

3.0 DESCRIPTION OF SCHEME OPTIONS

- 3.1 A number of options have been developed based on the Strategies S5 and S7 that were recommended for further assessment in the Stage 1 SAR. A combined Strategy S5S7 that was noted at Stage 1 has also been developed and arising from the assessments of these options, and a local gyratory Strategy G was also developed. For completeness of the assessment of possible options, a number of variations of those options have also been illustrated and discussed in this report.
- 3.2 A total of 14 options and variations have been examined. To avoid repetition of assessment, they are considered in 4 (strategy) groups:
- Strategy S5 Options – New Road Inland Corridor (7 total);
 - Strategy S7 Options – Existing Road Corridor Improvements (4 total);
 - Strategy S5S7 Options – Combined Partial Bypass (2 total);
 - Strategy G1 Options – Gyratory (1 only).
- 3.3 The options and variations are described below and are illustrated in the relevant figures. A table of option (and variation) characteristics has been prepared for ease of comparison and is presented in [Appendix 3.1](#). A figure is included in the report for each of the 14 options and variations. These have been drawn to a scale and format that provides an illustration of the impact on property. For a better appreciation of the route of each option a complementary figure has been drawn up to show how it would be located within the study area. These have also been included for reference in the [Appendix 3.1](#).
- 3.4 The figures illustrate the properties that could be affected by that option. For illustration purposes, buildings that would have to be demolished have been shown in red. Other buildings that would be within 5m of the new road boundary have also been shown as they may or may not be affected either by the finished works or by the construction of the works. That would be subject to the findings of the detailed design of a scheme, but for the purposes of comparison of the options an estimate has been made and they are categorised as either ‘probably demolished’ in orange or ‘possibly demolished’ in green.
- 3.5 It should be noted that some of the variations have been drawn up simply to illustrate the choice between roundabouts or traffic signalled controlled junctions. Junctions have not been designed beyond a broad illustration of their location and size and on that basis the implications can be considered. A decision on the choice of junctions on a route would not be made at this stage of the scheme development but would be more a matter for the detailed design of the preferred option to be taken forward to Stage 3 assessment.
- 3.6 A full cost estimate appraisal of all options and their variations has been included in [Appendix 3.2](#). Tables of properties affected by each option and variation have been included in [Appendix 3.3](#).
- 3.7 All bar one of the S5 options and variations commence at the southern end with a junction alteration at Jordanstown Road and that is therefore necessarily included in their cost estimate. The remaining S5 option variation and all other options commence at the bus turning facility 200m north of Jordanstown Road and those cost estimates do not include for any works at Jordanstown Road. All of the options and variations are illustrated as including and ending at a roundabout at Seapark, though in the final event that could be traffic signals.

- 3.8 A contractor's view of construction issues with on-line widening has been obtained and a report of this has been included in [Appendix 3.4](#). This identifies and discusses the construction issues and how they might affect the programme and cost of works. The report from the contractor confirms the special nature of working not only alongside live traffic but dealing with numerous utilities diversions and connections to properties and maintaining access to the host of properties along the road. The key difficulty confirmed is the interface with numerous third parties (utilities, landowners, the school etc.) and how that requires work on site to be broken down into small items.
- 3.9 The contractor's report highlights a number of areas where item costs could be tackled differently and where estimated costs could be on the low side. However, it also confirms that the value of optimism bias retained in the estimates at this stage gives a level of comfort that the estimated on-line option cost estimates will prove to be adequate.

Strategy S5 Options – New Road Inland Corridor

- 3.10 The aim of this strategy is to provide a new road inland of the A2 Shore Road to relieve the existing A2 2-lane single carriageway. This would be located to the west of the A2 on the landward side of the road away from Belfast Lough. Two main options have been considered within this strategy: S5-1 with the road in a deep cutting through Greenisland, with a variation S5-1-V1; and S5-2 with the road at-grade, with 4 variations S5-2-V1 to S5-2-V4.
- 3.11 The inland route was initially assessed on a similar alignment to that illustrated in the Stage 1 SAR, but with one significant change. At the southern end of the route, it would continue through the University to an amended junction at Jordanstown Road and not down Shore Avenue from the University as shown in the Stage 1 SAR. The junction at Jordanstown Road will be tested as a traffic signal controlled junction but a variation (V1) with a roundabout will be illustrated. In both cases, the link to the existing Shore Road at Jordanstown Road would be buses-only in both directions to avoid the bypassed section of Shore Road being used as a through route.
- 3.12 That alignment would have implications for severance of the community at Greenisland. This has been mitigated to some degree by considering the road in a deep cutting through Greenisland, although deep cutting may be perceived as causing greater severance. However, an option has been considered with the new road at-grade through Greenisland so that the differences can be tested. Also, further at-grade variations were drawn up that would have an alignment closer to Shore Road. There would still be severance of communities, but in different locations and consequently with different impacts.
- 3.13 The northern end of this option would join the existing A2 at Seapark where it would join the existing dual carriageway. That junction has been illustrated as a roundabout because it could be considered a safer option than traffic signals coming as it does at the end of the long dual carriageway from Carrickfergus. However, the most appropriate form of junction would be considered at Stage 3 with a comparison made between roundabout and traffic signals.
- 3.14 Thus, there are two distinct concepts that are demonstrated; a sub-grade separated route that goes through Greenisland in a deep cutting and an at-grade route through Greenisland. A number of variations are illustrated; some with different types of junction and some with routes closer to Shore Road. They are all described below, with a cost estimate.

Option S5-1 – New Road Inland Corridor - Greenisland Cutting

Figure SAR2/3.1

- 3.15 This option has been considered as a rural dual carriageway along the whole of its length and it would have a 50mph speed limit and be designed accordingly. The cross-section dimensions are taken from Figure 4-3a of the Advice Note *TD 27/05 Cross-sections and Headrooms*, of the Design Manual for Roads and Bridges (DMRB). That is a dual 2-lane carriageway with carriageway widths at 7.3m plus 1.0m hardstrips and a central reserve of 2.5m. To ensure robust cost estimates it has been assumed that there would be a total of 6m for footways and cycleways rather than grass verges and that street lighting would be provided. The total width would be 27.1m plus any space for embankments, cutting slopes and retaining walls.
- 3.16 The terminating junctions would be at Jordanstown Road and Seapark and there would be only one other junction, which would be located between the University and Greenisland. That would serve the University and a new development road linking to Shorelands. It is proposed that the existing Shore Road would not connect to the Jordanstown Road junction except as a bus-only link therefore the link road via Shorelands would serve as a link for local traffic to the new road. As the link road would be an essential element of the option, it has been included in cost estimates.
- 3.17 The option would commence with alterations to Jordanstown Road junction to enable the road to swing inland. The connection to Shore Road would be restricted to buses only and that could be facilitated by an additional signalised junction that could only be operated by some form of recognition of an approaching bus. Its occasional use would have little impact on the main traffic flows.
- 3.18 The new road would continue through housing on Shore Road and enter the University campus following a route that would take it through an area of student halls of residence. It would then cut across the existing access on Shore Avenue, across University car parks and through a gap between the main part of the campus and the Harry Ferguson Village research centre before crossing the Silver Stream watercourse and entering agricultural fields owned by the University.
- 3.19 For robust cost estimating, it has been assumed that the whole block of halls of residence would have to be replaced elsewhere on the University campus. Bus stop laybys have been illustrated at the University, though bus routes would be a matter for Translink to determine, and a footbridge has been included in costs, to provide a safe crossing to the University. The footbridge would also provide a safe pedestrian route to the separated Harry Ferguson Village premises. A new vehicle access would be required for those premises. A major area of formal car parks would have to be replaced somewhere within the University campus.
- 3.20 The new junction would be located between Silver Stream and Neill's Lane and the latter would be connected to the junction. As illustrated, the junction and link road to Shorelands would occupy the western edge of the Belfast High School playing fields.
- 3.21 The new road would continue northwards across open fields, some of which have been allocated as housing land in the Draft Belfast Metropolitan Area Plan. Although the road might circumvent the actual allocation land, for robust cost estimating it has been assumed that all of the land south of Greenisland has development potential.
- 3.22 The route illustrated would utilise the open space within Greenisland as far as possible but it would directly affect a care home, a community hall and on the north side of Station Road a number of dwellings. It would be constructed in a deep cutting over this length. Bridges over the cutting

would be provided for Station Road and for the local estate road between Rossmoor Green and Knockleigh Drive, with the two roads continuing at their existing level.

- 3.23 The current examination is based on the deepest part of the cutting being located between the two bridges and as stated above with the two local roads bridging at current levels. The new road would then gradually rise out of the cutting. With the minimum of cutting, the new road would come back to ground level approximately at a point 150m within the southern edge of Greenisland and approximately 50m beyond the northern edge. In practice the cutting might have to be extended further south to minimise noise and visual impacts at properties in Greenisland.
- 3.24 The bridges over the deep cutting would mitigate the severance caused by the cutting itself by maintaining access between the two sides of the road. The cutting would mitigate noise impacts and visual intrusions but the benefit would diminish as the road climbed out of the cutting. There could therefore be an increase in costs if the extent of the cutting had to be increased to adequately deal with these issues. There would also be loss of open space and if that had to be replaced by some level of cut and cover, sometimes referred to as a land bridge, that could significantly increase costs of this option.
- 3.25 The final section of the new road would run across open fields to Seapark. It would cross Whinfield Lane at grade. As it is intended that there would be no direct access to the new road an accommodation bridge has been allowed for in the costs. This would be a single lane bridge with single lane approaches on embankments and passing places could be provided at the top of the ramps.
- 3.26 The new roundabout at Seapark would include a link to the existing A2 Shore Road and a link into the former factory site. The existing access to the latter would be closed and significant alterations would be required to divert the new access to the roundabout.
- 3.27 Aside from the cutting, the new road would closely follow the existing ground levels. The most significant factor would be setting the road high enough to bridge over watercourses and ditches and as a result much of the road away from Greenisland could be on low embankments. As the land falls away from Greenisland to both north and south, the road would gradually rise to Greenisland on fairly shallow gradients. Having passed through Greenisland, it would fall gradually at fairly shallow gradients to Seapark.
- 3.28 The estimated cost of the Option S5-1 at current prices is of the following order:

Construction	£ 14.8m
Preliminaries & Traffic Management	£ 3.3m
Preparation & Supervision	£ 3.5m
Property & Land	<u>£ 26.3m</u>
Sub-total	£ 47.9m
Optimism Bias (44%)	<u>£ 21.0m</u>
S5-1 cost estimate	<u>£ 68.9m</u>

Variation S5-1-VI – New Road Inland Corridor - Jordanstown Roundabout [Figure SAR2/3.2](#)

- 3.29 The only difference of this variation from the option above is the form of junction at Jordanstown Road. A roundabout is illustrated and this has a connecting leg to Shore Road, for buses only. That tends to push the new road on a different alignment, affecting residential properties on Jordanstown Road rather than Shore Road. Although it appears to skirt the edge of the University halls of residence, for robust estimating it has again been assumed that the whole block of halls of residence would have to be replaced elsewhere on the University campus.
- 3.30 In practice, if this option were to be taken forward the most appropriate form of junction would be selected based on a detailed design and assessment of the junction options. That would take into account operational characteristics, cost and impact on properties in particular.
- 3.31 As would be expected, the estimated cost of the option at £69.2m including optimism bias at current prices differs little from S5-1.

