vicinity of the scheme (using the Road Safety Authority Personal Injury Accident database), where observed accident rates deviate from the default	COBALT has been re-run using local accident data (where available). On further investigation it was discovered that the standard COBALT Parameters do not include links with a free flow speed of less than 50kph in the Safety Analysis. The effect of this was that the majority of links in the City Centre were excluded from the previous analysis. The standard COBALT parameters were amended to include all links within the Study Area as part of the Safety Assessment. This has resulted in a	No further action required.

Issue	Findings of Audit – Version 0: 10 th January 2017	Design Team Response – 1 st March 2017	Findings of Audit – Version 1: 7 th March 2017
	<p>national average collision rates employed within COBALT.</p> <p>TII note that each of the route options examined within Phase 2 Option Selection demonstrated considerable benefits in terms of safety.</p> <p>It is also noted that the COBALT analysis only takes into account the opening year and design year flows (15 years after opening year). No forecast year flows (30 years after opening year) have been input into COBALT. Therefore, the safety analysis doesn't form a 30 year appraisal. Ideally a forecast year model should be developed to provide input flows, thus taking account of longer term growth projections and trends. This issue on the forecast year model also presents itself within the TUBA analysis.</p>	<p>positive safety benefit for the proposed road scheme.</p> <p>Forecast year models have been developed and used in the Cost-benefit analysis</p>	
A.3	Financial Analysis	The CAF requires Financial Appraisal and Exchequer Analysis in order to examine the impact of the implementation of the scheme on the finances of the Sponsoring Agency and the Exchequer respectively. As per the CAF, these analyses are mandatory for projects costing in excess of €20m and therefore needs to be considered within the Business Case.	Financial Appraisal undertaken in line with CAF. This has been added to the Business Case -see Section 6.9. No further action required.
A.4	Business Case: CBA Results	There appears to be some inconsistencies in the benefits shown in Tables 6.3 – 6.5 of the Business Case, when compared with the corresponding tables within the Cost Benefit Analysis report e.g. different values on Business User Benefits, Indirect Tax Revenues, etc.	Updated in both to be consistent. No further action required.

Issue

**Findings of Audit – Version 0: 10th
January 2017**

**Design Team Response – 1st March
2017**

**Findings of Audit – Version 1:
7th March 2017**

These discrepancies also lead inconsistencies in terms of the BCR values provided within both reports and should be corrected.

3.2 Data Issues

The table below outlines the additional information that is expected, and provides instructions to the design team.

Issue	Findings of Audit – Version 0: 10 th January 2017	Design Team Response – 1 st March 2017	Findings of Audit – Version 1: 7 th March 2017
<p>B.1 Traffic Modelling Report: Introduction</p> <p>Insufficient information has been provided within the Traffic Modelling Report (TMR) describing the characteristics of the scheme. The TMR should be supplemented with a detailed description or graphical display of the scheme providing the following information:</p> <ul style="list-style-type: none"> • Overall distances of the route; • Proposed carriageway cross sections along the corridor (and number of associated lanes) and associated distances; • Number of junctions, grade separated or otherwise; and • Lengths of any bridge, tunnel or viaduct elements. <p>It is noted that some detail in relation to the above has been provided within the TMR and Cost Benefit Analysis (CBA) Report. However, this data shall be presented collectively within the main text of the TMR also as it is often read as a stand-alone report.</p>	<p>Section 1.3 added to TMR.</p>	<p>No further action required.</p>	
<p>B.2 Traffic Modelling Report: Analysis</p> <p>Related to the point above, forecast traffic flows are a critical input in ensuring that transport infrastructure is adequate to support future demands. Opening and design year flows have been presented within the TMR and Business Case report and some considerable AADTs have been forecast to utilise a number of sections of the GCRR, particularly the N17 to N84 link. Therefore</p>	<p>Section 7.5 added to TMR.</p>	<p>No further action required.</p>	

Issue	Findings of Audit – Version 0: 10 th January 2017	Design Team Response – 1 st March 2017	Findings of Audit – Version 1: 7 th March 2017
	commentary shall be provided within the TMR on the adequacy of the various cross sections selected along GCRR corridor, in accommodating projected AADTs.		
B.3	<p>Traffic Report: Collection</p> <p>Modelling Data Collection</p> <p>It is noted that 42 additional traffic counts were collated in 2014 to infill data gaps, yet it is clearly stated that the model is calibrated and validated to a 2012 reflection. No discussion is provided within the TMR as to whether this 2014 data was factored to a 2012 reflection or otherwise.</p> <p>Related to this point, and in order to put context on the benefits likely to be delivered by the scheme, the appraisal team shall examine and report upon recent growth trends in the region since 2012 (in which the original data collection exercise was undertaken).</p>	<p>Section 2.2 updated to note that no 2014 counts have been used in model cal / val.</p> <p>A comparison of traffic flows from 2012 - 2016 has been undertaken based on available data from the National Roads leading into Galway City and from bridge counts undertaken within the city centre. The results indicate an increase in traffic flows from 2012 - 2015, but with a reduction in traffic flows on the radial routes and within the city in 2016. Given the limited coverage of these counts, and the inconclusive results, it is not possible to determine any strong trend in traffic growth throughout the Study Area. Therefore we have provided this information as a separate technical note, but would recommend that it is not included within the main report as it may lead to confusion.</p>	No further action required.
B.4	<p>Traffic Report: Development</p> <p>Modelling Model Development</p> <p>The discussion on model convergence should be expanded and provide additional detail related to the levels of convergence achieved for each of the time periods modelled. This should include detail as</p>	<p>Section 4.7 includes info on convergence.</p>	No further action required.

