

4. Background to the Scheme, Scheme Objectives and Alternative Options Considered

4.1 Introduction

- 4.1.1 The purpose of this chapter is to describe the Scheme objectives, existing situation, alternatives considered during the Scheme development process, and the Scheme design.
- 4.1.2 The objective is to remove the existing bottleneck on the A2 Shore Road at Greenisland and to find a route corridor where road construction will be least damaging. In the course of development of the Scheme a further objective was introduced that adequate provision should be made for non-motorised road users (pedestrians and cyclists) and account should be taken of the safety of residential accesses along Shore Road.
- 4.1.3 This chapter sets out how the Scheme proposals have been developed from the commencement of the Scheme preparation to the preferred option. The Scheme has been developed in a three-stage process in accordance with Standard *TD 37/93 Scheme Assessment Reporting* of the Design Manual for Roads and Bridges.
- 4.1.4 The following comments give a summary of the Stages 1 and 2 of Scheme preparation. Stage 1 examined a number of strategies that might provide a solution to the bottleneck problem. In this case, two strategies were considered to warrant taking forward for further examination. Stage 2 developed a number of options that would demonstrate how those strategies might be implemented. Three of the options were put forward for public consultation and finally, taking into account the results of further examination and public comment, a preferred option was chosen to be taken forward for further development.

4.2 Alternatives Considered – Stage 1 Strategies

- 4.2.1 Stage 1 of the Scheme assessment, examined a range of strategies to address the bottleneck on the A2 Shore Road. The findings of the Stage 1 assessment were presented in a report, "Stage 1 Scheme Assessment November 2005". The strategies, which are illustrated in Figure 4.1 – Stage 1 Strategy Alternatives, are described below.
- 4.2.2 **Strategy S1 The B90 Corridor Improvements** examined the dualling of the B90 single carriageway road. A new dual carriageway connection could readily be made to the southern edge of Carrickfergus in line with local policy improvements. Parts of the B90 could be dualled by the addition of a second carriageway but a new bypass would be needed at the western edge of Greenisland to avoid the established housing area. A 2.5km length of second carriageway would be required through established areas of Newtownabbey if a link was taken to the M2 motorway.
- 4.2.3 The indications were that there would be no significant transfer of traffic from the A2 due to the increased distance and improving this secondary (non-strategic) route in particular at the M2 junction, which has its own congestion problems, would not accord with the Belfast Metropolitan Transport Plan. This strategy was not therefore taken further.