Option S5-2 – New Road Inland Corridor - Greenisland At-grade [Figure SAR2/3.3](#)

- 3.32 There are two significant differences of this option from option S5-1 described earlier. Firstly, the new road would continue through Greenisland at existing ground level (at-grade). As a result of that, the concept of the road has been changed from rural to urban. The impact of these changes is explained below, the road would otherwise be as option S5-1.
- 3.33 The new road would rise from Jordanstown Road junction to a high point, which would be at a point 100m within the southern edge of Greenisland. The road would then fall continuously through Greenisland and across open fields.
- 3.34 The estate road between Rossmoor Green and Knockleigh Drive would be closed. There would be no replacement road bridge but a footbridge would be provided somewhere in that vicinity, perhaps in conjunction with bus lay-bys.
- 3.35 A new junction would be provided at Station Road. This would provide a more direct access to the new road for local traffic than in option S5-1. There would also be a junction between Silver Stream and Neill's Lane as in option S5-1.
- 3.36 The latter junction would provide a link to Shore Road via Shorelands. Unlike option S5-1, the link is not absolutely essential to the option as local traffic would be able to access the new road at the Station Road junction. However, for many local journeys it would provide a more direct, shorter route and as a second local access, would share the traffic load with Station Road junction. The cost of the link road has therefore been included in this option and the link road has been included in the traffic model.
- 3.37 This option would therefore have 4 junctions within a length of approximately 3.3km, i.e. at an average spacing of 1.1km. It is considered therefore that the new road would be more appropriate as an urban road, rather than rural as in option S5-1. All junctions except at Seapark have been illustrated as traffic signal junctions and the road would be designed to have a 40mph speed limit.
- 3.38 The cross-section dimensions are taken from Figure 4-4a of *TD 27/05 Cross-sections and Headrooms* (DMRB). That is a dual 2-lane carriageway with carriageway widths at 7.3m without hardstrips and a central reserve of 1.8m. To ensure robust cost estimates it has been assumed that there would be a total of 6m for footways and cycleways and that street lighting would be provided.

The total road width would be 22.4m plus any space for embankments, cutting slopes and retaining walls.

3.39 This option gives the opportunity to test a different traffic model, i.e. largely rural to largely urban. It would also highlight by comparison the actual cost of placing the road in a cutting at Greenisland, in S5-1.

3.40 The estimated cost of the Option S5-2 at current prices is of the following order:

Construction	£ 11.2m
Preliminaries & Traffic Management	£ 2.5m
Preparation & Supervision	£ 3.5m
Property & Land	£ 26.5m
Sub-total	£ 43.7m
Optimism Bias (44%)	£ 19.2m
S5-2 cost estimate	£ 62.9m

Variation S5-2-V1 – New Road Inland Corridor - Roundabout Junctions [Figure SAR2/3.4](#)

3.41 The difference in this variation from S5-2 is that all junctions are illustrated as roundabouts. As in the variation of S5-2, although it appears to skirt the edge of the University halls of residence, for robust estimating it has again been assumed that the whole block of halls of residence would have to be replaced elsewhere on the University campus.

3.42 As would be expected, the estimated cost of the option at £63.8m including optimism bias at current prices differs little from S5-2.

Variation S5-2-V2 – New Road Inland Corridor – Split University Shorelands Junctions [Figure SAR2/3.5](#)

3.43 The difference in this variation of S5-2 is that junctions to serve the University and to serve a link to Shore Road via Shorelands would be provided separately. The main advantage in this is that the individual junctions can be best located for their particular purpose. The University junction could be located further south and closer to the existing University buildings and the Shorelands junction could be situated close to Greenisland.

3.44 Where traffic signal junctions are considered, the junctions could include facilities for bus-stops and provision for pedestrian crossings. By spacing out these two junctions, those facilities would be evenly spread along the new road. Furthermore, the connecting road into the University campus and the link road to Shorelands would be shorter and a smaller cost to the option.

3.45 Junctions with 3-legs are more efficient than junctions with 4 legs as there are fewer conflicting movements at each junction. That is counterbalanced by the simple fact of an additional junction on the route. That could result in an additional delay to the major flow of traffic travelling along the full length of the new road.

3.46 This variation is only given limited consideration at this stage but if this concept were considered to be the preferred option, this variation would be examined in more detail during Stage 3 assessment.

As would be expected, the estimated cost of the option at current prices differs very little from S5-2 at £63.8m including optimism bias.

***Variation S5-2-V3 – New Road Inland Corridor -
Parallel to Shore Road at University***

[Figure SAR2/3.6](#)

- 3.47 This is described as a variation of S5-2 on the grounds that it would be another inland at-grade road, as an urban dual carriageway, but the route of the new road is distinctly different. The premise being investigated is that the severance caused by a new inland road would be less if it were not through the central area of Greenisland and not utilising open space that has free access for the general public, as in S5-2. A route has been illustrated therefore along the eastern edge of Greenisland housing area and behind the relatively new Shorelands housing estate.
- 3.48 The route would be as for option S5-2 but within the University grounds it would turn in a more easterly direction behind the Langley Hall housing estate. It would cut through the Harry Ferguson Village research centre, cross over Silver Stream, run through the Belfast High School playing fields and across the housing allocation land at Shorelands.
- 3.49 There would be a new junction at Shorelands that would serve developments on both sides of the road. The junction would be a significant distance from the University and in reality that would probably require a better placed additional junction.
- 3.50 By skirting the Shorelands estate, the route would run through the Moyard Gardens area of Greenisland, across the eastern end of the Silverstream Primary School playing field, through a further area of land with a housing allocation and St. Colman's RC Church.
- 3.51 A junction would be provided at Station Road which would directly affect a number of dwellings. From there the dual carriageway would run along Longfield Gardens but given the increased width it would directly affect houses and possibly the Ebenezer Chapel. Longfield Gardens would be diverted to Station Road to give separation from the main junction and more properties would be affected by that. The route would finally cross open fields to rejoin the route of option S5-2 to Seapark.
- 3.52 This variation does not remove the issue of severance at either the University or in Greenisland but it does illustrate that wherever an inland route is located, the severance may differ but it remains a major issue. By demonstrating this, it adds to the understanding of other options in comparison. Indeed, from this illustration another variation was identified, see V4 following.

3.53 The estimated cost of the Option S5-2-V3 at current prices is of the following order:

Construction	£	10.1m
Preliminaries & Traffic Management	£	2.5m
Preparation & Supervision	£	3.5m
Property & Land	£	35.7m
Sub-total	£	51.8m
Optimism Bias (44%)	£	22.8m
S5-2-V3 cost estimate	£	74.6m

Variation S5-2-V4 – New Road Inland Corridor - Parallel to Shore Road at School

[Figure SAR2/3.7](#)

- 3.54 One of the key factors in any inland route is finding a point that it can leave and rejoin the existing A2 and the impact on the established road frontage is critical to that. It is considered that a reasonable solution is available at the northern end at Seapark but the southern end presents much greater difficulties. All previous versions of S5 inland road have commenced at Jordanstown Road and cut through housing and the University. However, examination of variation V3 above tends toward suggesting that there could be an alternative starting point at the Belfast High School. This has therefore been illustrated.
- 3.55 In this case the existing road would be widened over the length from the bus turning facility as far as Belfast High School. That could largely be achieved within space that has been preserved for this scheme. The University would continue to be served by the existing access at Shore Avenue, which might be improved by the provision of traffic signals, or roundabout.
- 3.56 The road would then swing inland through the grounds at the front of the school to the rear of Silverstream Banks housing estate. This would require the removal of some school buildings and / or dwelling(s) at the housing estate. The impact on the school would not be considered to threaten the future of the school but land could be required to enable the replacement of the lost buildings and playing fields.
- 3.57 The road would continue through the school playing fields, through dwelling(s) on Neill’s Lane and across the housing allocation land to a new junction at Shorelands. The junction would enable a link to be created via Shorelands on the east side of the road to Shore Road and it would also serve the developable area on the west side of the road.
- 3.58 The new access on the west side could also provide a new access to the school though it would be some distance from the school. If it is too far, an alternative replacement access might have to be provided for the school. That could involve an additional access for the school’s sole use. Alternatively, split junctions might be a better solution on the same principle as described in variation V2 above. In that case there would a 3-legged junction nearer the school that would serve both the school and development land and a second 3-legged junction connecting to Shorelands. That would be an issue to be examined at Stage 3 if this were to become the preferred option.
- 3.59 The road would then follow the same route as in variation V3 above.

3.60 The estimated cost of the Option S5-2-V4 at current prices is of the following order:

Construction	£	8.7m
Preliminaries & Traffic Management	£	2.3m
Preparation & Supervision	£	3.5m
Property & Land	£	14.1m
Sub-total	£	28.6m
Optimism Bias (44%)	£	12.6m
S5-2-V4 cost estimate	£	41.2m

Strategy S7 Options – Existing Road Corridor Improvements

3.61 The aim of this strategy is to provide an increase in traffic lanes along the existing A2 Shore Road by widening the road. The concept is based on urban road conditions with a speed limit of 40mph, as at present. Four options have been considered within this strategy; S7-1 to S7-4.

3.62 The existing corridor improvement options will be on similar alignments to that illustrated in the Stage 1 SAR. There are 3 fundamental choices that can be made that could provide a matrix of 8 options but for practical purposes this can be cut down to a smaller number that will demonstrate all the required aspects of cost, operation and impact on surrounding property. The fundamental choices are:

- Widen on both sides in a variable manner or on one side only (landward side),
- Provide 4 lanes or 5 lanes,
- Permit right-turn movements or prevent them.

3.63 In practice, a 4-lane road with permitted right-turns into individual properties would not provide adequate capacity as determined by current Advice Note *TA 79/99 Amendment No.1 Traffic Capacity of Urban Roads*, of the Design Manual for Roads and Bridges (DMRB), for the forecast flows and a 4-lane road with permitted right-turns would not be put forward on safety grounds. Therefore for those reasons a 4-lane road has only been tested with central double white lines preventing right-turns, in which case residential accesses would be left-in/left-out. In the illustrated options, roundabout junctions would be provided to enable residents to perform u-turns at key junctions; at Sea Park, Station Road, Shorelands and Shore Avenue (the University).

