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A RAPID TRANSIT NETWORK FOR BELFAST METROPOLITAN AREA

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A Strategic Outline Case (SOC) has been prepared for a Rapid Transit Network for the Belfast Metropolitan Area. This paper outlines the key findings and recommendations for each of the proposed routes.

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SUMMARY OF KEY POINTS

The Department for Regional Development (DRD) commissioned Atkins Limited and KPMG to undertake a Strategic Outline Case (SOC) to assess the feasibility of the delivery of a rapid transit network in the Greater Belfast area.

The following proposed routes were assessed:

- 1) CITI Rapid Transit Scheme: Core section between Belfast City Centre and Titanic Quarter;
- 2) CITI: Extension eastwards through Titanic Quarter to Belfast City Airport;
- 3) CITI: Extension southwards to Queens University and Belfast City Hospital;
- 4) EWAY: Belfast City Centre to Dundonald; and
- 5) WWAY: Belfast City Centre to Royal Victoria Hospital and West Belfast.

The Consultants' report identified two main types of rapid transit. These are light rail transit (LRT) and bus-based rapid transit (BRT) and each of these options were assessed for the routes identified above.

The key findings for each of the proposed routes were that:

The CITI core rapid transit scheme is a worthwhile scheme. With bus-based technology, it has a viable and healthy economic case.

The extension of the CITI rapid transit scheme eastwards to Belfast City Airport / Tillysburn is not a worthwhile scheme and should not be progressed.

The extension of the CITI rapid transit to Queens University and Belfast City Hospital could be a worthwhile scheme in principle but there are a number of issues around road space reallocation and highway capacity which need to be addressed.

The EWAY rapid transit scheme is potentially a worthwhile scheme, with bus based technology. It has a good economic case with positive social and economic benefits for the wider Belfast City Centre and East Belfast.

The WWAY rapid transit scheme is potentially a worthwhile scheme, with bus-based technology. It has a good economic case with positive social and economic benefits for the wider Belfast City Centre area and West Belfast.

Assuming that the rapid transit is a bus based solution using specialised BRT vehicles, this results in a capital cost of between £101.53m and £176.03m, depending on the final routes chosen.

It is noted that, total value of central government funding available for the delivery of the rapid transit is approximately £111m as outlined in the Investment Strategy. This leaves a potential funding difference of up to £65.03m.

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SECTION 1 - BACKGROUND

The Department for Regional Development (DRD) commissioned Atkins Limited and KPMG to undertake a Strategic Outline Case (SOC) to assess the feasibility of the delivery of a rapid transit network in the Greater Belfast area.

The following proposed routes were assessed:

- 1) CITI Rapid Transit Scheme: Core section between Belfast City Centre and Titanic Quarter;
- 2) CITI: Extension eastwards through Titanic Quarter to Belfast City Airport;
- 3) CITI: Extension southwards to Queens University and Belfast City Hospital;
- 4) EWAY: Belfast City Centre to Dundonald; and
- 5) WWAY: Belfast City Centre to Royal Victoria Hospital and West Belfast.

The SOC provides an assessment of the need; objectives; option identification and initial appraisal; quantitative and qualitative assessment of the options for each of the proposed routes above.

In addition to this, the associated risks and uncertainties; possible procurement strategies and funding issues; the use of developer contributions; affordability and accounting treatment and the next steps are addressed within the report.

The Consultants' report identifies two main types of rapid transit. These are light rail transit (LRT) and bus-based rapid transit (BRT).

"LRT uses rail-based technology and typically operates in urban settings. The most common type is that which runs primarily on street-level tracks. The vehicles draw electric power from an overhead power line".¹

"BRT is a rubber-tired rapid transit service that transcends conventional bus services by providing a high quality and rapid transit service that is on par with other options such as LRT. It combines high quality stations/stops, distinctive and high quality vehicles, off-board ticketing, dedicated running ways, a flexible operating plan and new technology into a high quality, customer focused service that is frequent, fast, reliable, comfortable and cost efficient."²

The report notes that available BRT systems vary considerably with some systems using standard buses and others using high-order technology and vehicles. The Consultants' report considers non-guided rapid using specialised vehicles; standard buses; and use of guidance technology.

This briefing paper provides an overview of the key findings for each of the proposed routes above.

