A5.1 Supplementary Do-Minimum Assessment

1 Overview

1.1 Introduction

1.1.1 The objective of EIA is to determine the significant environmental effects resulting from a project. The assessment of impacts is undertaken in comparison to baseline conditions, which describe the existing environmental conditions of the site and the surrounding area. For road schemes, which generally take considerable time to be constructed, the assessment of impacts due to operation of the scheme is undertaken in comparison to the baseline conditions envisaged to exist if the scheme were not provided, i.e. a future scenario, usually the year the scheme is due to open. For some parameters the baseline and impact assessment also considers 15 years after the proposed opening year of the scheme.

1.1.2 This baseline is referred to as the 'Do-Minimum', as it represents the conditions which would exist if the scheme did not go ahead and only minimum works necessary[1] to the road network would be undertaken. Road scheme impacts are therefore assessed by considering future year conditions with ('Do-something') and without ('Do-Minimum') the proposed scheme in place.

1.1.3 For many environmental disciplines, the Do-Minimum scenario for a future year would not significantly differ from existing conditions. For this reason, baseline conditions informed by current site survey data etc are accepted to be a workable approximation for future year conditions. However, for assessments where traffic flows are a major influence on impacts (e.g. air quality and traffic noise/vibration), taking account of future conditions becomes more important.

1.1.4 For most projects, the Do-Minimum scenario is likely to resemble the existing situation but with increased traffic flows. Changes to the network infrastructure are generally minor. However, the Forth Replacement Crossing project is unusual in that it is driven by uncertainty over the future viability of the existing Forth Road Bridge. This Appendix to the ES takes into account the uncertainty about the condition of the Forth Road Bridge and the likelihood that, in the absence of a replacement crossing, there will be a need for substantial repairs and refurbishment to the bridge. These works would have significant associated disruption and environmental impacts which are considered in this Appendix.

1.1.5 As noted in Chapter 5 (Overview of Assessment Process), the Do-Minimum is incorporated within the TMfS:05A traffic model. For the purposes of this ES the Do-Minimum reflects the continued operation of the existing road network in tandem with the Forth Road Bridge. This provides an understandable baseline against which to assess the impacts of the scheme. It assumes an extension of the existing situation, i.e. that in the absence of a new crossing, the Forth Road Bridge will continue to operate as it does at the moment. Although the existing bridge remaining open to traffic is perhaps the most understandable scenario for a Do-Minimum, it is not the most likely scenario. However, the uncertainties surrounding the extent and timing of the repairs required to the existing bridge are such that the range of refurbishment/closure scenarios is so great that to attempt to utilise these as Do-Minimum scenarios could result in significant over or under-estimation of impacts. It would also be difficult to present impacts in a meaningful way which are understandable to stakeholders.

[1] The 'Do-Minimum' option includes *"transport improvement commitments that have policy and funding approval and from which it would be difficult to withdraw. These commitments may apply to public transport and parking as well as roads and traffic management. This includes projects for which tenders have been invited or let and projects to which Ministers have given a firm commitment. For transport improvements which affect the trunk road network or rail infrastructure, commitment from Transport Scotland or Ministers is required before a scheme should be included in the do-minimum."* (Scot-TAG, 2009).

1.1.6 Three main scenarios exist in relation to the Do-Minimum scheme for the Forth Replacement Crossing project:

- Forth Road Bridge remains open to traffic – the Do-Minimum described in paragraph 1.1.5 and the Do-Minimum reported in the main body of this ES. Referred to as the 'ES Do-Minimum' in this appendix.
- Cable replacement of the Forth Road Bridge – the Forth Estuary Transport Authority's (FETA) and Scottish Ministers' assessment is that this is necessary to safeguard the crossing. As noted in Chapter 2 (Need for the Scheme), in February 2008, FETA reported on a study (FETA, 2008a) undertaken to investigate the feasibility of replacing or augmenting the main cables, should this become necessary. Whilst the study stated that cable replacement or augmentation was possible, it concluded that this process was not feasible without a replacement bridge, the severity of the impact on road users and the wider economy being too severe. This scenario is referred to as 'Do-Minimum 1' in this Appendix.
- Full closure of the Forth Road Bridge – work undertaken during development of the FRC project supports the assessment that this is now a less likely, although theoretically possible scenario. As this is considered to be a less likely scenario, it is assessed in less detail in this Appendix than the re-cabling works. This scenario is referred to as 'Do-Minimum 2' in this Appendix.

1.1.7 Do-Minimum 1, or similar, is likely to occur over some 8 years of the assessment period. A supplementary assessment for this Do-Minimum scenario, setting out a qualitative statement of the likely impacts of full closure or cable replacement of the existing bridge is set out in this Appendix. In addition, a comparison of how these scenarios would affect the impacts reported in the ES is provided. This assessment should be read in conjunction with the assessments reported in the main body of the ES as it addresses reasonable assumptions of possible baseline conditions over parts of the assessment period. An assessment of Do-Minimum 2 is included to a lesser level of detail.

1.2 Condition of the Forth Road Bridge

1.2.1 The Forth Road Bridge is a long span suspension bridge (the bridge deck is suspended from two main aerially spun cables). The bridge was designed in the 1950s, opened in 1964, and is maintained and operated by FETA.

1.2.2 The Forth Road Bridge has seen a marked increased in traffic throughout its operational life and now carries in excess of 65,000 vehicles per day. Using the TMfS:05A model traffic on the Forth Road Bridge is anticipated to increase to approximately 83,500 AADT in 2017. Although maintained by FETA throughout its life, the bridge is showing signs of deterioration, climatic influences, weather and increased traffic volumes all having effect (Jacobs Arup, 2009).

1.2.3 In 2004 the first internal inspection of the main cables revealed that approximately 8% of the cable strength had been lost due to corrosion. The findings of the inspection concluded that should the rate of deterioration continue weight restrictions might need to be introduced between 2014 and 2020. Following the results of this inspection a feasibility study was carried out by FaberMaunsell, which recommended the installation of a dehumidification system to reduce corrosion. Prior to commencing dehumidification a second inspection of the cables was undertaken in February 2008. This indicated that the rate of deterioration at the inspected locations was slower than previously feared and that if this was consistent along the length of the main cables that weight restrictions may need to be considered between 2017 and 2021.