3.64 On the 5-lane options the fifth lane could be used for turning movements. The 5-lane road has therefore been tested with traffic signal junctions. It might be possible to provide pedestrian refuges or extended islands within the central lane of the 5-lane options to supplement the facilities at the signalised junctions whilst permitting right-turns.

3.65 For this Stage 2 Assessment, the assumed width of 4-lane options is 20m (4x3.5 plus footway / cycleways of 2.5m and 3.5m) and the assumed width of 5-lane options is 23m, i.e. with an additional central lane of 3m. The lane widths have been derived from the above Advice Note *TA 79/99* as being adequate for the predicted traffic flows. These widths have been illustrated with widening on both sides and widening on one side only, as that will illustrate a full range of physical impacts on adjacent property.

- 3.66 It is generally assumed that cutting and embankment slopes would not be used given that the land required would be occupied principally by houses and gardens. Where level changes arise at road boundaries, retaining structures would be used.
- 3.67 A 3.5m wide shared footway / cycleway would be provided on the lough side as that is the location of the existing cycleway as it approaches from the south. Furthermore, the lough side would have no interruptions from access roads and other junctions, hence it would be a safer and smoother ride for cyclists. A 2.5m footway would be placed on the landward side. These widths would ensure that there was an enhanced facility for pedestrians and cyclists and that motorists exiting driveways would have reasonable visibility along Shore Road before entering the carriageway.
- 3.68 On the 4-lane options, it might be possible to introduce the occasional pedestrian refuge if the extra width was easily attained i.e. not affecting additional properties, otherwise pedestrian facilities would have to be limited to the vicinity of roundabouts. In practice, the 4-lane road might have a central reserve for greater separation than provided by a double white line and also to provide facilities for pedestrians to cross the road in two separate actions, but the total width would not be more than 23m. Thus the impact on property of such a variation of this option would be tested by the 5-lane option at 23m.
- 3.69 The strategy examined is based on an urban road concept, with a recognised permitted traffic speed of 40mph as at present. The equivalent design speed using current standards of highway design from *TD 9/93 Highway Link Design* of the Design Manual for Roads and Bridges (DMRB) is 70kph.
- 3.70 Four options have been illustrated. They serve to determine the merits of each option and to provide a comparison between options. However, they are not designed schemes and do not, for example, accurately define the impact of each option on individual properties. An estimate of impact of property has been made and illustrated in the colour code described at the beginning of this chapter.
- 3.71 The topography of the road would be a significant factor in regard to the impact on buildings. Over much of the length of Shore Road the land slopes from the landward side down to the lough side of the road. That would determine the nature and scope of works required and how that would impact on properties.
- 3.72 On the landward side, widening would generally cut into gardens and a structural wall could be required to retain the garden near to houses. In a foreshortened garden there may not be room to provide a vehicle hardstanding (less than 5m) at the house, or the driveway could be too steep for practical consideration. The house may be closer than 5m to the road boundary and not acceptable as a liveable dwelling depending on the circumstances. Where houses would be more than 5m from the new road boundary, it has been assumed that only the garden areas would be affected. Where the houses are less than 5m from the highway boundary, the decision on whether the house would be demolished would be taken on a house by house basis when a more detailed design was available.
- 3.73 Aside from housing, there is a school, the Belfast High School, and a Spar grocery store on the landward side of the road. There are no level difficulties at those premises but there are specific access arrangements that would have to be considered.
- 3.74 On the lough side of the road, incursions to gardens would generally require the road to be retained by a suitable structure as the gardens tend to fall away from the road. The same assessment of the

impact on houses would be undertaken as on the landward side. It is known that on the lough side of Shore Road some of the driveways already have very steep slopes up to the road and it would not be practical to increase that slope, therefore incursion to the property would be impractical. Therefore widening on the lough side only is not considered a viable option.

- 3.75 As stated above, decisions on how a property would be affected by an option would have to be made on a house to house basis. The current illustrations of the options enable an assessment to be made of the possible impacts at this stage and these would be taken into consideration and examined further if a particular option were to be taken forward as the preferred option.
- 3.76 Given the current state of the existing carriageway and footways, complete reconstruction would be required. That will directly affect cost estimates of the options. It is also a major factor in determining the practical feasibility of widening the road whilst maintaining reasonable traffic flows, and the indirect impact on the cost of the works that might have. The end section from Island Road to Seapark has more recent reconstruction than the remainder of the road and may not require wholesale reconstruction. That has been taken into consideration when estimating the costs of options.
- 3.77 Taking into account comments made above, widening to one side only would imply widening on the landward side. The four options that have been illustrated are therefore:
- 4-lanes and roundabouts, widen on both sides;
 - 4-lanes and roundabouts, landward side only;
 - 5-lanes and traffic signals, widen on both sides;
 - 5-lanes with traffic signals, landward side only.

***Option S7-1 – Existing Road Corridor Improvements –
4 Lanes Widen Both Sides***

[Figure SAR2/3.8](#)

- 3.78 The aim of this option is to provide 4 x 3.5m traffic lanes along the full length of Shore Road in a manner that would minimise the number of occupied buildings (almost wholly dwelling houses) that would be directly affected, and which would have to be demolished. Where space is already available through earlier land acquisition, that would be utilised as far as possible.
- 3.79 The widening would commence at the southern end at the bus turning facility, which is located approximately 200m north of Jordanstown Road and at the southern end of the lough side properties. The widening would cease at Seapark.
- 3.80 There would be roundabouts at the Shore Avenue junction (the access to the University), at Shorelands, at Station Road and at the existing traffic signals junction at the former factory site at Seapark. The last mentioned would be provided simply to provide a U-turn facility. The roundabouts have been shown with a 50m ICD (overall carriageway diameter), the actual size would be determined from more detailed assessment.
- 3.81 In some locations, an alternative access to the rear of houses would be considered, as illustrated. This device could provide a safer and more practical access for vehicles than a direct access from Shore Road.

3.82 The estimated cost of the Option S7-1 at current prices is of the following order:

Construction	£ 11.5m
Preliminaries & Traffic Management	£ 3.8m
Preparation & Supervision	£ 3.5m
Property & Land	<u>£ 12.2m</u>
Sub-total	£ 31.0m
Optimism Bias (44%)	<u>£ 13.6m</u>
S7-1 cost estimate	<u>£ 44.6m</u>

Option S7-2 – Existing Road Corridor Improvements - 4 Lanes Landward Side Only

[Figure SAR2/3.9](#)

3.83 This option widens the road over the same length of the road as in option S7-1. Roundabouts would be provided in the same locations. Carriageways and footway / cycleways provision would be the same. In this case all of the widening would be undertaken on the landward side of the road.

3.84 The aim would be that the horizontal alignment of the widened road would closely follow the existing eastern (lough) side highway boundary. Inspection of the existing road indicated that the horizontal radii of the curves in the road are generally above, but sometimes locally less than, the desirable minimum radius of 365m for the design speed of 70kph. It would either be necessary to acquire additional land for the sole purpose of creating flatter curves, or seek relaxations from standard, subject to checks for forward visibility.

3.85 The estimated cost of the Option S7-2 at current prices is of the following order:

Construction	£ 11.1m
Preliminaries & Traffic Management	£ 3.2m
Preparation & Supervision	£ 3.5m
Property & Land	<u>£ 11.2m</u>
Sub-total	£ 28.9m
Optimism Bias (44%)	<u>£ 12.7m</u>
S7-2 cost estimate	<u>£ 41.6m</u>

Option S7-3 – Existing Road Corridor Improvements – 5 Lanes Widen Both Sides

[Figure SAR2/3.10](#)

3.86 This option would be widened on both sides as in option S7-1 but it would have an additional 3m width and the junctions have been illustrated as traffic signal junctions. Right-turns would not be banned and the additional central lane would be used by right-turning vehicles. The central lane could be continuous or it could have islands to protect right-turning vehicles and provide assistance to pedestrians crossing the road.

3.87 The estimated cost of the Option S7-3 at current prices is of the following order:

Construction	£	12.3m
Preliminaries & Traffic Management	£	4.0m
Preparation & Supervision	£	3.5m
Property & Land	£	14.4m
Sub-total	£	34.2m
Optimism Bias (44%)	£	15.0m
S7-3 cost estimate	£	49.2m

***Option S7-4 – Existing Road Corridor Improvements –
5 Lanes Landward Side Only***

Figure SAR2/3.11

3.88 This option would be widened on the landward side only as in option S7-2 but it would have an additional 3m width and the junctions have been illustrated as traffic signal junctions. It would operate as option S7-3.

3.89 The estimated cost of the Option S7-4 at current prices is of the following order:

Construction	£	11.9m
Preliminaries & Traffic Management	£	3.4m
Preparation & Supervision	£	3.5m
Property & Land	£	13.4m
Sub-total	£	32.2m
Optimism Bias (44%)	£	14.2m
S7-4 cost estimate	£	46.3m

Strategy S5S7 Options – Combined Partial Bypass

3.90 The aim of this strategy is to widen Shore Road as far north as Station Road and from there provide a new road inland of the A2 Shore Road between Station Road and Seapark where it would rejoin the A2 at the existing dual carriageway. Two options have been considered within this strategy; S5S7-1 and S5S7-2. The first would link the inland bypass with a 4-lane widening option and the second would link it to a 5-lane option. (The associated figures will mainly show the bypass section.) For assessment purposes a cost estimate S5S7-1 has been prepared with 4-lane widening on the landward side only and S5S7-2 with 5-lane landward side only.

3.91 The strategy has been examined as an urban route with a design speed of 70kph (40mph) throughout. The existing road would be widened to 20m in S5S7-1 with roundabouts and widened to 23m in S5S7-2 with traffic signals.

3.92 The bypass section has also been designed to 40mph urban standards with a cross-section and total width of 22.4m as in option S5-2. That would provide a break from the 50mph speed limit on the existing dual carriageway to the north and would permit more flexibility in shaping the route than

for a higher speed road design. However, it would be possible to design the bypass section of these options to 85kph (50mph) rural standard but that would require an increase in carriageway widths to 27.1m as in option S5-1. In that latter situation, Station Road would act as the change point from a rural 50mph road to the urban 40mph road.

- 3.93 A key issue within this strategy would be the provision for access between the existing, established Shore Road north of Station Road and the new road and to the greater part of Greenisland. Provision must also be made for public transport services to continue travelling along the bypassed road. However, this must be balanced against the desire to minimise delays to through traffic on the new road and to discourage through traffic from continuing to use the existing road in preference to the new road.
- 3.94 The option is illustrated with full access at the Seapark roundabout but only buses would be permitted access at the Station Road end. This could be reviewed if these options were to be taken forward as the preferred option.