¹ Atkins and KPMG, *Strategic Outline Case, Consideration of Options for a Rapid Transit Network for the Belfast Metropolitan Area, Main Report, Feb 08, pg 4.*

² *Ibid, pg 5.*

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SECTION 2 - CITI RAPID TRANSIT SCHEME: CORE SECTION BETWEEN BELFAST CITY CENTRE AND TITANIC QUARTER

Section A, chapters 5-9, provide the information on the proposed CITI routes.³

<p>Proposed Route:</p> <p>Belfast City Centre to Titanic Quarter via the existing highway network, taking account of proposed city centre traffic management plans. Route: proposed bus lanes along Oxford Street, May Street, Chichester Street and Victoria Street; fully segregated rapid transit (RT) lanes along Queen's Bridge, Queen Elizabeth Bridge, Queen's Quay and Sydenham Road; and within fully segregated RT lanes along Abercorn Crescent. (See Fig. 1)</p>
<p>Key Findings:</p> <p>The CITI core rapid transit scheme is a worthwhile scheme. With bus-based technology, it has a viable and healthy economic case.</p>
<p>Economic Assessment:</p> <p>Benefit Cost Ratios (BCR) refer to the rate at which benefits exceed (or not) costs to government. The initial economic assessment returns a BCR for the bus based option of 3.0 for guided BRT and 4.4 for non-guided BRT. Current government guidance states that any transport scheme with a BCR of greater than 2 is worthwhile.</p> <p>Capital cost estimates for bus based scheme are between £5.2m and £8.8m depending on the type of technology used. Operating costs per annum are estimated to be £326k.</p> <p>Investment costs of £91.8m are associated with a LRT. This outweighs the benefits obtained and results in a poor economic case with negative net present value and BCR of less than 1.0. Operating costs are estimated at £1.268m per annum.</p>
<p>Qualitative Assessment</p> <p>Wider qualitative assessments demonstrate that the scheme will have significant positive effects on the environment including greenhouse gases, townscape, physical fitness, journey ambience, accidents and passenger security.</p> <p>The scheme is also expected to have wider economic benefits in terms of regeneration, development, job creation, especially with regard to Titanic Quarter development.</p>
<p>Patronage</p> <p>Patronage forecasts for a new bus-based scheme for the morning peak period in 2015 are approximately 1,250 passengers. This forecast level cannot adequately be served by the proposed Metro bus services.</p>
<p>Final Recommendations</p> <p>The scheme should be progressed to preliminary/detailed design stage and Outline Business Case Stage and should be bus based with further consideration given to type of technology;</p>

³ Atkins, KPMG, *Strategic Outline Case*, 2008, chapters 5-9.
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Final Recommendations Continued

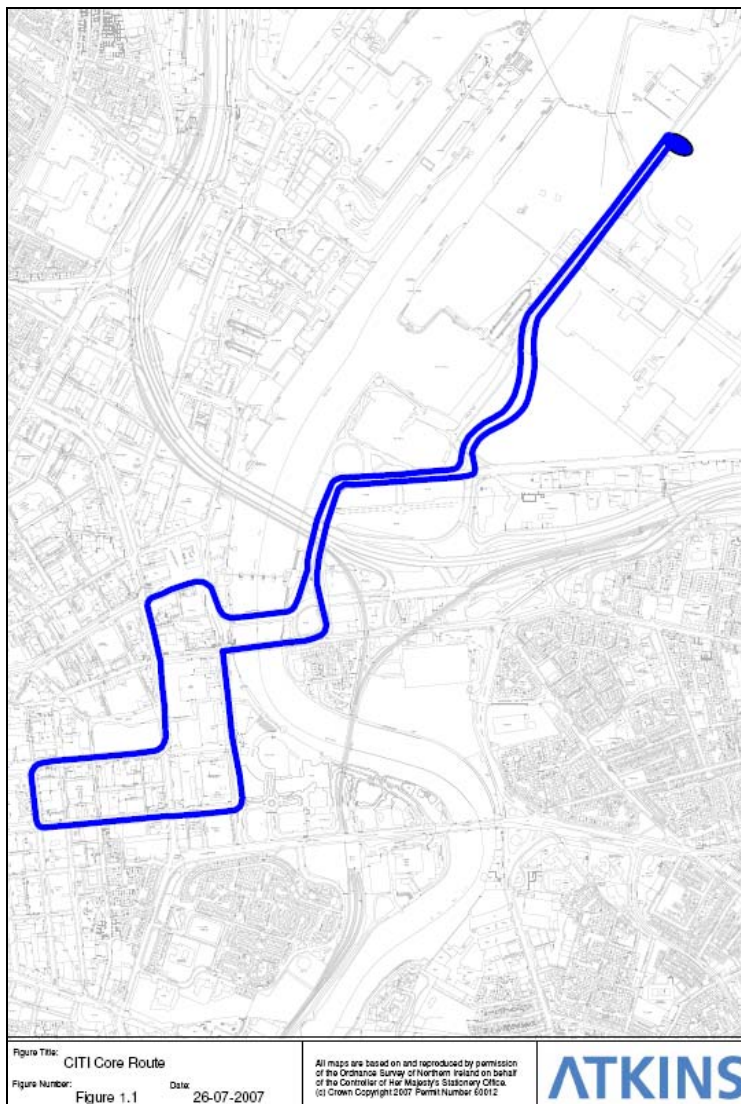
It should connect Belfast City Centre and Titanic Quarter via Queen's Quay, Sydenham Road and Abercorn Crescent;