1.2.4 Dehumidification is a well tried system of preventing corrosion of steel and is already in use in the anchorage chambers of the Forth Road Bridge. However, its application to main cables of suspension bridges is relatively new; such systems are being fitted on new bridges and retrofitted to bridges in Japan, Sweden and Denmark where corrosion has been revealed. However, there is not yet any available evidence to enable unconditional assurances to be given that

dehumidification would work on the Forth Road Bridge (FETA, 2008b). A trial study on a section of the cables is ongoing with initial results not anticipated before 2011/2012.

1.3 Description of Cable Replacement and Maintenance Works

1.3.1 The works involved in the replacement of the main cables are described in the Feasibility Study into Replacement/Augmentation of Main Cable prepared by FETA (FETA, 2008a). The FETA report considered options for the replacement or augmentation of the main cables on the Forth Road Bridge. This work will be necessary if the dehumidification system installed does not halt the corrosion of the main cables to a level where the residual capacity of the cables is sufficient to provide for the long term needs of the bridge.

1.3.2 Three options were considered in the report of the replacement or augmentation of the main cables, this included:

- Main Structural Option A – Replacement of the main cable with a new cable provided above the existing cable. Once the loading is transferred to the new cable, the existing cable will be removed.
- Main Structural Option B – Augmentation of the main cable above the existing cable. This is similar to Option A except that the loading will be shared between the existing and new cable.
- Main Structural Option C – Augmentation of the main cable to the side of the existing cable with the loading being shared between the existing and new cable.

1.3.3 Different construction options were considered based on different applications of traffic management, including full bridge closures, single carriageway closures or tidal lane closures and off-peak single carriageway closures or tidal lane closures.

1.3.4 'Main Structural Option A - Replacement of Main Cable Above, Sub Options - New Anchorages and Traffic Management Based on Carriageway Closures' was selected as the most appropriate option for the supplementary assessment for the following reasons:

- The Do-Minimum scheme is the scheme that would be implemented assuming that the Forth Replacement Crossing was not being progressed. As the Forth Replacement Crossing is being taken forward, the Do-Minimum scheme must enable a reasonable comparison with the proposed scheme to be made.
- FETA confirmed that they considered that cable replacement was their preferred option, as it was the only option which would address issues associated with uncertainty regarding the life of the existing cables and the contribution they could provide in the cable augmentation options.
- This is the only option which will provide certainty regarding the future use of the bridge and will avoid the potential for restrictions or closure of the bridge that could occur if the results of the dehumidification works indicate that cable replacement would be necessary, the same outcome as the proposed scheme. It is also the only option that will address the risk that the dehumidification process does not arrest corrosion in the main cables adequately.
- This is the most reasonable and preferred approach for undertaking the cable replacement works considering the practicality of undertaking the work whilst reducing disruption to traffic on the bridge.

1.3.5 The cable replacement works would involve the following:

- temporary works construction and removal;
- construction of new anchorages for the main cables;
- alterations to footways at the side towers;
- alterations to the side towers;

- alterations to the main towers;
- replacement of the main cables;
- install new main cables and hangars; and
- remove existing main cables and hangars.

1.3.6 The majority of the above works would be undertaken on land or on the bridge and no works are anticipated to be necessary within the Firth of Forth. Construction of the new anchorages for the new cables would be adjacent to, and below the viaducts on either side of the suspension bridge. The northern anchorage would be located to the south of the access road which passes beneath the viaduct to the Queensferry Hotel and the southern anchorage would be located close to the dismantled railway line to the south of Shore Road.

1.3.7 A risk assessment has been undertaken for the above involving Transport Scotland, Jacobs Arup and FETA. This indicated that there are significant risks associated with the work due to level of detailed design and construction assessment associated with the study which was concerned primarily with establishing the technical feasibility of replacing the main cables. Also, the cable work contemplated has very little precedent at this scale and there is little information upon which to benchmark the assessment. This was recognised in the feasibility study report which considers options that may be possible to augment or replace the cables of the Forth Road Bridge with a view to selecting schemes for a further analysis stage. The impact of risks on the programme for the cable replacement works described in the feasibility study report indicate that the work could take 11 years with 268 weeks of carriageway closures occurring, during which one lane would remain open in each direction. Twelve full weekend closures would also occur. The construction stage of the cable replacement works would last for approximately 8 years and during this period restricted carriageway availability would be in place for approximately 65% of the time.

1.3.8 In addition to the cable replacement and associated major refurbishment works, other maintenance works are necessary for the Forth Road Bridge These works would include:

- resurfacing main spans north and south;
- resurfacing side spans north and south;
- resurfacing viaducts;
- resurfacing north approaches;
- upgrade/replace cable acoustic monitoring;
- parapet replacement;
- viaduct barrier replacement;
- viaduct bearing replacement;
- tower impact strengthening;
- addition of wind barriers;
- replacing plaza and service road;
- tower painting;
- replacement of weigh in motion/vehicle counter system;
- maintenance of deck half joints;
- replacement of expansion joints;
- street lighting; and
- replacement of Variable Message Sign (VMS) System.

1.3.9 Undertaking the above works would require partial closures of the bridge and implementation of extensive Traffic Management (TM) proposals. TM requirements likely to be required for maintenance and refurbishment works include speed limit restrictions (i.e. reduction from 50 to 30mph), reduction to single lanes and lane closures with contraflows in place. These would generally be undertaken during continuous weekend working Friday 2100 to Monday 0600 and working weeknights 2100 to 0600. In addition full closure of the Forth Road Bridge would be required during tower painting works occurring during short weekend nights (0030 to 0330).

1.3.10 Table 1 provides details of the TM events during the maintenance works outlined above.

Table 1: Traffic Management Events required for Maintenance Works on the Forth Road Bridge

Description of Traffic Management Measure	Duration	Total Events Required
Contraflows* – duration split equally between north and southbound carriageways, opposite carriageway closed.	Continuous weekends (Friday 2100 to Monday 0600)	549 weekends
	Week nights (2100 to 0600)	2,914 week nights
	Weekend nights (2100 to 0600)	1,044 weekend nights
	Long weekends (Thursday 2100 to Tuesday 0600)	40 long weekends
Restriction to single lane running both carriageways.	Week nights (2100 to 0600)	60 week nights
	Weekend nights (2100 to 0600)	24 weekend nights
Full closure of the Forth Road Bridge.	Short weekend nights (0030 to 0330)	48 short weekend nights

*Contraflows are implemented when traffic is restricted to a single carriageway and therefore one lane is allowed to travel in the direction that is normally against the flow of traffic.