***Option S5S7-1 – Combined Partial Bypass –
Widen 4 Lanes With Roundabouts***

[Figure SAR2/3.12](#)

- 3.95 This option would combine the bypass loop with either S7-1 or S7-2. For illustration purposes the latter has been drawn up and costed, that is with the widening to 4-lanes on the landward side only with roundabout junctions. The widening would have a 20m width and the by-pass as drawn a 22.4m width. That would provide a step down concept from a rural dual carriageway approaching from Carrickfergus, an urban dual carriageway from Seapark and an urban 4-lane road from Station Road.
- 3.96 The illustration shows a 4-legged roundabout at Station Road with the leg from the bypassed section of Shore Road as a bus-only road. Providing for that particular leg tends to push the roundabout further into Station Road with a high impact on residential property. An alternative would be to have a 3-legged roundabout with the roundabout positioned closed to Shore Road and the access to the bypassed section of Shore Road taken off the dual carriageway at, say, 100-150m from the roundabout. That could be a signal controlled junction that would only be operated by some form of recognition of an approaching bus. Its occasional use would have little impact on the main traffic flows.
- 3.97 The estimated cost of the Option S5S7-1 at current prices is of the following order:

Construction	£ 11.7m
Preliminaries & Traffic Management	£ 3.1m
Preparation & Supervision	£ 3.5m
Property & Land	£ 10.2m
Sub-total	£ 28.5m
Optimism Bias (44%)	£ 12.6m
S5S7-1 cost estimate	£ 41.1m

**Option S5S7-2 – Combined Partial Bypass –
Widen 5 Lanes With Traffic Signals**

Figure SAR2/3.13

- 3.98 This option would combine the bypass loop with either S7-3 or S7-4. For illustration purposes the latter has been drawn up and costed, that is with the widening to 5-lanes on the landward side only with traffic signal junctions. The widening would have a 23m width and the by-pass as drawn a 22.4m width. That would be a nominal difference and as drawn there would be a step down concept from a rural dual carriageway approaching from Carrickfergus, an urban dual carriageway from Seapark and an urban 5-lane road from Station Road possibly with central islands.
- 3.99 The illustration shows a 3-legged traffic signal controlled junction at Station Road with the junction positioned on Shore Road. The access to the bypassed section of Shore Road would be taken off the dual carriageway at, say, 100-150m from the junction. That could be a signal controlled junction that would only be operated by some form of recognition of an approaching bus. Its occasional use would have little impact on the main traffic flows.
- 3.100 The estimated cost of the Option S5S7-2 at current prices is of the following order:

Construction	£ 12.2m
Preliminaries & Traffic Management	£ 3.2m
Preparation & Supervision	£ 3.5m
Property & Land	£ 9.5m
Sub-total	£ 28.4m
Optimism Bias (44%)	£ 12.5m
S5S7-2 cost estimate	£ 41.0m

Strategy G1 Option – Gyratory

Figure SAR2/3.14

- 3.101 The variation V4 to the at-grade urban route S5-2, which was described earlier, would have a road located parallel to Shore Road running northwards from that part of Shore Road at the Belfast High School. When this was being drawn up, it was apparent that it could be readily converted to include a gyratory as the new road and Shore Road were less than 150m apart. The concept of a gyratory had been mentioned by visitors to the Preliminary Public Consultation in May 2005 though at the time it was considered that this was a reference to using the B90 in tandem with Shore Road, which was not considered to be a practical proposition due to the diversionary distances involved.
- 3.102 It was considered that a closer gyratory should be illustrated, which would be based on S5-2-V4, the inland road parallel to Shore Road at the school, but adapted with other elements. The main differences would be at the University junction (Shore Avenue) and in the section from the school to Station Road.
- 3.103 At the southern end of the scheme between the bus turning circle and Belfast High School, it would have 4-lanes with a roundabout on Shore Avenue. The entrance to Langley Hall housing estate would be left-in / left-out and a loop would be provided at the start of the gyratory at the school to permit traffic from Langley Hall to do a U-turn to travel southwards. In conjunction with that there

would be a loop to permit southbound vehicles on the Shore Road gyratory to do a U-turn to travel north, that would be essential for access to the school from the north.

- 3.104 A 2-lane single carriageway road would generally follow the same route as the dual carriageway in S5-2-V4, as far as Station Road. That would be for northbound vehicles only. Southbound vehicles would turn down Station Road and then travel along Shore Road. Thus there would be a two-way road system between the school and Station Road, just over 1000m in each direction. The two-way road would have a 7.3m carriageway and a total of 6m for footways and cycleways, 13.3m in all.
- 3.105 The gyratory could be divided into two smaller gyratories by linking Shorelands. That would not directly affect the longer distance traffic but would shorten the more local journeys; in that respect Shorelands would be more efficient as a two-way road. The gyratories would effectively be approximately 500m in each direction for local journeys.
- 3.106 The Belfast High School could be provided with its own left-in / left-out access from the new single carriageway road with special facilities for school buses to turn off the road and park whilst loading or unloading. A junction would be required to serve the new development area west of Shorelands. That could be either separate from the Shorelands junction or be provided as a single joint junction. Neill's Lane could be connected to the development access. The Bates Park access to Station Road would be diverted to the new one-way road as a left-in / left-out access.
- 3.107 At Station Road junction, traffic signals would probably be the most efficient form of junction to cope with the traffic from Station Road entering the gyratory. However traffic from the north wishing to enter Station Road (west) would have to travel around the gyratory. A roundabout would avoid that but would probably affect more properties.
- 3.108 The new road north of Station Road would be a dual carriageway as in S5-2-V4 and Longfield Gardens would have to be diverted to a new access on Station Road. The northern section could alternatively be a further gyratory but it would be over 1200m in each direction. Station Road could be made two-way but alternatively a more intermediate link for local traffic could be provided by acquisition of property to create a gap in the housing on Shore Road.
- 3.109 From the school to Station Road the new road would impact on the same property areas as S5-2-V4 but perhaps with less affect due to the reduction in width from 22.4m to 13.3m. It might be possible for example to avoid the St. Colman's RC Church building and take car park area only, which could be replaced on adjacent land.
- 3.110 The concept of this option is to make best use of the space available within the existing highway of Station Road and Shore Road. However, the carriageway along Shore Road should be nearer 9m to cope with traffic flows and ideally this option should include the equivalent 6m for footways and shared cycleway as in other options, giving a 15m width. As there is insufficient space to achieve that, [Figure SAR2/3.15](#) illustrates the additional width that would be required to achieve that same standard.
- 3.111 The cost of converting that additional area to provide wider footways and carriageway would be around £6.2m including for acquisition of gardens and retaining walls and optimism bias. Therefore to be comparable with other options, that has been included in the estimated cost of the Gyratory. An essential element of the cost of the option would also be to reconstruct those lengths of Station Road and Shore Road within the gyratory.
- 3.112 Bus stops and pedestrian crossing facilities could be provided at various points along the gyratory.

3.113 The estimated cost of the Option G1 at current prices is of the following order:

Construction	£	9.5m
Preliminaries & Traffic Management	£	2.4m
Preparation & Supervision	£	3.5m
Property & Land	£	12.7m
Sub-total	£	28.1m
Optimism Bias (44%)	£	12.4m
G-1 cost estimate	£	40.5m

Cost Estimates

3.114 For ease of reference, the Table 3.1 from [Appendix 3.2](#) has been attached at the end of this chapter. This shows the estimated costs and breakdown of all options and variations.

3.115 The following comments are given to aid understanding of the tabulated costs.

S5 Options – New Road Inland Corridor

3.116 No costs have been included for any works on the bypassed lengths of Shore Road. There would be an opportunity to convert them to a lower class of road with a more compatible narrower carriageway and wider footways, but that is not an element of this scheme.

3.117 Option S5-1 with a cutting at Greenisland would be vulnerable to increased costs from demands to increase the length of the cutting and possibly to replace open space with a landbridge.

3.118 All bar one of the S5 inland road options require a considerable area of land within the University and some require land from the Belfast High School. There is little information available at this stage of probable costs, only an indication from the respective organisations. Costs would have to cover the replacement of halls of residences, research buildings, school buildings, sports facilities and, not least, access facilities and internal roads and car parks. A significant sum has been included but this would be subject to significant risk.

3.119 There is another area of risk in that two variations of the inland route would require demolition of the St. Colman’s RC Church and possibly the Ebenezer Chapel. It is the Roads Service practice that church land is only taken by agreement and apart from the inherent risk of not reaching agreement there is the risk that any agreement could be costly.

S7 and S5S7 Options – Existing Road Corridor Improvements and Combined Partial Bypass

3.120 On the S7 online widening options, land and property costs are crucial. Decisions on which properties would be affected and to what degree can only be confirmed when more detailed house-by-house examination can be made.

3.121 One example of this relates to the form and layout of junctions that might be employed. Traffic signals, for example, require a long broad area to cope with additional storage lanes and islands whereas roundabouts require a shorter, wider area to cover the approaches to the wide central

island and circulating carriageway. On balance, roundabouts would tend to have a greater impact in an established area of housing and this is illustrated by the relative potential property impact at Station Road.

- 3.122 This perhaps lessens the difference between 4-lane options S7-1 and 2 and the 5-lane options S7-3 and 4. The increase in land and wall costs for the additional 3m widening is only £2.5m, but the 4-lane options include for roundabouts, which are more demanding of property.
- 3.123 The land and property costs for combined option S5S7-1 with a short bypass and 4-lane widening to landward is only £0.9m less than the nearest equivalent option, S7-2 whereas the combined option S5S7-2 with a short bypass and 5-lane widening to landward is £3.9m less for land and property. This is because S5S7-1 is illustrated with a large roundabout at Station Road and that has a big impact on adjacent property in comparison with a traffic signal junction. (costs quoted here do not include optimism bias)
- 3.124 Options with widening to both sides were intended to illustrate that they would have a lesser impact on houses than options with widening to one side only. The number of houses to be demolished is lower but the cost of land and property is estimated to be the higher by over £1m. The probable reason for this is that widening to both sides actually affects more properties in total, that is when gardens are taken into account. By definition, widening to landward side only can only affect half of the properties whereas the meandering line affects the majority of houses and gardens. Furthermore, an average price has been used for houses, and as houses on the lough side of the road have a higher value than the equivalent landward houses, widening to both sides could incur even more cost when true values are considered. The lead table of [Appendix 3.3](#) shows a comparison of property impacts on the online widening options S7-1 to 4.
- 3.125 Some properties on Shore Road may need to be demolished because of their closeness to the widened road. There could be situations where such cleared plots of land are left with a reasonable width. Some of these plots could be adjacent to each other and may in themselves or jointly provide a building plot for new dwellings, whether houses or flats. They might also have value to an adjacent plot holder to provide replacement drives or additional gardens. If the land was not required for landscape or other purposes, there could therefore be a credit value to off-set the cost of land acquisition. If this was pursued, new services and access could be provided to the plots.
- 3.126 It is difficult to be too certain with regard to costs of acquisition until a detailed scheme has been drawn up, but it is apparent that widening to one side only on the landward side has potential savings in construction costs and traffic management, would affect less properties in total and could have a lower acquisition cost. However, roundabouts would tend to have a bigger affect on properties than traffic signals and on that account the latter would be preferred from an economic standpoint.