The scheme should consider the potential migration of the system to light rail in the future;

The scheme should consider further opportunities for additional off road segregation;

There should be resolution of: city centre traffic management proposals; final route of the scheme through the city centre: timescales for removal of Station Street Flyover; Titanic Quarter infrastructure requirements and developer contributions; level of segregation and priority that can be afforded to the scheme; and the resulting implications on on-street parking.

Figure 1: CITI Core Route



Source: Atkins, KPMG, Strategic Outline Case, 2008.⁴

⁴ Atkins, KPMG, *Strategic Outline Case*, 2008, pg 7.
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SECTION 3 - CITI EXTENSION TO BELFAST CITY AIRPORT / TILLYSBURN

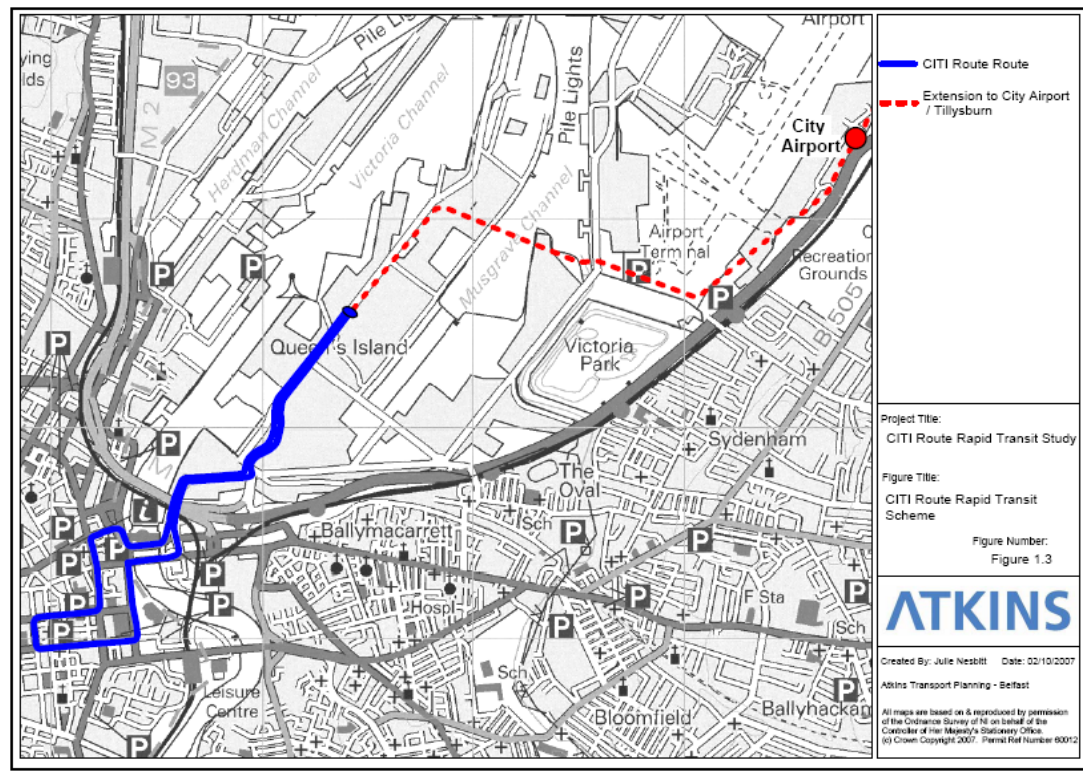
Atkins were also asked to provide a high level review of a possible extension of the CITI core route eastwards towards Belfast City Airport as outlined in the BMAP and BMTP.⁵ Full details of the scheme can be found in chapters 5-9 of the report.⁶