1.3.11 The FETA cable augmentation study (FETA, 2008a) also noted that if the re-cabling works were undertaken without a replacement bridge to carry traffic the ensuing disruption would be result in significant economic consequences. Business turnover would be reduced by between £539 million and £1,320 million and business output by between £443 million and £1085 million in Scotland as a whole. This is in addition to the possibility of job losses in the region of 3,200, many of which would be permanent. Further details on the economic considerations and the need for the Forth Replacement Crossing are provided in Chapter 2 (Need for the Scheme) of this ES.

1.4 Approach to Assessment

1.4.1 The supplementary assessment describes in qualitative terms the effects of the cable replacement and maintenance works on the environment (including people and communities) by providing a description of the likely future conditions under these works. In addition, this assessment considers how the impacts reported in this ES would change if they were assessed against a baseline involving the cable replacement and maintenance works rather than being assessed, as they are in the ES, against the scenario of the Forth Road Bridge continuing to operate as normal.

1.4.2 A further comparative assessment is made of cable replacement works against the equivalent works considered likely to be required for construction of the proposed replacement crossing.

1.4.3 For the proposed scheme, a strategic traffic model has been used to determine traffic flows for the Do-Minimum and Do-Something scenarios. The model used in this assessment was the Transport Model for Scotland (TMfS:05A) developed and maintained by MVA Consultancy (MVA) for Transport Scotland. This is a strategic, four stage, multi-modal forecasting model with a 2005 base year that translates output from the Transport and Economic Land Use Model of Scotland (TELMoS) into forecasts of travel demand on both the road and public transport networks. Annex A provides a list of the assumptions of planned improvements and developments taken into account in TMfS:05A.

1.4.4 Paramics traffic modelling was also used to model construction period traffic delays for the cable replacement works and the proposed scheme. The modelling provided an indication of the magnitude of difference between disruption and delays anticipated as a result of the construction of the scheme compared with the cable replacement works.

1.4.5 For detailed assessments of road traffic noise, the 18-hour (06:00 to 00:00) Annual Average Weekday Traffic (AAWT) flows would usually be used. However, the use of 24-hour Annual Average Daily Traffic (AADT) flows were considered appropriate for this comparative exercise. AADT flows are also used for the air quality assessment. Changes to AADT flows under the alternative Do-Minimum options (relative to the ES Do-Minimum) were analysed in order to assess the potential changes to both reported baseline levels and reported noise and air quality impacts.

2 Supplementary Do-Minimum 1: Cable Replacement and Maintenance of the Forth Road Bridge

2.1 Introduction

2.1.1 In the absence of a replacement crossing the Forth Road Bridge would require cable replacement and maintenance works to allow the bridge to continue to operate. This section considers the implications of the cable replacement and maintenance works and provides a comparison to the assessment as reported in the main body of the ES.

2.2 Likely Effect on Traffic Movements

2.2.1 As indicated in Section 1.3 above, a significant number of carriageway closures during which contraflows would be in operation will occur during cable replacement and other maintenance works. Road users have a number of journey options during these traffic management events:

- continue to use the Forth Road Bridge despite the likelihood of additional journey delay;
- make use of alternative routes diverting away from the Forth Road Bridge;
- change mode of travel to public transport (e.g. bus and rail);
- change destination to avoid crossing at North/South Queensferry altogether;
- change journey timing to avoid periods of operation when the network is affected by TM;
- choose not to travel; or
- combinations of the above.

2.2.2 In terms of delays to traffic and impact on travel the cable replacement works would cause more disruption than the other maintenance works. This is because the carriageway closures are full continuous weekday closures associated with generally higher levels of traffic demand than during weekend periods. Weekend closures, however, will also cause significant disruption to the road network.

2.2.3 Traffic modelling and analysis of previous TM event impacts on cross-Forth traffic demand indicates that there will be a drop in cross-Forth traffic demand of around 47% during the cable replacement works as travellers plan in advance to avoid disruption to their journeys as outlined in paragraph 2.2.1. Figure A5.1 presents traffic flow forecasts for the cable replacement Do-Minimum compared to the Do-Minimum assessed in the main body of this ES.

2.2.4 Much of this reduced demand will be displaced onto alternative cross-Forth routes via the Kincardine and Clackmannanshire Bridge crossings. Consequently, increased AADT flow along the A985 (40%), the A977 (20%), Kincardine Bridge (32%), M9 (13%), and A801 (19%) are forecast by TMfS:05A.

2.2.5 The extent of cross-Forth demand reduction at North/South Queensferry is likely to be less than the extent of capacity reduction associated with cable replacement traffic management such that increased congestion, particularly north of the river, is expected as a result.

2.2.6 Paramics traffic modelling testing of residual cross-Forth traffic demand at North/South Queensferry indicates that, significant congestion with corresponding delays to cross Forth trips will occur along the A90/M90 during contraflow operations. During morning peak periods queuing would extend to Halbeath Interchange on the north side of the Forth and to the Scotstoun Interchange to the south. Should forecasts of reduced bridge traffic demand during the periods of the bridgeworks not materialise, these effects will be exacerbated further still. General traffic growth, for example, may counter the effect of any existing travellers choosing to switch routes, modes of travel, or journey timings. Even allowing for mitigation, such as interventions to encourage alternative travel arrangements and modes where possible, the impact of the works are assessed to have a number of negative consequences including:

- Journey times for all vehicle users of the Forth Road Bridge increasing to an average of 40 minutes for peak directions of travel (i.e. southbound AM, and northbound PM).
- Slip road merges would not operate effectively with traffic having to slow down, stop or give way, either on the slip roads or on the main carriageway.
- Delays would extend onto slip roads, consequently affecting users of other roads and junctions in the study area. For example, congestion on the A904 and diversions onto local roads through South Queensferry can, in extremis, cause local gridlock.