Gyratory

- 3.127 The gyratory option is marginally the lowest cost option. However, as in some other options, there is an area of risk in that land would be required from the St. Colman's RC Church and possibly from the Ebenezer Chapel. Generally church land is only taken by agreement and apart from the inherent risk of not reaching agreement there is the risk that any agreement could be costly.

Increase in Costs from Stage 1 Estimates

S5 Options – New Road Inland Corridor

- 3.128 The Stage 1 cost estimate of an inland road was less than £50m but the majority of the S5 options examined are in the range £60m -£75m. The Stage 1 cost was based on the new road utilising Shore Avenue, the existing entrance to the University, but this was not considered to be a viable route and most of the options in the Stage 2 assessments continue through the University halls of residence and houses at the junction of Shore Road and Jordanstown. The increase is mainly due to the increase in land and property.
- 3.129 One variation has a lower cost at £41.2m but is not wholly an inland bypass and that compares well with the online widening options.

S7 and S5S7 Options – Existing Road Corridor Improvements and Combined Partial Bypass

- 3.130 The increases in the S7 online cost estimates are generally above £6m including optimism bias. Most of this arises from three items. In Stage 1 costs the earthworks costs underestimated the true cost of excavation of the existing road, given the difficult nature of that work. Also a much closer appraisal of the boundary walls was undertaken during Stage 2 and these proved likely to be more expensive than estimated previously. Finally, having received some C3 estimates from utilities, the estimated cost of services work has risen by almost £1m.
- 3.131 The increase in costs in the S5S7 combined options is only around £3m. Whereas earthworks and services have proportionately risen as in the S7 options, the forecast cost for land has been reduced.

Optimism Bias

- 3.132 Although some elements of the options have been examined more closely in Stage 2, the cost estimates still include 44% optimism bias. That is largely because costs are based on inaccurate topographical information. The Stage 3 work will be based on accurate topographical survey and a more detailed illustrative design. Geometrical elements of costs will be much more certain and decisions on appropriate standards and scheme provision will have been made. The actual properties affected by the works will also be assessed with more certainty and it is intended that property values will be more closely evaluated.
- 3.133 At Stage 3 therefore risk assessments will be undertaken to reduce the value of optimism bias.

Table 3.1 Stage 2 Options - Cost Estimates

Strategy Number	S5							S7				S5S7		G1
Strategy Name	New road - inland corridor							Existing corridor improvements				New road-inland corridor with existing corridor improvements		New road-inland corridor
Option	S5-1 Greenisland Cutting	S5-1-V1 Jordantown Roundabout	S5-2 Greenisland At-grade	S5-2-V1 Jordanstown Roundabout	S5-2-V2 Split University Shorelands Junction	S5-2-V3 Parallel to Shore Road at University	S5-2-V4 Parallel to Shore Road at School	S7-1 4-Lanes- Widen Both Sides	S7-2 4-Lanes- Landward Side Only	S7-3 5-Lanes- Widen Both Sides	S7-4 5-Lanes- Landward Side Only	SSS7-1 Combined Partial Bypass Widen 4- Lanes With Roundabouts	SSS7-2 Combined Partial Bypass Widen 45 Lanes With Traffic Signals	Gyratory
	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m
Roadworks	6.1	6.1	5.6	5.5	5.8	5.2	4.8	4.4	4.4	4.8	4.8	5.5	5.8	5.5
Earthworks	1.8	1.9	2.3	2.3	2.3	2.1	1.8	1.1	1.2	1.2	1.3	1.3	1.4	1.7
Structures	6.0	6.0	2.8	2.8	2.8	2.3	1.3	2.4	2.1	2.7	2.4	2.1	2.2	1.7
Services	0.9	0.9	0.5	0.5	0.5	0.5	0.8	3.6	3.4	3.6	3.4	2.8	2.8	0.6
Sub Total	14.8	14.9	11.2	11.1	11.4	10.1	8.7	11.5	11.1	12.3	11.9	11.7	12.2	9.5
Traffic Management	0.3	0.3	0.3	0.3	0.3	0.5	0.6	1.5	1.0	1.5	1.0	0.8	0.8	0.5
Preliminaries	3.0	3.0	2.2	2.2	2.3	2.0	1.7	2.3	2.2	2.5	2.4	2.3	2.4	1.9
Property and Land	26.3	26.4	26.5	27.2	26.8	35.7	14.1	12.2	11.1	14.4	13.4	10.2	9.5	12.8
Preparation & supervision	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Estimated Scheme Cost.	47.9	48.1	43.7	44.3	44.3	51.8	28.6	31.0	28.9	34.2	32.2	28.5	28.4	28.1
Optimism Bias	21.1	21.2	19.2	19.5	19.5	22.8	12.6	13.6	12.7	15.0	14.2	12.6	12.5	12.4
Total Cost	68.9	69.2	63.0	63.8	63.8	74.6	41.2	44.6	41.6	49.2	46.3	41.1	41.0	40.5
Optimism Bias at 44%.														