- 4.2.4 **Strategy S2 New Road Railway Corridor** examined whether a new road could be provided along the existing Belfast to Larne railway corridor as a way of limiting environmental impact in an existing transport corridor. Replacing the railway with a new road would be against the Regional Transport Strategy as improvements are sought for both roads and railways, therefore any new road would have to be located alongside the railway. A link could be made at the Carrickfergus end as with strategy S1 and in open ground as far as Greenisland. However beyond that there would be significant areas of demolition of established areas through Greenisland and Jordanstown, especially if it was linked directly to the end of the M5 motorway. Otherwise a shorter route would link it to the A2 at Whiteabbey via Three Mile Water Valley, a Site of Local Nature Conservation Importance (SLNCI).
- 4.2.5 The route would have high cost and significant adverse environmental impacts, not least in the properties directly affected in established areas. This strategy was not therefore taken further.
- 4.2.6 **Strategy S3 Public Transport Improvements** would aim to relieve the A2 of traffic by attracting more people onto public transport. However, the Regional Transport Strategy proposes that improvements to road and rail are seen as complementary and that the initial priority is to remove bottlenecks from the strategic road network. At a practical level, bus services along the A2 are constrained by the congestion at Greenisland and there is no room to provide bus-only-lanes without specific property acquisition, therefore no transfer of motorists to buses could be expected.
- 4.2.7 Using best estimates from the Belfast Transportation Model, doubling the use of the railway would only reduce peak period flows by around 200 vehicles per hour and that would not in itself solve the problems on the A2. This strategy was not therefore taken further as a solution to the A2 congestion.
- 4.2.8 **Strategy S4 A2 / B90 Links** was examined following comments from the public that better links between the A2 and the B90 would help the situation. It was considered that new links would certainly provide opportunities to relieve conditions on Jordanstown Road, Station Road Greenisland and Troopers Lane. They may also provide opportunities to reduce journey lengths, for example by creating a more direct access to the university campus via a link to the B90, and thereby reducing some flows on the A2. However, the immediate need is essentially for additional lanes on the A2 route and this strategy would not provide that and was not therefore taken further as a solution to the A2 congestion.
- 4.2.9 **Strategy S5 New Road Inland Corridor** examined the potential for a new road inland of the A2 Shore Road. Although at that stage of Scheme preparation it was too early to provide a design of such a route, a particular route was drawn up in order to illustrate the likely costs and issues in more detail than in other strategies. The route was taken up to the University access road, Shore Avenue, and through the edge of the university campus and across the playing fields of Belfast High School and across open land to Greenisland. It could then run through largely open space within the housing areas of Greenisland in a deep cutting to minimise severance and then continue across open land to rejoin the A2 at the existing dual carriageway at Seapark beside the former factory site.
- 4.2.10 The strategy appeared relatively good in terms of accessibility and safety in that traffic would be taken from a road with multiple accesses (existing A2) to a new road with access limited to a small number of junctions. Bus services would continue to use a quieter Shore Road. On a practical level, the dogleg at the southern end would make the by-pass less attractive to motorists than the existing road, which would therefore require restrictions. That aspect of the strategy would have to be addressed further.

- 4.2.11 Its economic and environmental performance would depend on the precise horizontal and vertical alignment selected. Severance would be reduced by the deep cutting at Greenisland but if cut and cover replacement of open space was also required, costs would rise. As a new road it would introduce noise and air quality issues where there is relatively little at present.
- 4.2.12 On balance, although there were significant concerns, it was considered that this strategy warranted further examination.
- 4.2.13 **Strategy S6 Upgrade Junctions Only** was examined to determine whether the problems lie with the limitations of the junctions and whether a Scheme of junction improvements would be adequate. It was found that even if junctions were improved, the existing lengths of Shore Road between the junctions were not adequate to carry the existing traffic flows and they would not be able to carry sufficient traffic to utilise any improved capacity at junctions, now or in the future. Furthermore, improving the junctions alone would require significant acquisition of residential properties and was not therefore a way of avoiding property impact. This strategy was not therefore taken further.
- 4.2.14 **Strategy S7 Existing Road Corridor Improvements** examined the case for widening the A2 Shore Road online. The previous Scheme of the early 1990s was considered but that was found to have inadequate width of traffic lanes to cope with existing and future traffic flows. It would have permitted traffic to continue to turn right into and out of the numerous private accesses across increased traffic flows so there were significant doubts as to its adequacy in operation and its safety, but the concept of on-line widening was developed further.
- 4.2.15 A major issue with this strategy is the impact on property, i.e. on the reduction of gardens and the demolition of dwellings; therefore the width of the widened road would be crucial. The aim would be to provide 4 lanes (2 lanes in each direction) for moving traffic but it was found that to be adequate the road should be either a dual carriageway with no interruption from right turning vehicles at private accesses, or have a fifth central lane for turning traffic. There is also an expectation that wider pedestrian footways and safe cycle facilities should be an essential element of any improvements.
- 4.2.16 The potential demolition of residential properties, which could be anything from 10 to 40 in number depending on the actual line and width of the improved road, and in addition many gardens would be reduced.
- 4.2.17 Noise and air quality issues would require careful attention but any increase in adverse effect would be relatively small given existing conditions. Shore Road has a recognised townscape value, due in part to the mature trees along the route. It would be inevitable that many trees would have to be felled to create the additional road space and measures would be required to replace as many as possible.
- 4.2.18 This strategy has the advantage that it directly addresses the problem within the existing road corridor and, because the route has been protected, is perhaps the solution most expected by stakeholders. However, it could be the most complex to construct and would almost certainly have a significant impact on residential property. It could have substantial adverse environmental impacts in relation to the built environment and could be less favourable than Strategy S5 in terms of safety, both during construction and in use unless a dual carriageway is adopted.
- 4.2.19 On balance, although there were significant concerns, it was considered that this strategy warranted further examination.