Findings of Audit – Version 0: 10th January 2017		Design Team Response – 1st March 2017		Findings of Audit – Version 1: 7th March 2017	
<p>outlined within Section 4.6 of PAG Unit 5.1: <i>Construction of Transport Models</i> (recently updated in October 2016).</p>					
<p>B.4</p>	<p>Traffic Modelling Report: Model Calibration & Validation</p>	<p>Examination of Appendix D indicates that a number of calibration links demonstrate a GEH of greater than 10. Insufficient information has been provided within the TMR on such instances. Having links with such a high GEH within the vicinity of the existing or proposed corridor is not ideal. These links should be presented graphically, investigated and commentary on their significance to the scheme provided within the TMR.</p>	<p>Section 4.4 and 4.6 updated with relevant maps.</p>	<p>No further action required.</p>	
<p>B.5</p>	<p>Traffic Modelling Report: Future Year Development & Network Performance Indicators</p>	<p>Insufficient information has been provided within the TMR with respect to matrix totals employed within the modelling. Matrix totals are provided within Tables 5.10.1 and 5.10.2 of the Traffic Modelling Report. However, it unclear as to which growth scenario these matrix totals apply. Matrix totals for each of the growth scenarios shall be provided within the TMR, including any scenario involving the Galway Transport Strategy.</p> <p>Similar comments apply to the network performance statistics and also the journey times provided within Chapter 6 of the TMR. It is not clear as to which growth scenario these results apply. Again, network performance statistics for each of the scenarios assessed shall be provided within the TMR for clarity.</p>	<p>Tables 5.10 and 5.11 updated.</p> <p>Appendix H contains network stats for Sensitivity tests.</p>	<p>No further action required.</p>	
<p>B.6</p>	<p>Traffic Modelling Report: Forecast AADT Estimates</p>	<p>Figure 7.3.1 within the TMR indicates the locations for which AADT flows from the model is reported. Data point 42 (located on the N84, south of the</p>	<p>Tables updated with point 42 included.</p>	<p>No further action required.</p>	

Issue	Findings of Audit – Version 0: 10 th January 2017	Design Team Response – 1 st March 2017	Findings of Audit – Version 1: 7 th March 2017
	<p>scheme) is shown on Figure 7.3.1, however it is not reported upon in the subsequent tables. AADT flows for this link should also be presented within the TMR.</p> <p>Data points 1, 2 and 3 indicate a significant increase in AADT flows between the Do Minimum and Do Something scenarios within the eastern environs of Galway City. However, it is not clear whether these differences in flows is related to induced traffic or reassigned flows. Further information is required to provide clarification on this.</p>	<p>Section 7.6 added to provide context to Data points 1, 2 and 3.</p>	
<p>B.7 Traffic Modelling Report: Junction Strategy</p>	<p>The N6 GCRR Junctions Strategy report is provided alongside the TMR. This report contains the results of some detailed junction analysis undertaken on the emerging and preferred junction arrangements. Analysis of the signalised junctions indicates some significant queuing in between junctions and also on ramps. Of particular concern is the potential for queues to extend into neighbouring junctions at interchanges and impact on queue lengths on the GCRR off ramps. Additional commentary shall be provided within the junction strategy report (where queue lengths are considered significant) outlining how these interactions may be managed and minimised.</p>	<p>All interchanges have been re-modelled in Linsig ensuring junctions are linked. Section 3.2 has been updated with relevant information and maps of most significant queues at each junction.</p>	<p>No further action required.</p>
<p>B.8 Project Brief & Business Scheme Objectives</p>	<p>The scheme objectives should be revisited in cases, to ensure they are specific and measurable and also to reduce the potential for double counting of benefits both within the criteria and across the criteria.</p>	<p>Checked.</p>	<p>No further action required. For information and future reference we would note that in development of scheme objective the SMART principle should be applied and carried throughout</p>