Proposed Route:
City Centre eastwards to Belfast City Airport / Tillysburn along the route currently identified in the BMPT and draft BMAP. Route: run on street through Titanic Quarter; across Musgrave Channel over a new bridge structure and then access to airport through third party land. (See Fig. 2)
Key Findings:
The extension of the CITI rapid transit scheme eastwards to Belfast City Airport / Tillysburn is not a worthwhile scheme and should not be progressed. The engineering and planning implications for this route are significant and include the construction of a new bridge structure across the Musgrave Channel into lands owned by Bombardier as well as the public safety zone for the airport.
Economic Assessment:
The initial costs for a bus based scheme is approximately £70m (in addition to the core scheme cost). For a LRT scheme it could be in the region of £156m (including optimum bias). The significant additional investment costs compared with only a small increase in patronage will have a negative impact on the economic viability of the overall scheme
Qualitative Assessment
Scheme will have significant positive benefits with regard to environment and society. It is also expected to have wider economic benefits in terms of regeneration, development and job creation.
Patronage
Patronage forecasts for the CITI scheme are not anticipated to change significantly with the addition of this extended route – only a small increase of 5% is forecast.
Final Recommendations
Alternative route options for the extended route should be explored at the appropriate time.

⁵ Belfast Metropolitan Area Plan and Belfast Metropolitan Transport Plan.

⁶ Atkins, KPMG, *Strategic Outline Case*, 2008, chapters 5-9.

Figure 2: CITI Route: Extension to City Airport



Source: Atkins, KPMG, Strategic Outline Case, 2008.⁷

⁷ Atkins, KPMG, *Strategic Outline Case*, 2008, pg 12.
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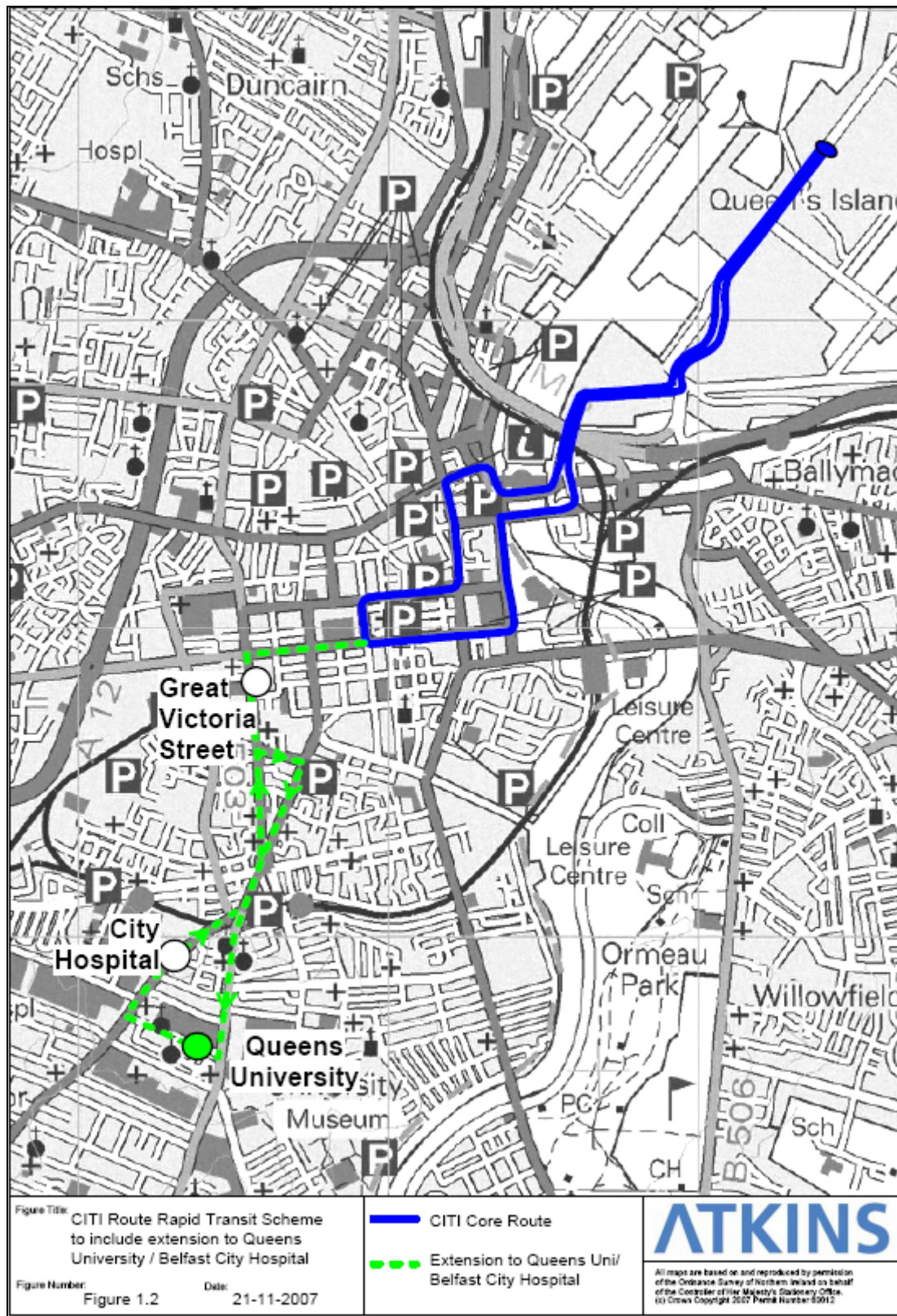
SECTION 4 - CITI EXTENSION TO QUEENS UNIVERSITY / BELFAST CITY HOSPITAL