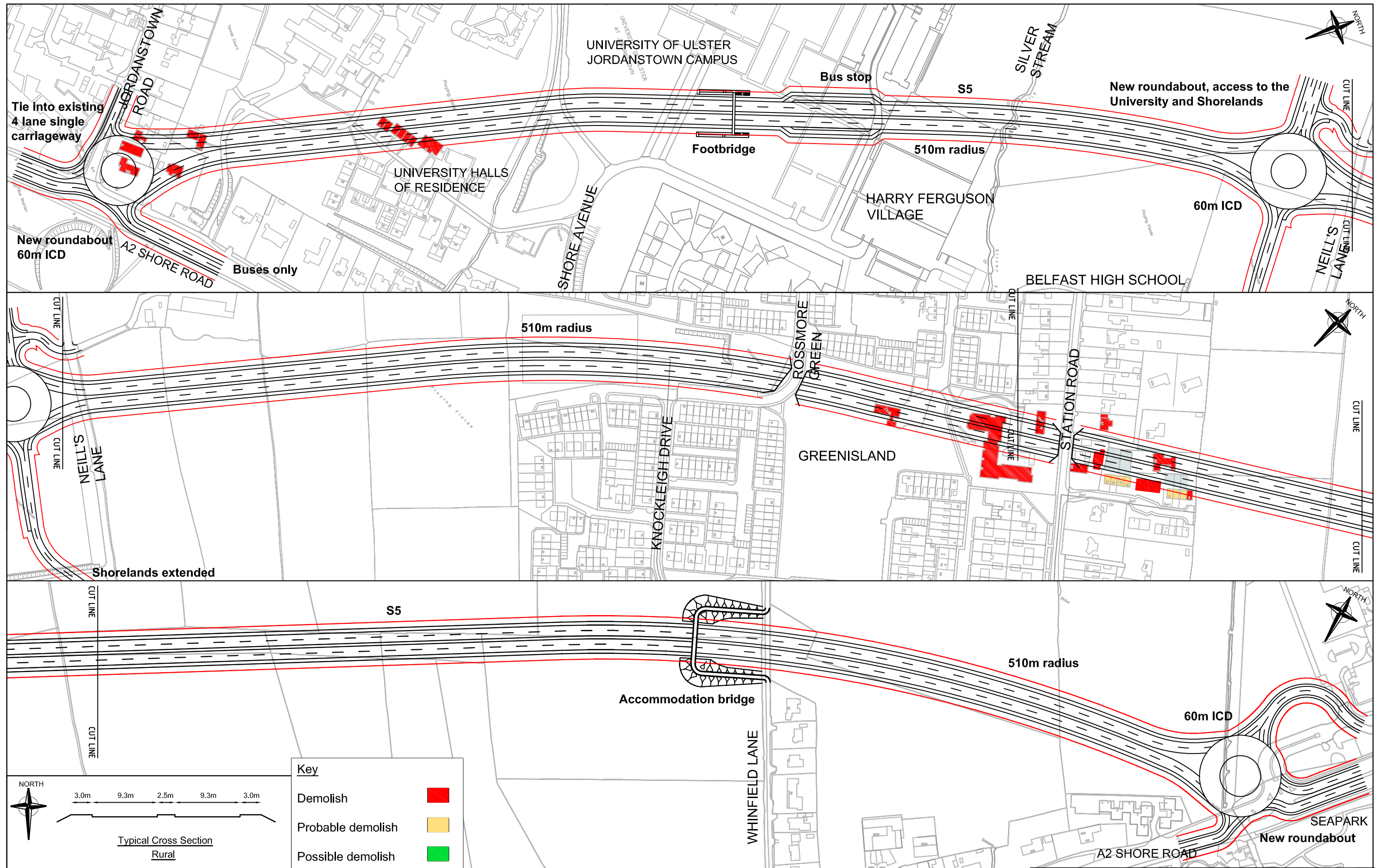
**A2 SHORE ROAD GREENISLAND
STAGE 2 SCHEME ASSESSMENT**

Figure Title
**Option S5-1
New Road-Inland Corridor
Greenisland Cutting**

FIGURE SAR2/3.1

Scale at A3 : NOT TO SCALE





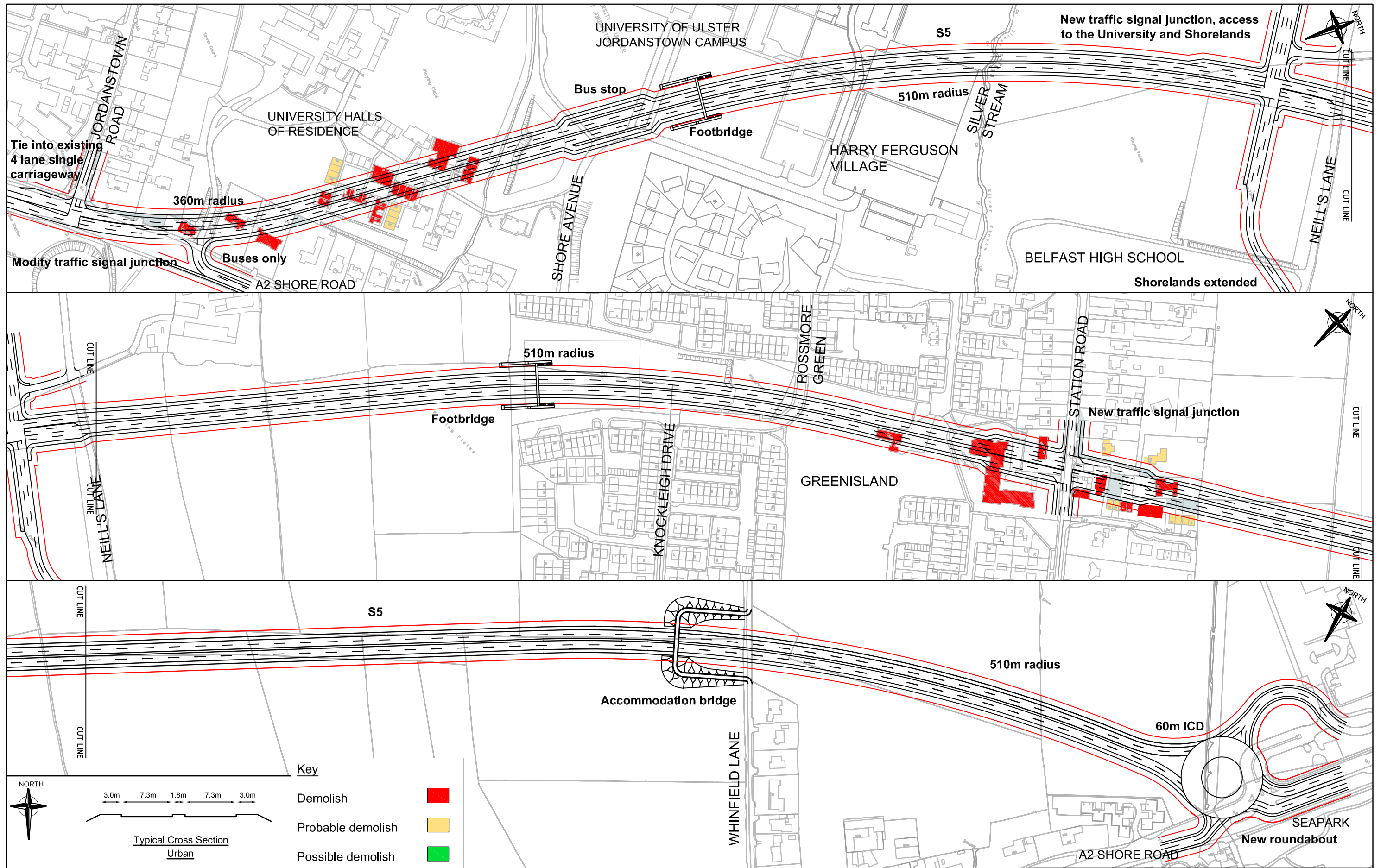
A2 SHORE ROAD GREENISLAND
STAGE 2 SCHEME ASSESSMENT

Figure Title
Variation S5-1-V1
New Road-Inland Corridor
Jordanstown Roundabout

FIGURE SAR2/3.2

Scale at A3 : NOT TO SCALE





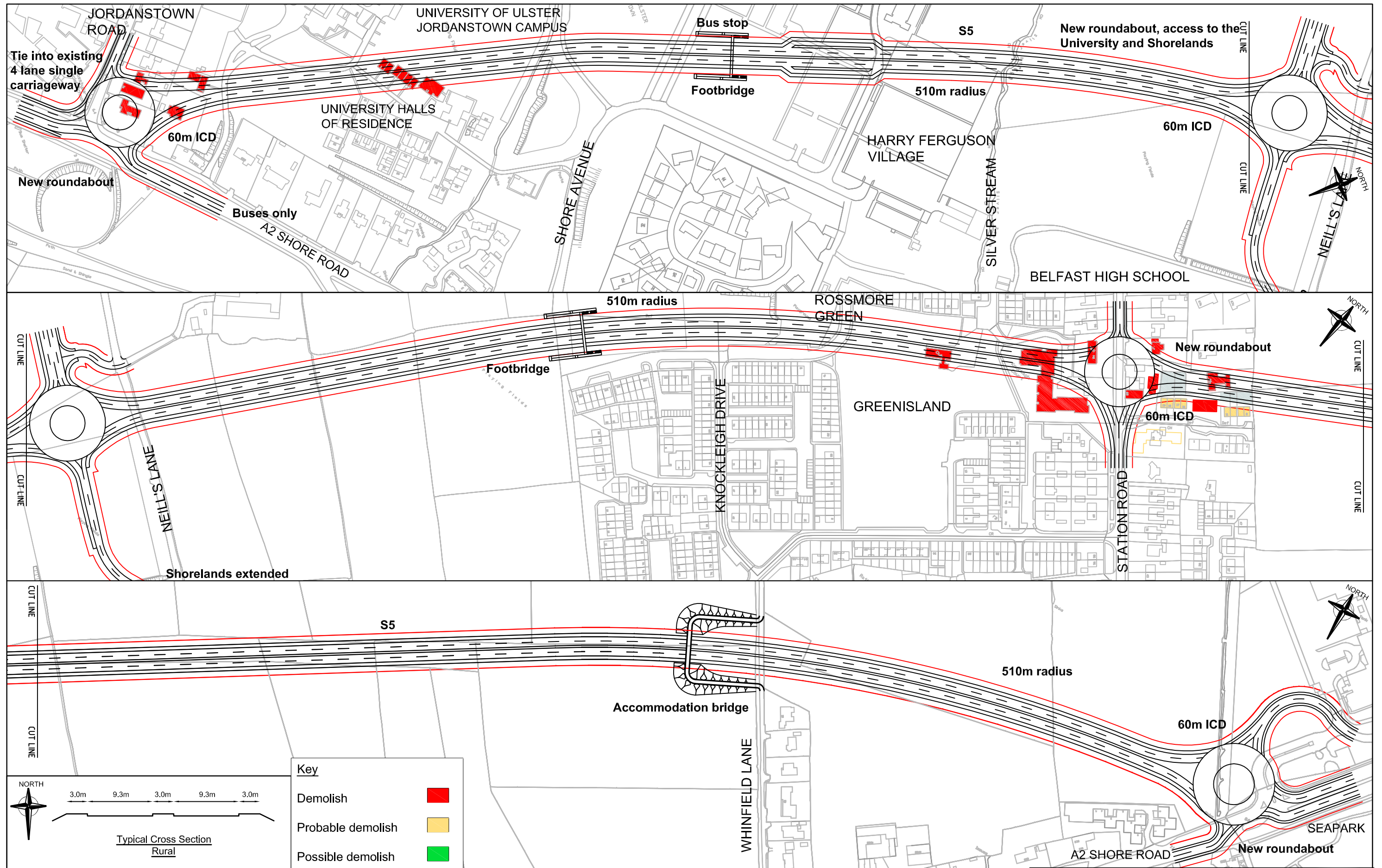
A2 SHORE ROAD GREENISLAND
 STAGE 2 SCHEME ASSESSMENT

Figure Title
 Option S5-2
 New Road-Inland Corridor
 Greenisland At-grade

FIGURE SAR2/3.3

Scale at A3 : NOT TO SCALE