- 4.2.20 **Strategy S8 New Road Coastal Corridor** would aim to relieve Shore Road within Greenisland by provision of a new parallel road within the Belfast Lough. It would provide a good traffic engineering solution as it would, by definition, have junctions only at each end.
- 4.2.21 It would however have significant deliverability problems. Property would be required at the north end to link back to the A2. Some of the remaining properties have moorings and there would be an expectation of boat access to the lough and there would be loss of amenity (view across the lough). In terms of integration with other policies and in particular those for the environment it is almost certainly not deliverable as a result of the environmental impacts on the Belfast Lough Special Protection Area habitat (overwintering birds), a Ramsar Site and Areas of Special Scientific Interest. This strategy was not therefore taken further.
- 4.2.22 It was therefore considered that two strategies, **S5 New Road Inland Corridor** and **S7 Existing Road Corridor Improvements**, had potential as solutions to the bottleneck problem. Buildability, services and land and compensation were identified as major risks that could not be quantified or mitigated without more design work and it was recommended that the two strategies be taken forward for more detailed assessment.

4.3 Alternatives Considered – Stage 2 Options

- 4.3.1 The Stage 2 assessment focussed on identifying and assessing options in inland (S5) and existing road (S7) corridors. Options were also developed for a combination of the S5 and S7 strategies; online widening of the southern part of the existing road with a new inland road bypassing the section north of Station Road. During the course of the Stage 2 examination it became evident that a local gyratory system might also provide a solution and this option was considered as well.
- 4.3.2 Numerous options and variations of those options were drawn up and assessed. The findings of the Stage 2 assessment were presented in a report, "Stage 2 Scheme Assessment August 2006".
- 4.3.3 It should be noted that some of the variations were drawn up simply to illustrate the choice between roundabouts or traffic signalled controlled junctions. Junctions were not designed beyond a broad illustration of their location and size and on that basis the implications were considered.

Strategy S5 Options – New Road Inland Corridor

- 4.3.4 The following options were considered:
- Option S5-1 – New Road Inland Corridor - Greenisland Cutting;
 - Option S5-2 – New Road Inland Corridor - Greenisland At-grade;
 - Option S5-2-V3 – New Road Inland Corridor - Parallel to Shore Road at University;
 - Option S5-2-V4 – New Road Inland Corridor - Parallel to Shore Road at School.
- 4.3.5 The inland routes have an advantage in that dealing with traffic during construction would be a localised problem, albeit an important issue. They would have a major advantage for the residents of Shore Road as the impacts on their property would be

relatively low. They would have the parallel disadvantage of introducing a new road into a different community.