A high level review of a further extension of the CITI Core route was also undertaken by Atkins. Full details can be found in chapters 5-9 of the SOC.⁸

Proposed Route:
Extension of CITI core route southwards to Queens University / Belfast City Hospital. The Route involves Great Victoria Street, Bruce Street, Dublin Road and the lower section of Great Victoria Street. (See Fig. 3)
Key Findings:
This extension could be a worthwhile scheme in principle but there are a number of issues around road space reallocation and highway capacity which need to be addressed.
Economic Assessment:
The initial cost estimate for a non-guided bus-based scheme along this extension is approximately £5m (in addition to core scheme costs). For a LRT scheme it could be in the region of £75m. Additional annual operating costs are approximately £332k, excluding vehicle purchase costs.
Qualitative Assessment
Whilst many environment and economic benefits are recognised, the disbenefits felt by general road users, due to the reduction in high way capacity and the increase in congestion, outweighs the benefits and the initial economic assessment returns a negative value of benefits as well as a negative value of costs.
Patronage
Patronage forecasts for the extended scheme for the morning peak period in 2015 are expected to increase by approximately 400 passengers;
Final Recommendations
The extension of the CITI rapid transit scheme to QUB/BCH could be a worthwhile scheme in principle however, a number of issues to be considered further. There should be resolution of the final format and timescales for implementation of city centre transport management proposals; There should be resolution of the level of on-street priority which can be realistically accommodated along this route without unduly impacting on current and forecast traffic conditions.

⁸ Atkins, KPMG, *Strategic Outline Case*, 2008, chapters 5-9.
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Figure 3: CITI Route Extension to Queens University / Belfast City Hospital



Source: Atkins, KPMG, Strategic Outline Case, 2008.⁹

⁹ Atkins, KPMG, *Strategic Outline Case*, 2008, pg 10.
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SECTION 5: THE EWAY SCHEME

Full details on the EWAY scheme are covered in Section B, chapters 10 – 14 of the report.¹⁰