2.2.7 Queue length predictions from Paramics traffic modelling show extensive queuing along the mainline A90, which cause further queuing and delay on other roads and junctions in the area, in particular Inverkeithing and Rosyth during the morning peak period as a majority of traffic demand flows south.

2.2.8 Existing traffic queues along Hope Street through Inverkeithing town centre will extend further towards the B981/A921 Junction and last longer. This will inevitably affect traffic flow and access along numerous side-streets in the town.

2.2.9 Extended queues along the B980 Castlandhill Road will also tailback from a congested Ferrytoll Junction into southern areas of Rosyth. Mainline congestion at Admiralty will result in extended queuing along the A921 and past Inverkeithing towards Dalgety Bay. Mainline queuing at Masterton will result in longer tailbacks along the A823(M).

2.2.10 During evening peak periods, as a majority of traffic flows north, mainline A90 queues will extend back from the southern bridgehead through Echline and onto the Scotstoun Interchange. This will exacerbate existing congestion at Newbridge and Barnton. Consequently, this may result in some re-routing of traffic off the mainline A90 onto local routes such as the B800, B924 and A904 for those travelling to/from South Queensferry, Dalmeny, Kirkliston and Ratho.

2.3 Socio-Economics

2.3.1 The Forth Road Bridge is important to the economy locally, regionally and nationally. The Edinburgh economy depends, in part, on its neighbouring communities (including Fife) as a source of labour. There are parts of Fife where 20-40 percent of residents work in Edinburgh.

2.3.2 On a national scale the Forth Road Bridge is also part of the strategic road network which connects other major towns and cities including Perth, Dundee, Aberdeen and Inverness with southeast Scotland. Based on the traffic modelling predictions (refer to Section 2.2) there will be a reduced demand of traffic crossing the Firth of Forth in the North/South Queensferry area and significant delays for those utilising the Forth Road Bridge under TM. Both recreational users of the bridge, including tourists and day shoppers, and commercial users (particularly haulage firms) may follow alternative routes, most likely via Kincardine, to avoid the delays and congestion around the Forth

Road Bridge, particularly during peak times. Any resulting drop in visitors may lead to adverse effects on local businesses which rely on passing trade. As the TM associated with the re-cabling works cover an extended period (8 years) of significant disruption, this is likely to influence development patterns and impact on the regional economy during this time.

2.3.3 The provision and investment in transport can impact the economy through a variety of mechanisms, which were identified in a paper by the Standing Advisory Committee for Trunk Road Assessment (SACTRA, 1999) as being:

- reorganisation or rationalisation of production, distribution and land use;
- effects on labour market catchment areas and hence on labour costs;
- increases in output resulting from lower costs of production;
- stimulation of inward investment;
- unlocking inaccessible sites for development; and
- triggering growth, which in turn stimulates further growth.

2.3.4 Eddington (2006) illustrated the link between investment in transport infrastructure and development activities, which include land for employment, leisure and residential use, when constraints, such as congestion and bottlenecks, exist. Without a reliable vehicular route across the Forth, economic development may be affected. Fife in particular, as a result of poor transport links, could suffer through lack of investment for new development opportunities, which may consequently lead to impacts on the economy and population. However, should development activities re-locate elsewhere in Scotland, this could in turn result in economic stimulation of other local economies, although this is likely to be limited to the period of disruption which is estimated to be 8 years.

2.3.5 The TM in place during cable replacement works on the Forth Road Bridge would result in significant disruption to traffic for an extended period (8 years). During this period, tourism is likely to be negatively impacted as congestion would keep some people away from the area. Tourist attractions such as Deep Sea World at North Queensferry would be adversely affected as would any businesses that rely on passing trade. Local businesses interviewed during the EIA (refer to Chapter 7: Land Use) noted a decrease in trade on days when the Forth Road Bridge is under repair. In addition, as noted above the significant increases of traffic using the A985 would result in increased severance, which may also affect local businesses along this route.

2.3.6 The baseline under supplementary Do-Minimum 1 would therefore be one of poorer socio-economic conditions than at present.

2.4 Illustration of Future Environmental Baseline Conditions for Do-Minimum 1 (Cable Replacement and Maintenance Works)

2.4.1 Long-term partial closure of the Forth Road Bridge to enable cable replacement works would result in significant disruption to vehicle travellers as outlined Section 2.2. For the majority of environmental disciplines, the baseline conditions would be broadly similar to those that already exist as a result of the operation of the Forth Road Bridge, as the existing road infrastructure continues to be used. This would be the case for land use, geology, landscape and visual and cultural heritage. For the remaining environmental disciplines, changes in baseline conditions could be significantly affected by changes to traffic volumes and travel patterns.

2.4.2 Based on the changes in AADT flows described in Section 2.2 and shown on Figure A5.1 the Do-Minimum baseline would be significantly different for the M9 Spur, M90/A90 Forth Road Bridge, A985, A977, and the Kincardine Bridge.

2.4.3 The key changes in environmental baseline conditions for cable replacement of the Forth Road Bridge are described in the following paragraphs.

Non-Motorised Users and Community Effects

2.4.4 Under the cable replacement scenario the majority of traffic (60%) would still use the Forth Road Bridge. Edinburgh, the Lothians and Fife would therefore remain connected and no new severance would result. It is assumed that non-motorised user (NMU) provision would be maintained during TM events on the Forth Road Bridge, since the pedestrian and cycle paths are segregated from carriageway. The significant decrease in traffic would normally be considered to result in an improvement in amenity value for users of the paths, however, in this case the decrease is unlikely to provide a benefit to users, since the TM would result in extensive delays on the bridge and slow moving traffic which have a negative effect on amenity value.

2.4.5 A significant decrease (39%) in traffic volumes on the M9 Spur is also predicted under this scenario. Under the existing conditions the M9 Spur can be considered to result in some level of severance in Dalmeny, however, using local roads vehicular movements across the spur are currently possible. No paths or cycleways cross the carriageway of the M9 Spur at-grade, and underbridges are already in place to enable movement of local traffic and NMUs from east to west, therefore, no relief from existing severance would result from lower traffic flows at this location.