Issue	Findings of Audit – Version 0: 10 th January 2017	Design Team Response – 1 st March 2017	Findings of Audit – Version 1: 7 th March 2017
	<p>In addition, the scheme objectives outlined within the Business Case document should be consistent with the objectives contained within the Project Brief.</p>		<p>the appraisal process. The objective setting process would commence at pre-Appraisal stage.</p>
<p>B.9 Project Performance Targets</p>	<p>Brief: With respect to the performance targets set out for the scheme, some targets on safety and the reduction of road collisions, etc should be provided within the Project Brief.</p>	<p>Added paragraph to Section 2.6 & added as a performance target in Section 6.2.</p>	<p>No further action required.</p>
<p>B.10 Business Case: Future Year Matrix Totals</p>	<p>Future year matrix totals are presented within Section 3.7.2 of the Business Case, however it is not explicit as to which growth scenario these matrix totals apply. This is also the case within Section 5.3.2 of the Traffic Modelling Report. Matrix totals for each of the growth scenarios shall be provided within the Business Case report.</p>	<p>Tables 5.10 and 5.11 of TMR Updated. Table 3.4 and Table 3.5 in Business Case updated to include all scenarios.</p>	<p>No further action required.</p>
<p>B.11 Business Case: Consideration of Alternatives & Options</p>	<p>A transport strategy may dictate that the preferred alternative to address the need for a specific intervention may include a road based solution and therefore fall under TII's remit. Some discussion should be added within the earlier stages of Chapter 4 on how a road based alternative is also considered necessary to address the wider transport problems in Galway City as opposed to interventions focussing on entirely other transport modes (road, rail, bus, air etc.) or demand management proposals.</p>	<p>See additional two paragraphs in Section 4.2.2.2.</p>	<p>No further action required.</p>
<p>B.12 Business Case: Network Statistics</p>	<p>Section 5.4.1 of the Business Case should be supplemented with some of the discussion and tables on network statistics. It is noted that some detail is presented within the Traffic Modelling Report.</p>	<p>Added paragraph to Section 5.4.1 in Business Case.</p>	<p>No further action required.</p>

Issue	Findings of Audit – Version 0: 10 th January 2017	Design Team Response – 1 st March 2017	Findings of Audit – Version 1: 7 th March 2017
<p>B.13 Business Scheme Costs – Capital</p>	<p>Case: The costs provided within Table 6.1 of the Business Case and Table 3 of the CBA don't tally. Furthermore, it is not clear how a risk allocation is dealt with within these costs. Further clarification is required in relation to this.</p>	<p>Tables match.</p>	<p>No further action required.</p>
<p>B.14 Business Procurement</p>	<p>Case: The level of detail provided within Chapter 8 of the Business Case is considered insufficient to inform the decision-making process of the Sanctioning Authority. At a minimum, this section of the Business Case should explore potential procurement options and the strengths and weaknesses of each.</p>	<p>Additional text added.</p>	<p>No further action required.</p>
<p>B.15 Project Appraisal Balance Sheet: Environment</p>	<p>No qualitative statements are provided within the environmental section of the PABS sheet. Some discussion is necessary to give context to the quantitative results, as the PABS can be read independently.</p>	<p>Added statements.</p>	<p>No further action required.</p>

3.3 Comments

The table below outlines the comments from the Audit Team, and provides instructions to the design team.

Findings of Audit – Version 0: 10 th January 2017		Design Team Response – 1 st March 2017		Findings of Audit – Version 1: 7 th March 2017	
C.1	All Deliverables	PAG The appraisal team should be mindful of the recently updated TII Project Appraisal Guidelines for National Roads (October 2016) and should check and update references throughout all of the deliverables to ensure consistency with the same.	All PAG references updated in line with 2016 PAG.	No further action required.	No further action required.
C.2	Traffic Modelling Report: Model Calibration & Validation	It is considered practical to graphically highlight the locations of both the calibration and validation points. Of particular interest is the 20 locations utilised to validate the Galway City Ring Road Modal (GRRM).	Section 4.4 and 4.6 updated with relevant maps.	No further action required.	No further action required.
C.3	Cost Analysis Report: CBA Input Assumptions	With respect to the comments in the CBA Input Assumptions table in relation to the base year traded and untraded carbon values, the recently published <i>Common Appraisal Framework for Transport Projects and Programmes</i> publication (March 2016) states that the EU Emissions Trading System prices (provided in the CAF document) should also be applied to the non-Trading Scheme sectors.	Assumptions table (Ch. 5) updated.	No further action required.	No further action required.
C.4	Business Case: Policy Context	Significant discussion of policy context is presented in the Project Brief and is then repeated within the Business Case document. It may be of service to the Business Case to condense some of these sections where some policy documents reflect others in terms of objectives and aspirations.	Compressed Business Case text, referenced Brief in Appendix.	No further action required.	No further action required.

4 Conclusion

Following the audit process, it is concluded that the PAG deliverables submitted for the proposed scheme have been carried out in compliance with the relevant guidance. All issues previously raised by the audit team have been addressed and clarified by the design team.

For information and future reference it has been noted that the objective setting process is a key step in the appraisal process. In line with the Public Spending Code, Common Appraisal Framework and TII PAG, the objective setting process commences at Pre-Appraisal Stage and is carried through all steps of appraisal. Project objectives should where possible apply the SMART principle.

5 Audit Closeout

This Audit Report concludes the Phase 3 auditing of the PAG deliverables outlined in Section 2.3 of this document.