Proposed Route:
To link Belfast City Centre and Dundonald, terminating at a proposed park-and-ride (p&r) site at Millmount. 4 different route options were short-listed between for consideration between the core destinations. (See Fig. 4)
Option 1: Albertbridge Road – disused railway line – Quarry Corner East Link Road (Millmount p&r) Option 2: Albertbridge Road – disused railway line – East Link Road, Upper Newtownards Road (Quarry Corner p&r) Option 3: Sydenham Road –Dee Street – disused Railway line – Quarry Corner East Link Road (Millmount p&r) Option 4: Sydenham Road – Dee Street – disused railway line – East Link Road – Upper Newtownards Road (Quarry Corner p&r)
Key Findings:
The EWAY rapid transit scheme is potentially a worthwhile scheme, with bus based technology. It has a good economic case with positive social and economic benefits for the wider Belfast City Centre and East Belfast.
Economic Assessment:
Initial assessment of the bus based schemes provide a Benefit Cost Ratio of between 1.2 and 2.5. Current government guidance states that above 2 is a worthwhile scheme. Initial cost estimates for a bus based scheme is between £60m - £107m (including optimism bias ¹¹), depending on the final route chosen. Significant investment costs are associated with a LRT, between £262m and £345m. This outweighs the benefits obtained and results in a poor economic case with a negative Net Present Value and BCR of less than 1.0.
Qualitative Assessment
Wider qualitative assessment demonstrates that the scheme will have positive environmental benefits in terms of greenhouse gases, townscape, physical fitness and journey ambience. Disbenefits with regards to noise, landscape, biodiversity and water environment, exist particularly with regard to the use of disused rail corridor.
Patronage
Forecasts for a new bus based scheme for the morning peak period in 2015 are between 1,150 and 1,290 passengers

¹⁰ Atkins, KPMG, *Strategic Outline Case*, 2008, chapters 10-14.

¹¹ Optimism Bias takes into account the likely impact of cost overruns and delays. An optimism bias of 44% for BRT and 66% for LRT reflect the risks associated with the schemes.
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Final Recommendations

EWAY scheme should be progressed to preliminary / detailed design and Outline Business Case Stage;

Scheme should be a bus-based rapid transit scheme, with further consideration given to the type of guidance technology;

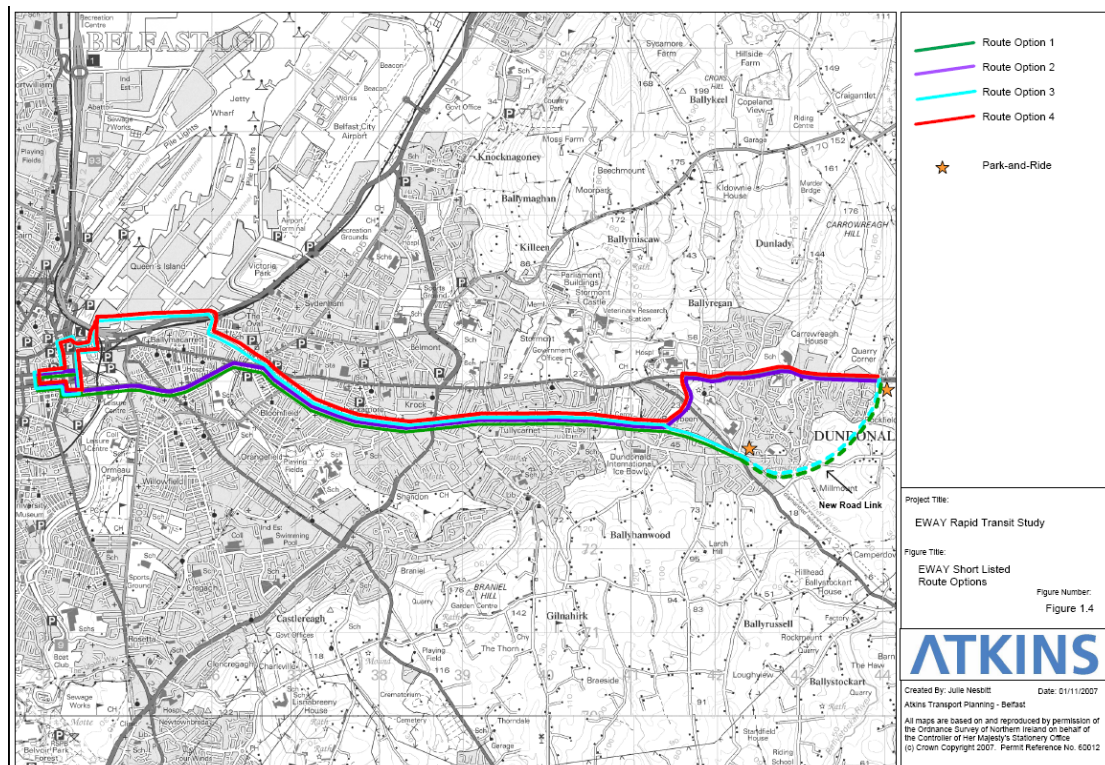
Schemes which connect into Titanic Quarter via Dee Street Bridge are considered better in economic terms;

Design of scheme should potentially allow for migration of system to light rail in the future;

Design of scheme should consider the integration of planned and committed schemes such as Sydenham Bypass widening, Dee Street Bridge and Connswater Community Greenway project.