2.4.6 Under Do-Minimum scenario 1 the A985 traffic volumes would be predicted to increase by 40%. Under the existing conditions the A985 results in some level of severance for local communities along this route. The increase of traffic flows would result in an additional severance experienced along this route. The other local roads which would be predicted to experience increased traffic flows have predicted flows of either less than 8,000 AADT or the increase is below 30% (thresholds for determining severance in DMRB (Highways Agency et al., 1993)) and are therefore not considered to contribute to additional severance.

2.4.7 As noted in Section 2.2, paramics modelling indicates that during the cable replacement works, while there will be a reduction in overall traffic volumes over the bridge, there will be a lot more congestion. Significant queue lengths are predicted south of the Forth during the evening peak periods and on the north side of the Forth during morning peak period. This will result in a loss of mobility for communities such as Inverkeithing, North Queenferry, Rosyth, Dalmeny, South Queensferry where junctions are likely to be blocked and re-routing will occur as residents attempt to use alternative routes. This loss of mobility within these communities would lead to a number of community effects including:

- reducing vehicular movements within the community;
- reducing accessibility to key community facilities such as doctor surgeries, hospitals, educational facilities (e.g. commuting staff members and students outwith the school catchment); and
- reducing access to retail/commercial facilities potentially not only affecting customers but staff and suppliers.

2.4.8 Anecdotal evidence provided by members of the community during consultation has noted that in the past extensive road works on the Forth Road Bridge have resulted in significant secondary impacts experienced within the local communities. For example, east to west movements across the A90 north of the Forth are disrupted causing problems for business and social facilities in North Queensferry, Inverkeithing, Rosyth and the wider Fife community.

2.4.9 The baseline under Do-Minimum 1 would therefore be similar for NMUs to that currently experienced, but with additional severance from the increased traffic on the A985 and in terms of community effects, the baseline conditions would be very poor for a number of the surrounding communities north and south of the Firth of Forth including North Queensferry, Inverkeithing, Dalmeny, South Queensferry and Newton due to the predicted traffic congestion and associated impacts.

Noise and Air Quality

2.4.10 Approximately 60% of traffic would continue to use the existing route over the Forth Road Bridge. However, some vehicles would use alternative routes to reach their destinations. Significant increases in traffic flows are anticipated on the A985 and Kincardine Bridge and significant decreases on the Forth Road Bridge A90/M90 and the M9 Spur. Although this would result in improvements to noise and air quality in some areas (compared to the existing situation), such as around the Forth Road Bridge at South Queensferry and North Queensferry, Newton and Kirkliston, as a result of decreased traffic flows, there would be increased traffic noise and emissions of pollutants experienced by communities in vicinity of the A985 and Kincardine Bridge. Additionally, as a result of the increased vehicle kilometres travelled, there would be increased greenhouse gas emissions, although not to the same extent as under a full closure of the Forth Road Bridge.

2.4.11 The baseline under Do-Minimum 1 would therefore be one where although some areas experience improved air quality and noise, others experience poorer conditions than are currently experienced.

2.4.12 Under Do-Minimum 1, noise changes relative to the ES Do-Minimum from existing roads are all likely to be of either negligible (<1dB) or minor magnitude (1 to 3dB). In particular:

- A985, A994, A977 (north of Gartarry Roundabout), Kincardine Bridge and the Clackmannanshire Bridge are likely to be subject to minor magnitude noise increases relative to the ES Do-Minimum.

2.4.13 Properties near to roads linking the M9 and the Forth Road Bridge would be likely to be subject to minor magnitude noise decreases relative to the ES Do-Minimum. This includes properties near to the M9 Spur in Kirkliston and properties in South Queensferry.

2.4.14 Properties near to the M90 / A90 north of the Firth of Forth would also be likely to be subject to minor decreases in noise relative to the ES Do-Minimum.

2.4.15 Regarding climate change issues, avoiding the need for cable replacement, and the lengthy period of congested conditions associated with that work, would mean that total CO_2[2] emissions during the congested peak periods for the proposed scheme are likely to be reduced.

2.4.16 A new Passenger car and Heavy-duty Emission Model (PHEM)[3] based emissions calculation module has been developed. This can be used with microsimulation models such as S-Paramics(referred to generically as Paramics)[4]. The emissions evaluation using S-Paramics with PHEM relationships is a technique being developed on behalf of Transport Scotland, but not yet fully approved for use in scheme appraisal. The information obtained from this evaluation tool has been used to supplement the strategic calculations which are based on the Department for Transport formulae. The PHEM based results are intended to provide a more informed view of the likely locally generated impact of the proposed scheme (refer to Chapter 15).

2.4.17 S-Paramics / PHEM tests were undertaken to test the impact of main cable replacement (MCR) works on the Forth Road Bridge (FRB) which are anticipated to require contraflow restrictions on the existing bridge for 268 weeks over 8 years between 2012 and 2019 inclusive. The traffic conditions which will prevail for much of the time if the cable replacement is undertaken will be very different from the normal Do Minimum conditions. Stop-start traffic will occur for longer periods in more locations under this scenario. Even allowing for a significantly reduced level of demand, the reduced capacity available on the Forth Road Bridge means that the average delay to vehicles will increase by around 40 minutes per journey, compared with normal un-restricted travel.

[2] CO_2 is used generically throughout this chapter to refer to CO_2 and CO_2(e)

[3] PHEM was developed by TUG (TU Graz – Institute for Internal Combustion Engines and Thermodynamics)

[4] Paramics and S-Paramics references relate to the use of S-Paramics version 2008.2 software

2.4.18 In order to provide a comparison of the local impacts of the cable replacement works on CO_2 emissions, similar equivalent tests were undertaken by applying the same demand to the unrestricted base network. The demand applied to both networks equates to 70% of base (2008) levels of demand. Interpeak emissions have not been assessed. The peak period tests also do not take account of the effects of the likely increased vehicle kms and increased congestion on competing crossings and approach routes caused by diverting traffic.

2.4.19 The assessed annual emissions are summarised in Table 2 below and are presented as negative numbers as they represent an impact which could be avoided by building the proposed scheme.