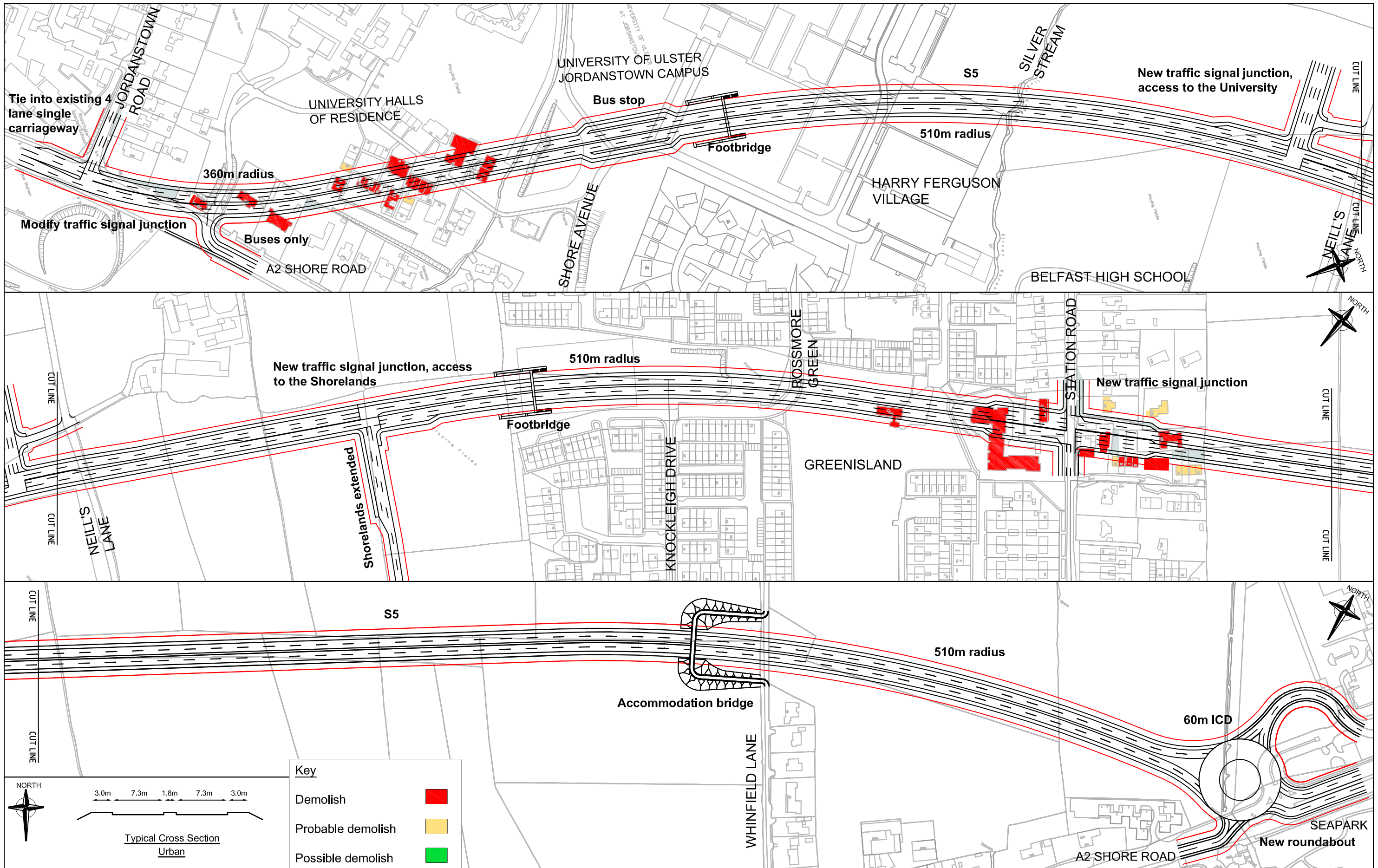
A2 SHORE ROAD GREENISLAND
STAGE 2 SCHEME ASSESSMENT

Figure Title
Variation S5-2-V1
New Road-Inland Corridor
Jordanstown Roundabout

FIGURE SAR2/3.4

Scale at A3 : NOT TO SCALE





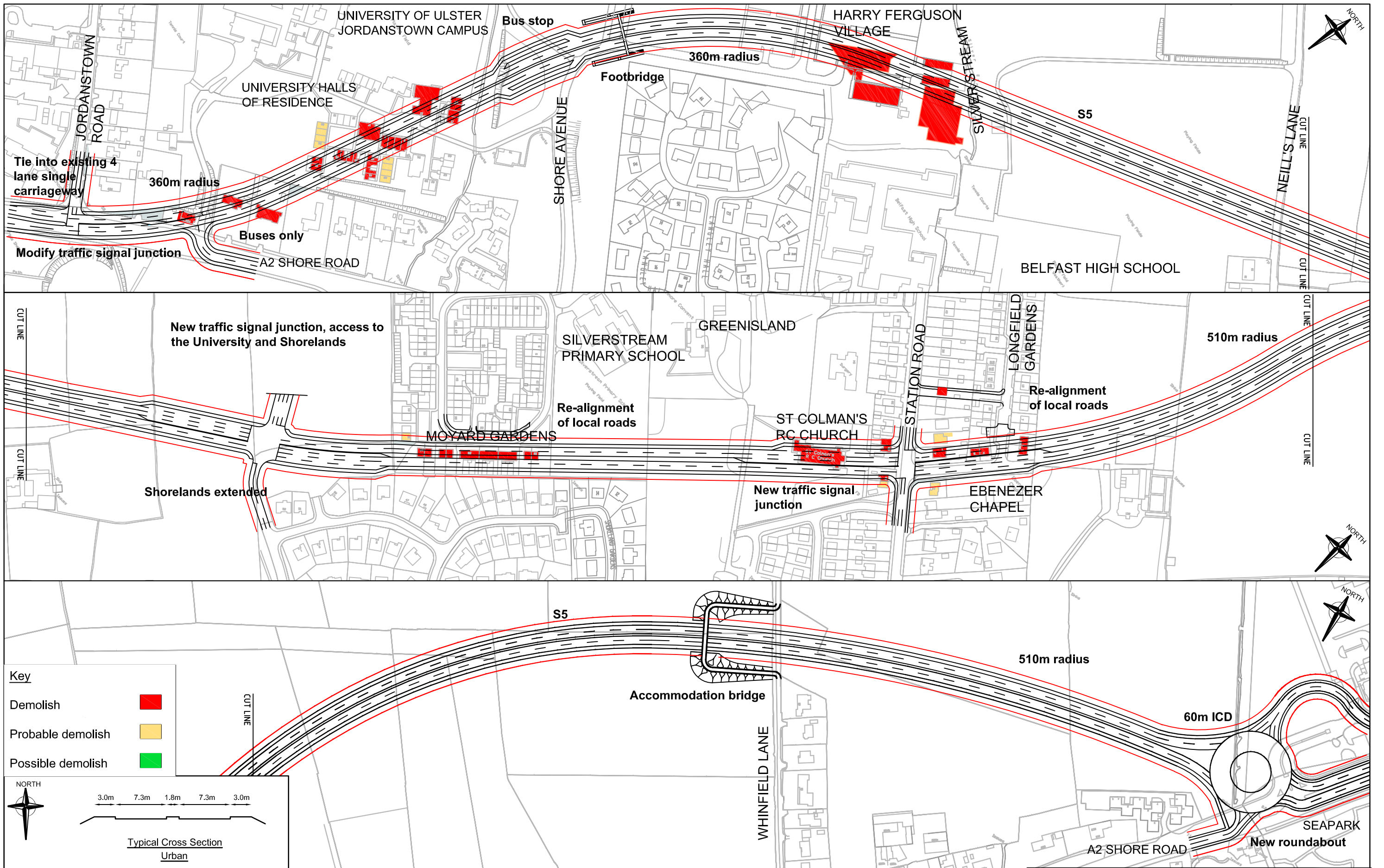
**A2 SHORE ROAD GREENISLAND
STAGE 2 SCHEME ASSESSMENT**

Figure Title
**Variation S5-2-V2
 New Road-Inland Corridor
 Split University Shorelands Junction**

FIGURE SAR2/3.5

Scale at A3 : NOT TO SCALE





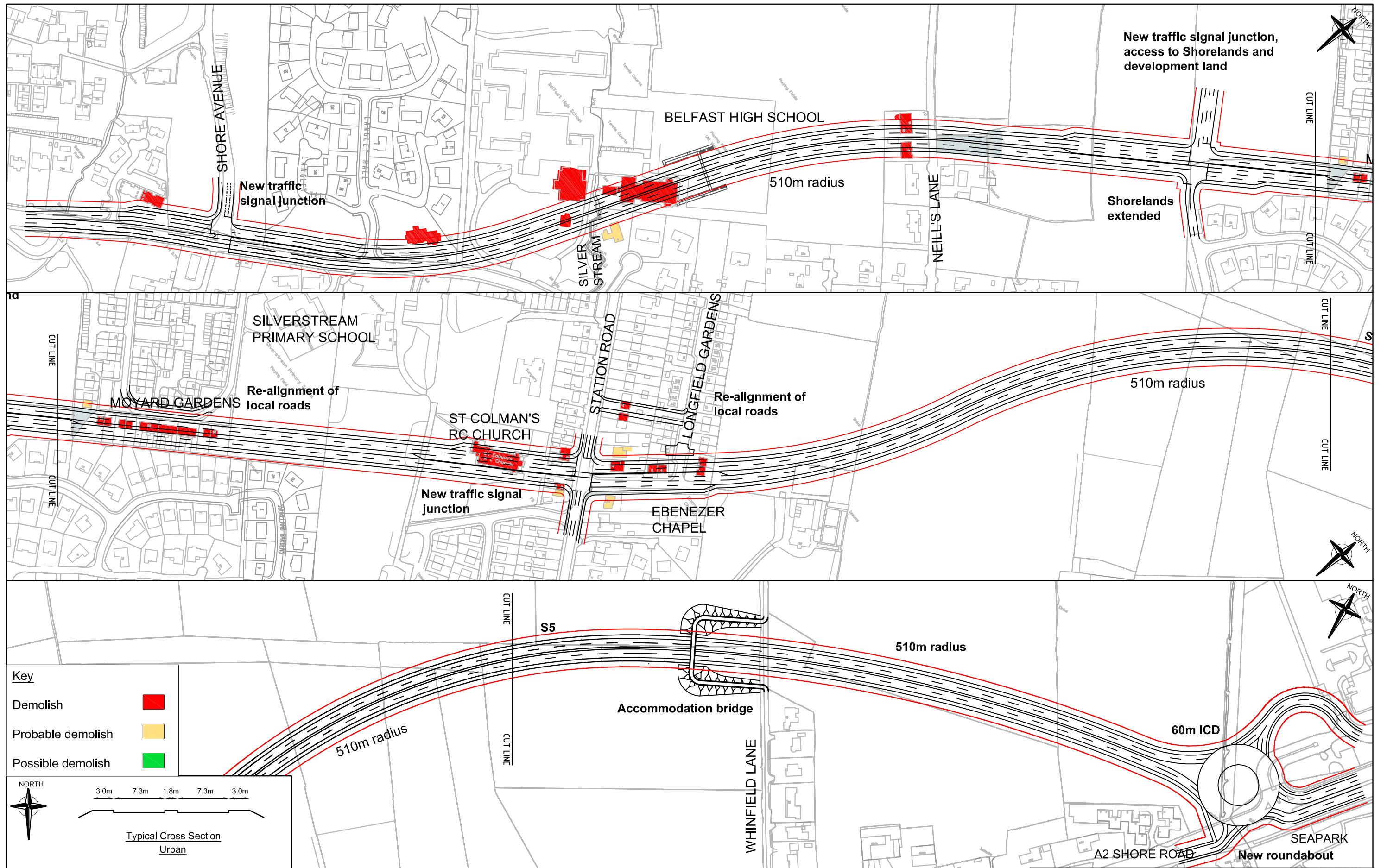
A2 SHORE ROAD GREENISLAND
STAGE 2 SCHEME ASSESSMENT

Figure Title
Variation S5-2-V3
New Road-Inland Corridor
Parallel to Shore Road at University