There should be resolution of: City Centre Traffic Management Proposals and final route of the rapid transit scheme through the city centre.

Figure 4: EWAY Rapid Transit Study



Source: Atkins, KPMG, Strategic Outline Case, 2008.¹²

¹² Atkins, KPMG, Strategic Outline Case, 2008, pg 15.
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SECTION 6: THE WWAY SCHEME

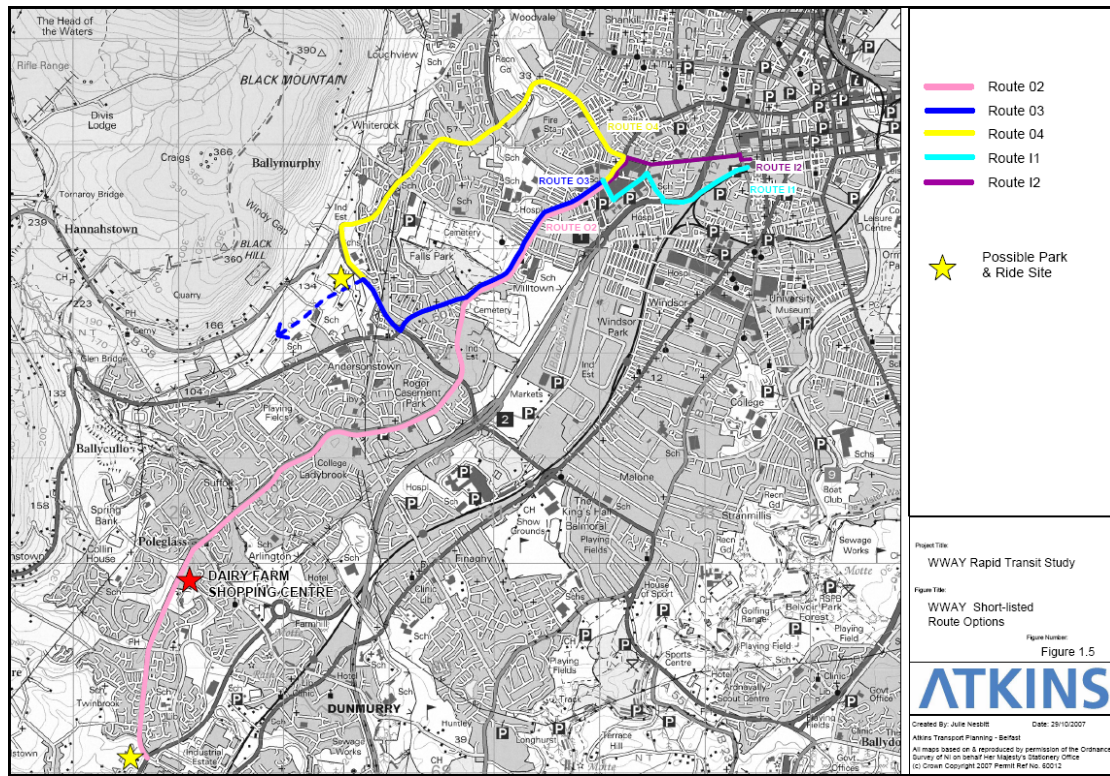
Full details of the WWAY Scheme can be found in Section C, chapters 15-19, of the Strategic Outline Case.