Table 2: Indicative Cable Replacement Impact

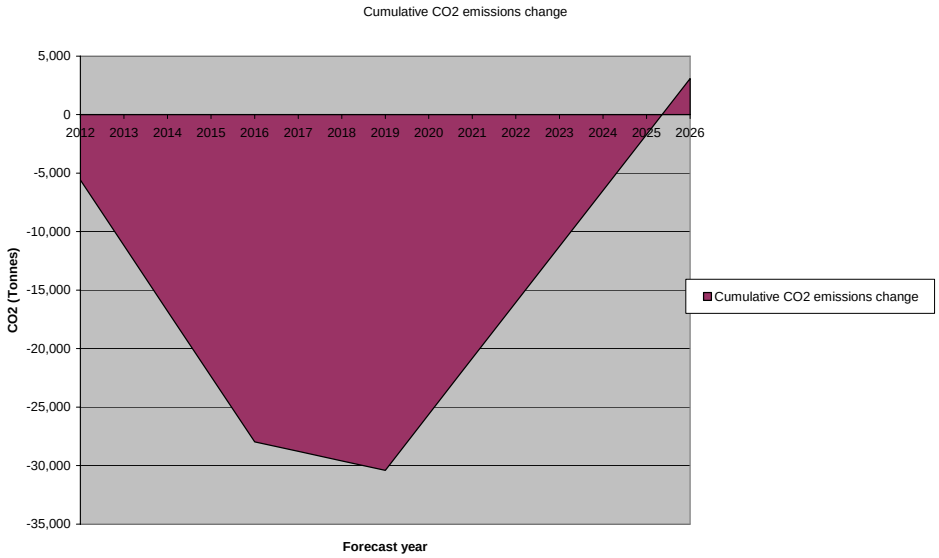
Modelled Period	Modelled CO_2(e) difference (Tonnes)	Annualisation Factor*	CO_2(e) difference per annum (Tonnes)
AM (4 hours)	-20.5	167.5	-3,434
PM(4 hours)	-12.9	167.5	-2,161
Total	-33.4		-5,595

* Annualisation Factor assumes 5 weekdays and 33.5 weeks per year.

2.4.20 The results in Table 2 indicate that the MCR works are likely to result in an increase in CO_2 emissions owing to an increase in congestion during the works. If the proposed scheme were implemented then this increase in emissions from the MCR works would be avoided. Therefore an indication of the annual net impact of the proposed scheme on CO_2 emissions can be calculated by taking the forecast increase in emissions owing to the proposed scheme and then subtracting the predicted increase in emissions that would be expected during the period of the cable replacement works.

2.4.21 The graph below (Figure A5.2) indicates the cumulative effect of the forecast changes in CO_2 emissions using this approach. As can be seen in this illustration, up to 2016, there is a net decrease in CO_2 emissions, this continues until 2019 at a lower rate as the increase in CO_2 from the proposed scheme cancels much of the reduction. After 2019 the cable replacement would be complete and hence the CO_2 emissions from the proposed scheme would now be higher than the Do-Minimum. However, there is a cumulative net saving in CO_2 emissions until 2025. Therefore the predicted increase in CO_2 emissions is delayed until 2025 by the implementation of the proposed scheme. It should be noted that the MCR impacts are derived from identical traffic demand in both the MCR modelling and the comparator Do-Minimum modelling. Therefore, only the impact of network changes are taken into account. The Managed Crossing Strategy impact, indicated in Chapter 15 and presented in the graph, includes both the effect of network changes and the effect of additional traffic demand in the Do-Something scenario.

Figure A5.2 – Indicative cumulative change in CO_2(e)



2.4.22 The data in Figure A5.2 illustrate that emissions during the congested peak periods for the proposed scheme are likely to be less than the Do-Minimum (including cable replacement) over the period 2012 to 2025. This assessment excludes the additional benefits that may result from avoiding delays and increased emissions within the interpeak periods due to cable replacement works.

Other Environmental Impacts

2.4.23 Impacts on water quality (and aquatic species/habitats) associated with road traffic are principally caused by pollutants that are transported in road runoff. The sources of the pollutants are variable and include vehicles (e.g. tyre rubber, brake and clutch linings, fuel, oil and coolant), highway maintenance and general road surface degradation. Some of the resulting pollutants which may impact on a receiving water and its associated aquatic ecology include:

- metals such as dissolved copper, zinc, lead and other soluble pollutants;
- suspended solids and contaminants;
- organic compounds such as oils and other hydrocarbons;
- biodegradable organic material; and
- de-icing salt and alternative de-icing agents.

2.4.24 The significant increases to traffic numbers on diversion routes would result in pressure on the road drainage systems (where in place). These systems are unlikely to have been designed to cater for the significant increased volumes of traffic and associated road run-off. Therefore the additional traffic on the diversion routes (particularly on the A985, on the Kincardine Bridge and the A977) would likely result in increases to the amount of surface water run-off. As a consequence, there may be increases in impacts on surface water and groundwater near the diversion routes from un-treated (or insufficiently treated) road run-off. This would in turn affect the aquatic habitats/species in surrounding watercourses. There would also be increased risk of wildlife road traffic accidents (RTAs) in these areas where a significant increase in traffic flows results from vehicles diverting to avoid delays on the Forth Road Bridge. Similarly, the significant decreases in traffic flow on some routes would result in a decreased risk of RTAs in these areas.

2.4.25 Reduced traffic flows on the Forth Road Bridge arising from the cable replacement works are unlikely to improve the quality of surface water and groundwater in the areas of the Forth Road Bridge and M9 Spur. On the Forth Road Bridge the dilution effect resulting from the size of the Firth of Forth means that the reduced pollutant load in road-runoff would not be perceptible. At the M9 Spur, improvements in water quality would also be unlikely, as the motorway has existing drainage provision designed to cater for higher traffic volumes than would be present under Do-Minimum 1.

2.4.26 The Forth Road Bridge is a category A listed structure, therefore, any works that would alter the fabric of the structure would require consent from Historic Scotland. However, due to the necessary nature of the works to maintain the bridge it is unlikely that the cable replacement works would adversely affect the status of the bridge.