- 4.3.6 Option S5-1 is a very high cost option at £68.9m, with a benefit/cost ratio (BCR) of 1.00. It has a major severance issue at Greenisland and at the University and in that respect, it would be moving the existing problem on Shore Road, to a different established urban community from where it is now. There is a significant risk that dealing with this severance could lead to even higher costs. Option S5-2 is a lower cost at £62.9m, but has negative value and a BCR of less than 1. It would have an even greater severance impact on Greenisland as the new road would be at grade with the surrounding community. It is considered that the Options S5-1 and S5-2 could not safely be taken forward because of high cost, relatively poor value and major severance to a community.
- 4.3.7 Option S5-2-V3 has the highest cost at £74.6m. There would be less severance at the University in the sense that it would create a new boundary, but it would directly affect halls of residence and research buildings and they would have to be replaced at significant cost and programme delay. It would not go through the centre of Greenisland but would have an element of severance at the edges and would directly affect a school, church and chapel as well as residential properties. It is the custom to respect the position of churches in the community and only acquire by agreement therefore in that sense the acquisition of church properties could not be guaranteed. It is considered that the Option S5-2-V3 could not safely be taken forward.
- 4.3.8 Option S5-2-V4 avoids the University but would run through the Belfast High School. There could be benefits to the school in being able to provide an improved access, but there would be cost and programme issues in replacing affected buildings. This option has the same severance issues as Option S5-2-V3 and the same lack of guarantee of acquisition of church properties. This option has a much lower cost at £41.2m than other inland options, but it has a negative value and a BCR of less than 1. It is considered that S5-2-V4 would be the most feasible option of the inland options mainly because the cost would be more manageable, though further work would be required to ensure that a fully designed Scheme could give value for money. It would also have major severance and acquisition issues.

Strategy S7 Options – Existing Road Corridor Improvements

- 4.3.9 The following options were considered:
- Option S7-1 – Existing Road Corridor Improvements - 4 Lanes Widen Both Sides;
 - Option S7-2 – Existing Road Corridor Improvements - 4 Lanes Landward Side Only;
 - Option S7-3 – Existing Road Corridor Improvements - 5 Lanes Widen Both Sides;
 - Option S7-4 – Existing Road Corridor Improvements - 5 Lanes Landward Side Only.
- 4.3.10 Options S7-1 and S7-2 would have costs of £44.6m and £41.6m respectively. Widening on both sides is shown to be more costly than one side only because of the larger numbers of properties in total (including gardens) that would be affected by the works. The boundary works, service connections and traffic management would all be more extensive than for the landward only side. Option S7-1 has a BCR of 1.31, and the Option S7-2 to widen on one side only would be expected to have slightly higher values due to the lower cost.

- 4.3.11 The concept of 4 lanes with only a double white line to prevent right turning movements has inherent road safety concerns and the best advice is that a 4-lane road would not be adequate to deal with future traffic flows. It is considered that Options S7-1 and S7-2, as 4 lane roads, could not be safely taken forward because they would be inadequate and have safety concerns.
- 4.3.12 Options S7-3 and S7-4 are more costly at £49.2m and £46.4m (both sides and landward only respectively) because of the additional road width and more extensive works required as a result. Option S7-3 has a BCR of 1.14, and again, the Option S7-4 to widen on one side only would be expected to have higher values due to the lower cost. S7-3 affects potentially 29 houses and 102 gardens, and for S7-4 the numbers are 40 and 41 respectively, plus the Spar grocery store is affected by both. These are likely to be maximum numbers but more detailed design would have to be undertaken to confirm that. Although S7-4 would affect more houses as opposed to gardens, the concerns over buildability of widening to both sides strongly suggests that S7-4 would be preferred.
- 4.3.13 In all of the online widening options the impact on residential properties and on the townscape of the road as a whole is a major issue. However, it is considered that evolving an acceptable cross-section would give a balance between the conflicting aims of serving the traffic demand and minimising the impact on the residential properties. Buildability is a major concern and it is considered that it must influence towards widening to one side only.
- 4.3.14 It was determined that, of the on-line widening options, Option S7-4 should be considered as the most feasible. However, in consideration of the operational efficiency and the safety of all road users it is considered that the option should be regarded as an urban dual carriageway rather than a 5-lane road.