FIGURE SAR2/3.6

Scale at A3 : NOT TO SCALE





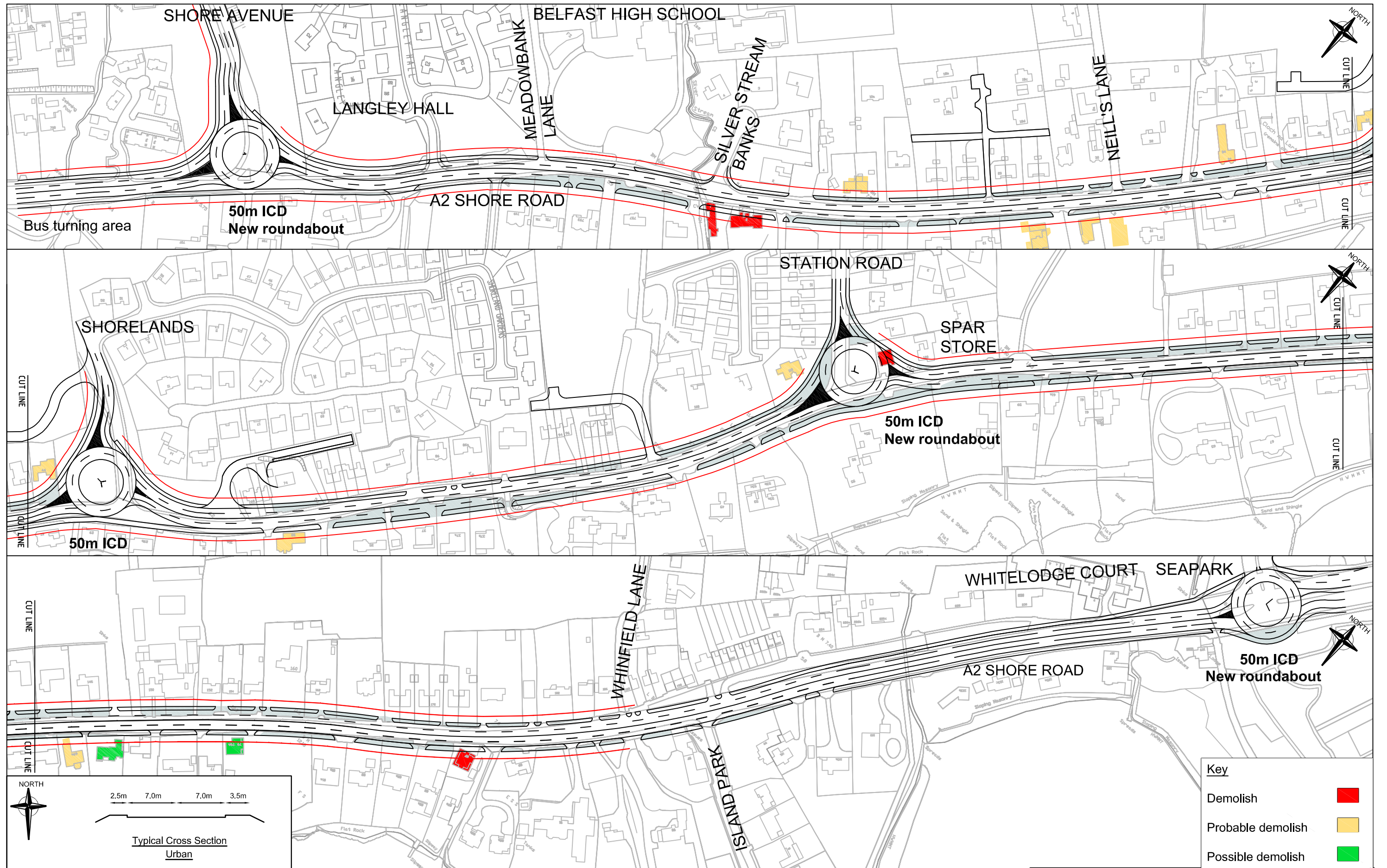
A2 SHORE ROAD GREENISLAND
STAGE 2 SCHEME ASSESSMENT

Figure Title
Variation S5-2-V4
New Road-Inland Corridor
Parallel to Shore Road at School

FIGURE SAR2/3.7

Scale at A3 : NOT TO SCALE





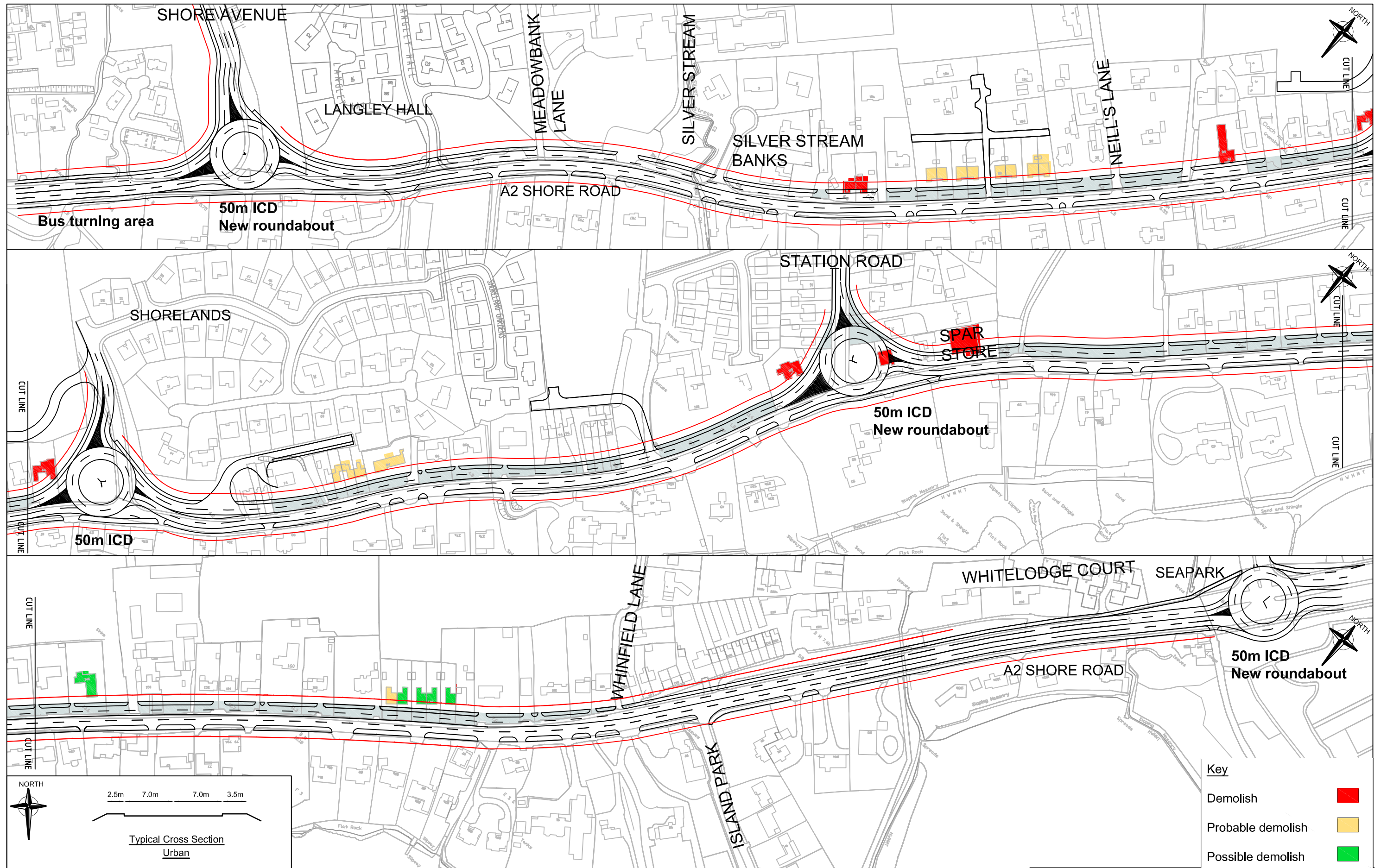
A2 SHORE ROAD GREENISLAND
 STAGE 2 SCHEME ASSESSMENT

Figure Title
 Option S7-1
 Existing Road Corridor Improvements
 4-Lanes-Widen Both Sides

FIGURE SAR2/3.8

Scale at A3 : 1:2500



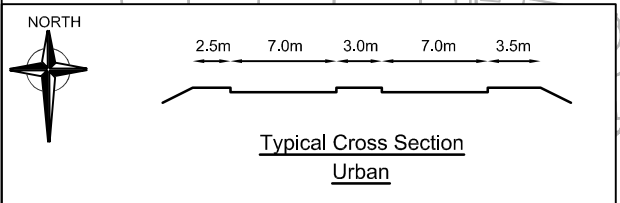
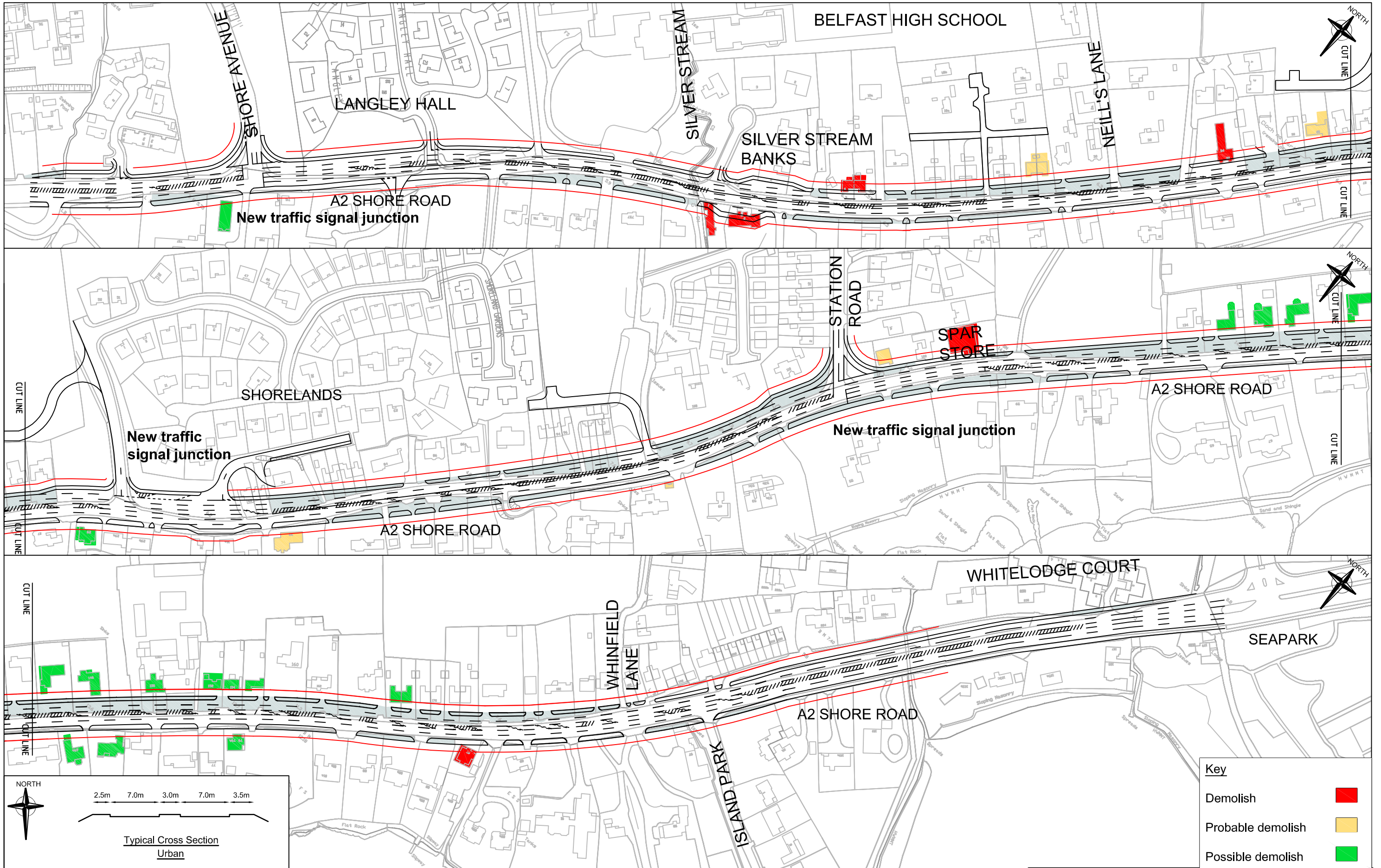


A2 SHORE ROAD GREENISLAND
STAGE 2 SCHEME ASSESSMENT

Figure Title
Option S7-2
Existing Road Corridor Improvements
4-Lanes-Landward Side Only

FIGURE SAR2/3.9

Scale at A3 : 1:2500



Key	
Demolish	■
Probable demolish	■
Possible demolish	■