Proposed Route:
Linking Belfast City Centre, Royal Victoria Hospital and West Belfast. Three short-listed options were taken forward for more detailed appraisal. Option 1: Falls Road, Andersonstown Road and Stewartstown Road Option 2: Falls Road, Glen Road and Monagh Bypass Option 3: Springfield Road and Monagh Bypass (See Fig. 5)
Key Findings:
The WWAY rapid transit scheme is potentially a worthwhile scheme, with bus-based technology. It has a good economic case with positive social and economic benefits for the wider Belfast City Centre area and West Belfast.
Economic Assessment:
Initial economic assessment returns a Benefit Cost (BCR) for the bus-based options of between 0.3 and 2.4. The route options which have a greater BCR than 2.0 connect into the proposed development at Glenmona via Falls Road / Glen Road or alternatively via Springfield Road. Initial cost system between £36m and £61m, depending on final route choice. Significant investment costs are associated with LRT, between £204m and £460m. This outweighs both the benefits and results in a poor economic value and negative net present value and BCR of less than 1.
Qualitative Assessment
The wider qualitative assessment demonstrates that the schemes will have positive environmental benefits in terms of greenhouse gases, townscape, physical fitness and journey ambiance. The scheme is also expected to have positive benefits in terms of safety and integrations as well as wider economic benefits in terms of regeneration, development and job creation.
Patronage
Peak morning period forecasts are between 500 and 1,288.
Final Recommendations
The WWAY rapid transit is possibly a worthwhile scheme and option 2 (route O3) should be progressed to outline business case. The scheme should be bus based and should consider the potential migration of the system of light rail in the future. The scheme should consider the integration of planned developments at Royal Victoria Hospital, and other planned and committed developments in the area; There should be resolution of the city centre traffic management proposals; final route of the rapid transit scheme through the city centre and level of segregation and

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priority that can be afforded in West Belfast and the potential impact that this will have on localised widening of roads and on-street parking.

Figure 5: WWAY Rapid Transit Study



Source: Atkins, KPMG, Strategic Outline Case, 2008.¹³

¹³ Atkins, KPMG, *Strategic Outline Case*, 2008, pg 20.
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SECTION 7: A RAPID TRANSIT NETWORK

Taking into consideration the recommendations outlined previously, the Report outlines the benefits/disbenefits associated with the implementation of the complete Rapid Transit Network. That is all CITI, EWAY and WWAY routes.

An initial economic appraisal was undertaken for the full network. It should be noted that these results are indicative only and have been calculated using the best performing, in economic terms, routes. A Benefit Cost Ratio of 2.8 was calculated for the complete network.

Assuming that the rapid transit is a bus based solution using specialised BRT vehicles, this results in a capital cost of between £101.53m and £176.03m, depending on the final routes chosen. A mid range point has been chosen for indicative purposes.

Table 1: Costs associated with a Rapid Transit Network

Raid Transit Scheme	Estimated Cost (£)	Assumptions
CITI	£6.14	BRT, no guidance – largest economic benefits and BCR > 2.0
EWAY	£106.80	BRT scheme, route 3, BCR > 2.0
WWAY	£35.88	BRT scheme, route 4, BCR > 2.0
Totals	£148.82	

Source: Atkins, KPMG, Strategic Outline Case, 2008.¹⁴

The report notes that total value of central government funding available for the delivery of the rapid transit is approximately £111m as outlined in the Investment Strategy for Northern Ireland. At the mid point this leaves a potential funding difference of £37.82m. At the upper level this leaves a potential funding difference of £65.03m.

¹⁴ Atkins, KPMG, *Strategic Outline Case*, 2008, pg 344.

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SECTION 8: OTHER ISSUES

Procurement and Funding

Chapter 21 considers the procurement strategy and commercial issues.

Key findings:

The programme level Value for Money (VfM) assessment shows that the individual scheme objectives are such that a PPP/PFI procurement route could be a viable option. However, the main concern with PPP/PFI is the appetite of the private sector to ensure sufficient competitive tension to harness VfM for the tax payer.

If LRT chosen solution it is likely that PPP/PFI procurement route would be advised. If BRT chosen, it is likely that conventional procurement will be the most appropriate route.¹⁵

Developer Contributions

Chapter 22 considers the use of developer contributions.

Key findings:

Contributions towards the cost of the rapid transit network private developers are expected to provide a material source of funding towards the scheme. They will have significant influences on the affordability and timescales for implementation of the individual routes.

The report recommends that the Department take the necessary steps to ensure that developer contributions towards the costs of the CITI rapid transit scheme are a condition of any planning permission granted for the remaining phases of Titanic Quarter.

It is also recommended that the Department, once that the preferred technical solution has been chosen, should consult with the relevant developers and Planning Service to ascertain the level of interest associated with the introduction of a RTS.¹⁶

¹⁵ Atkins, KPMG, *Strategic Outline Case*, 2008, pg 342.

¹⁶ Atkins, KPMG, *Strategic Outline Case*, 2008, pg 343.