2.4.27 As noted in paragraph 1.3.6, replacement of the main cables will also require new anchorages (north and south) of the Forth Road Bridge. Examination of historical OS maps dating from 1856 until present, review of recent field survey results and the ground investigation undertaken in 2008 indicated potential sources of contamination at the proposed location of the new anchorage points. In the north, this includes two former quarries labelled source reference N13 and N14 (refer to Figure 8.1a and Chapter 8: Geology, Contaminated Land and Groundwater). At the location of the south replacement anchorage a dismantled railway and former mine are also located. Contamination associated with quarries and former mines can pose a risk of asphyxiation or explosion to construction workers, maintenance workers, end users and offsite receptors during construction and operation in the absence of mitigation. The dismantled railway could also pose a risk to human health, the water environment, future buildings/structures and/or ecological receptors during construction and operation in the absence of mitigation. However, should cable replacement works be required, measures would be proposed to mitigate these risks. It should also be noted that the existing cables are coated with red lead, and it is estimated that approximately 200m^3 of contaminated wire would need to be disposed of during cable replacement works.

2.4.28 The baseline under Do-Minimum 1 would therefore be one where some areas would potentially experience poorer water quality and support fewer protected species than under current conditions. Despite reductions in traffic flows, perceptible improvements are unlikely to occur near the Forth Road Bridge or the M9 Spur. The cultural heritage baseline would not be affected by a change to Do-Minimum 1. There are areas of potential land contamination that would be directly affected by the replacement anchorage points, however it is assumed that appropriate mitigation would be implemented during construction and operation.

2.5 Summary of Environmental Baseline Conditions During Cable Replacement and Maintenance Works

2.5.1 Table 3 provides a summary of the key changes to the environmental baseline conditions that would occur during the cable replacement works requiring partial closure of the Forth Road Bridge.

2.5.2 Baseline conditions for certain environmental disciplines would not be materially changed and were therefore scoped out of further assessment in this Appendix. These are: land use (other than the business effects noted in section 2.3), landscape, visual impacts and cultural heritage (refer also to paragraph 2.4.1).

Table 3: Summary of Environmental Baseline Conditions for Do-Minimum 1

Environmental Parameter	Cable Replacement and Maintenance Works of Forth Road Bridge No Replacement Crossing
Geology (Hydrogeology and Contaminated Land)	Near A985, A977 and Kincardine Bridge potentially poorer groundwater quality. No improvements in areas of decreased traffic due to existing drainage or dilution of run-off. Potential sources of contamination have been identified at the location of the replacement cables including former quarries (in the north), a disused railway and former mining (in the south) and approximately 200m^3 of red lead contaminated wire would also need to be disposed of.

Environmental Parameter	Cable Replacement and Maintenance Works of Forth Road Bridge No Replacement Crossing
Water Environment	Potentially increased surface water contamination, as a result of significantly increased traffic flows on the A985, A977 and Kincardine Bridge resulting in reduced water quality in these areas.
Ecology	Negative impacts on aquatic habitats and species resulting from un-treated (or insufficiently treated) road runoff polluting watercourses where traffic is predicted to significantly increase. Increased risk of RTAs (e.g. badgers and otters) on diversion routes, although, not to same extent as under full closure.
Air Quality	Traffic congestion is likely to increase on the Forth Road Bridge as a result of the TM and some vehicles may divert and cross the Forth further upstream increasing the vehicle kilometres travelled. This would result in increased emissions of pollutants, greenhouse gases and deterioration of air quality at the diversion routes, although not to the same extent as full closure. In addition some improvements would be likely for communities near the Forth Road Bridge, although not as extensive as with full closure.
Noise and Vibration	Traffic congestion is likely to increase on the Forth Road Bridge as a result of the TM and some vehicles may divert and cross the Forth further upstream at Kincardine. This would result in predominantly minor noise level increases for properties close at the diversion routes, although not to the same extent as full closure. In addition, minor noise level decreases would be likely for communities near the Forth Road Bridge, although not as extensive as with full closure.
Pedestrians, Cyclists, Equestrians and Community Effects	Additional severance due to increased traffic on the A985. However, TM would ensure Edinburgh, the Lothians and Fife remain well connected. It is assumed that NMU provision would be maintained during TM events on the Forth Road Bridge since NMU paths are segregated from carriageway. NMUs may perceive a reduction in amenity value due to traffic congestion on the Forth Road Bridge. No relief of existing severance. Traffic congestion on the Forth Road Bridge and routes leading to the bridge would have a knock-on effect on surrounding communities and businesses as a result of blocked junctions and extensive queuing lengths reducing mobility and access to community facilities during peak times.
Vehicle Travellers	Traffic congestion is likely to increase with significant disruptions during traffic management events on the Forth Road Bridge. Some vehicle users may make use of diversion routes in order to cross the Forth significant increases predicted for the A985, the A977 and Kincardine Bridge. Journey lengths would increase (diversion via Kincardine is approximately an additional 40km).

2.6 Comparison of Cable Replacement and Maintenance Works (Do-Minimum 1) with Stage 3 Impacts

2.6.1 If the environmental assessment used the cable replacement and maintenance work Do-Minimum described in this Appendix, rather than the Do-Minimum which forms the baseline used to determine impacts reported in this ES, it is likely that different impacts would result for some disciplines. This section summarises the key differences in the environmental effects of the proposed scheme which would arise from the cable replacement and maintenance works on the Forth Road Bridge.

Geology (Hydrogeology and Contaminated Land)

2.6.2 Cable replacement of the Forth Road Bridge is unlikely to result in better groundwater quality (and surface water quality, refer to paragraph 2.6.5) than that for the Do-Minimum assessed in the ES, for the areas around the Forth Road Bridge and M9 Spur, despite anticipated lower traffic flows. This is due to the dilution effect the Firth of Forth would have on run-off and due to the existing drainage on the M9 Spur. The effects of the proposed scheme, when assessed against the cable replacement Do-Minimum, would not be significantly different than what has been assessed in the ES at these locations.

2.6.3 Where increases in traffic are predicted as a result of the cable replacement scenario i.e. A985, Kincardine Bridge and the A977, contaminated run-off may increase resulting in reduced groundwater quality (and surface water quality, refer to paragraph 2.6.5) for the alternative Do-Minimum baseline. An assessment using this Do-Minimum baseline as a comparison against the Do-Something, would likely report improvements to groundwater quality in the vicinity of these roads as a result of the traffic choosing to use the replacement bridge, reducing traffic on the local roads.