Strategy S5S7 Options – Combined Partial Bypass

- 4.3.15 The following options were considered:
- Option S5S7-1 – Combined Partial Bypass - Widen 4 Lanes With Roundabouts;
 - Option S5S7-2 – Combined Partial Bypass - Widen 5 Lanes With Traffic Signals.
- 4.3.16 The two options demonstrate that there would be a lower cost if a partial bypass were included than widening along the whole length of the Greenisland bottleneck. The estimated costs of Options S5S7-1 and S5S7-2 are £41.1m and £40.9m respectively, the main reason for the lower costs are the reduced impact on residential properties. The comparable numbers would be 27 houses and 29 gardens for S5S7-1 and 23 houses and 25 gardens for S5S7-2. Both would affect the Spar grocery store. Both of these options are illustrated with landward side only widening.
- 4.3.17 Option S5S7-1 has a BCR of 1.34. Option S5S7-2 could have a similar value subject to whether traffic signals or roundabouts perform better. As with Options S7-1 and S7-2, the concept of 4 lanes with only a double white line to prevent right turning movements has inherent road safety concerns and the best advice is that a 4-lane road would not be adequate to deal with future traffic flows.
- 4.3.18 It was determined that, of the combined options, Option S5S7-1 would be the most feasible. However, in consideration of the operational efficiency and the safety of all road users, it is considered that the option should be regarded as an urban dual carriageway rather than a 5-lane road.

Option G1 – Gyratory

- 4.3.19 The gyratory would have a new inland road for northbound traffic and using the existing Shore Road for southbound traffic. As found, Shore Road carriageway would be inadequate for future traffic flows. The poor provisions for pedestrians and cyclists would remain. A Scheme more comparable to other options, i.e. without those deficiencies and with some improvement along Shore Road, would cost £40.5m and would be comparable with online option costs. The additional improvement along Shore Road would affect 1 house and 50 gardens.
- 4.3.20 The new section of road from the Belfast High School to Station Road would introduce an element of new severance along the edge of the Greenisland housing area, in an area that does not suffer at present. It would directly affect the school and also residential properties and would go through church land (but not the church building). The new road north of Station Road would directly affect houses and also a chapel. Therefore there would be risks to cost and programme from the school acquisition and risks to successful acquisition from the churches as there would be no guarantee of acquisition. The element of severance of the community would be present, perhaps on a lower scale than some of the inland options. However, many residential properties would be situated within a major road system, with a major route both front and back.
- 4.3.21 Gyratories are perhaps more commonly situated in town centres or the immediate approaches to town centres. This gyratory would be situated on a route some distance from Belfast and would be wholly different to the remainder of the A2 route. The principle of a gyratory may not be popular with the travelling public nor with those residents marooned within the gyratory. Whilst possibly an efficient traffic solution, it is not seen as having any merits over the other option strategies. It is considered that this could not safely be taken forward.

Public Consultation

- 4.3.22 Roads Service instructed that public consultation should be undertaken before the preferred route was selected, to bring people up to date on the findings of the Scheme assessment and to seek comments on the options most likely to provide deliverable solutions. Three options were presented as possible solutions to the bottleneck problem on the A2 at Greenisland. The three options were:
- Inland Option based on S5-2-V4 – New Road Inland Corridor;
 - Online Option based on S7-4 – Existing Road Corridor Improvements;
 - Combined Option based on S5S7 – Combined Partial Bypass.
- 4.3.23 The consultations comprised a number of events. The options were presented to Carrickfergus Borough Council on 27th February 2006 and to Newtownabbey Borough Council on 15th March 2006. A public exhibition was held at the Clarion Hotel on Wednesday 22nd March and Thursday 23rd March, 2006.
- 4.3.24 Arising from the exhibition, a number of meetings were held with locally based organisations. These were St. Colman's RC Church; Northern Ireland Housing Executive; Silverstream Primary School; Belfast High School; Church of the Nazarene; and the Police Service of Northern Ireland. In addition, Roads Service was invited to attend meetings with the Shore Road residents group and the Greenisland residents group.
- 4.3.25 People were, in the main, concerned about direct impacts on their property or community facility and/or about disruption during construction. Another significant

concern was road safety, and in particular turning onto the road if the proposals result in higher vehicle speeds.

- 4.3.26 It became apparent that whilst residents on Shore Road were very aware of the Scheme and the impact it might have on their property, it came as a shock to residents from within the wider Greenisland community that they could be directly affected if the inland option were to be selected.
- 4.3.27 Community organisations came out very strongly against the inland option. They stressed that there was a stable community within Greenisland beyond the Shore Road corridor and to route a road even along the edge of that area in Greenisland would cause new, and to them unacceptable severance and loss of enjoyment of the area.
- 4.3.28 Overall from 983 questionnaires received, 29.5% backed the Inland Option – S5-2-V4, 15.8% selected the Combined Option and 51.8% chose the Online Option – S7-4. 2.9% did not choose any option.
- 4.3.29 From discussions with people attending the exhibition, it was evident that not all visitors understood the displays and the different options being described. Therefore, there could be an element of misunderstanding reflected in some of the questionnaires. For example, many people gave the impression that for them the real choice was between an inland route and an on-line improvement. If they were against the inland option, they did not particularly distinguish between the on-line option and the combined option.

4.4 Other Options (Do Nothing and Do Minimum)

- 4.4.1 It was assessed that a do nothing option would result in even greater traffic congestion and delays at peak times in the future. It would also not increase road safety for vehicular drives, pedestrians and public transport.
- 4.4.2 No options were identified as Do-Minimum solutions. It was demonstrated in Stage 1 that improving the junctions alone would not solve the congestion problem because the links between the junctions would not cope with traffic demand and would therefore restrict the flow of traffic into the improved junctions. The cost of improving the junctions and the land acquisition that would be required would be well beyond the notion of a Do-Minimum Scheme.
- 4.4.3 It has been evaluated from tests undertaken by Roads Service that the carriageway of Shore Road within the Scheme limits would effectively have no residual life beyond 2010 and would therefore require major reconstruction. That in itself would be a significant Scheme in terms of cost and the impact during reconstruction on the travelling public. No account has been taken of this in the economic assessment of the proposed Scheme and it is therefore a robust assessment.

4.5 Conclusion - The Preferred Option (The Scheme)

- 4.5.1 In considering the above findings, it was considered that a reasonable and sound deduction would be that the preferred option should be based on the combination of online widening with a partial bypass, as shown in Figure 5.1 – Preliminary Scheme Design. It would have the lowest estimated cost of the three options, a positive net present value and it would have a lower impact on residential property than a full online improvement and would have none of the new severance of an inland route.

- 4.5.2 The online widening section would be an urban dual carriageway with a wider shared cycleway / footway on one side and with pedestrian crossing assistance at intervals. The only permitted movements from private and minor accesses would be left-in / left-out and it is considered that this would be a safe provision.
- 4.5.3 The offline new road would also be a dual carriageway, possibly as an extension of the rural dual carriageway to the north, with kerbed carriageways and grass verges. Pedestrians and cyclists would use the bypassed section of Shore Road. There would be no direct access to the new road and as a result provision would have to be made for a bridge to connect the land either side of the road.
- 4.5.4 There would be formally controlled junctions at Jordanstown Road, as existing, and improved junctions at Shore Avenue (University), Shorelands and Station Road and amendments to the Seapark junction. The three improved junctions would have to provide safe opportunities to undertake U-turns.
- 4.5.5 This recommendation was presented to the Roads Service Board on Monday 6th June 2006 and the Preferred Route was ratified at that meeting. The decision was made public on Wednesday 14th June 2006. Every person who had contacted Roads Service about the Scheme since the present studies commenced in April 2005 was sent a note of the announcement and the information was released to the press.

4.6 References

- Design Manual for Roads and Bridges, Volume 11, Environmental Assessment. Department of the Environment for Northern Ireland et al (August 1994, as amended up to August 2006).