2.6.4 As noted in paragraph 2.4.20 potential sources of contamination have been identified at the location of the replacement cables in both the north and south that would require mitigation during the cable replacement works. In addition the cable themselves are coated with red lead which is a contaminant. These areas are not affected by the proposed scheme and therefore an assessment using this Do-Minimum would include these within the reported baseline but the impacts of the Do-Something scenario would not be affected.

Water Environment

2.6.5 As with groundwater quality, surface water quality is not anticipated to improve from the existing Do-Minimum assessed in the ES, in the areas of the Forth Road Bridge and M9 Spur, despite anticipated lower traffic flows. The effects of the proposed scheme when assessed against the cable replacement Do-Minimum would not be significantly different than what has been assessed in the ES at these locations.

2.6.6 Where increases in traffic are predicted with the cable replacement scenario i.e. A985, Kincardine Bridge and the A977, contaminated run-off may increase resulting in reduced surface water quality for the Do-Minimum baseline. An assessment using this Do-Minimum baseline as a comparison against the Do-Something, would likely report improvements to surface water quality (and associated aquatic habitats, refer to paragraph 2.6.8) in the vicinity of these roads as a result of the traffic choosing to use the replacement crossing, reducing traffic and associated run-off contamination from the local roads.

Ecology

2.6.7 Areas that experience a reduction in traffic flows may also experience a reduction in the risk of RTAs with protected species such as badger and otter. This may result in an increase in numbers of protected species in certain areas. The cable replacement Do-Minimum baseline may therefore have a higher sensitivity rating for some areas. Therefore, when assessed against the Do-Something, a different significance rating (to that assessed in the ES) may be applied on certain receptors even though the magnitude of impact may be similar.

2.6.8 Where reduced surface water and groundwater quality is predicted for the cable replacement baseline (A985, A977 and Kincardine Bridge) the suitability for watercourses to support aquatic habitats may also decrease. An assessment using this Do-Minimum baseline as a comparison against the Do-Something, would therefore likely report improvements to aquatic habitats in conjunction with improvements to water quality in the vicinity of these local roads.

2.6.9 There is also a potential significant impact on the qualifying bird features of the Firth of Forth and Forth Islands Special Protection Areas (SPAs) associated with cable replacement. As indicated in paragraphs 1.3.5 and 1.3.6 new anchorages would be required adjacent to and below the viaducts on either side of the bridge. The proximity of these to the shoreline could result in disturbance of bird populations. However, these could be mitigated if seasonal restrictions are applied to the timing of the construction.

Air Quality

2.6.10 The significant decrease in traffic at the M9 Spur, the Forth Road Bridge as well as northern access roads to the Forth Road Bridge (i.e. A90, M90, A92) would mean that baseline air quality pollutant concentrations would be lower in these areas when compared to the existing situation (assuming that greater traffic congestion does not offset the reductions in pollutant concentrations due to reduced flows). This would be the case for receptors close to these roads i.e. within South Queensferry, Newton, Kirkliston, North Queensferry, Kelty and Cowdenbeath. Different impacts than those reported in the ES might occur when comparing this alternative Do-Minimum with the Do-Something, depending on whether the Do-Something is likely to result in positive or detrimental changes to local air quality.

2.6.11 In South Queensferry, for example, areas around the existing Forth Road Bridge are predicted to experience an improvement in local air quality as a result of the proposed scheme. Assuming a 40% reduction in traffic flows along the Forth Road Bridge in this alternative Do-Minimum, and assuming a significant reduction in traffic in the Do-Something scenario (i.e. only public transport and taxis), an improvement in local air quality around the existing Forth Road Bridge is still likely, however, the improvement would be less than that reported in the ES. Impacts on local air quality in areas around the proposed Main Crossing are likely to be the same for this alternative Do-Minimum. Similar impacts are likely to result at locations around the existing Forth Road Bridge and proposed Main Crossing in North Queensferry (i.e. improvement but less improvement than reported in ES around Forth Road Bridge and detrimental impacts at the same level as reported in the ES around the proposed Main Crossing respectively).

2.6.12 The air quality assessment in the ES reported a very small increase in pollutant concentrations for receptors in Newton. Given that there is a predicted 14% decrease in traffic flows along the A904 for this alternative Do-Minimum, it is likely that the detrimental impact and significance would worsen when comparing this alternative Do-Minimum with the Do-Something. Total pollutant concentrations in this Do-Minimum would be lower than those reported in the ES while total pollutant concentrations in the Do-Something would be the same as those reported in the ES.

2.6.13 The significant increase in traffic at the A985, A977 and Kincardine Bridge would mean that the pollutant concentrations in the baseline Do-Minimum air quality would be higher than the existing situation. This would be the case for receptors close to these roads i.e. within Kincardine, areas of Rosyth, Crombie, High Valleyfield, Balado, Crook of Devon, Briglands, Powmill, Gartwhinzean Feus, Blaringone and Forestmill.

2.6.14 The majority of locations listed in the paragraph above are not affected by the proposed scheme when comparing the Do-Minimum with the Do-Something (as reported in the ES). If however, Do-Minimum traffic flows are higher along roads within these areas (in the alternative Do-Minimum) it is likely that the proposed scheme would result in beneficial effects in these areas as traffic is taken away from these roads.

2.6.15 The above findings on air quality effects are based on the strategic traffic model and the DMRB approach to air quality assessment as described in Chapter 15. In addition to this, some analysis has been undertaken of the effects of the cabling works using local traffic modelling system Paramics and PHEM (refer to Section 2.4).

Noise

2.6.16 Under Do-Minimum 1, reported impacts (and possibly as a result reported significant effects) would change in parts of the noise study area, although these changes would be less dramatic than the changes which would result under Do-Minimum 2. The main likely changes to the impacts as reported in the ES are listed below.

2.6.17 Properties surrounding the Forth Road Bridge approach road through South Queensferry would be subject to noise impacts less beneficial than those reported in the ES. The beneficial noise impacts would be likely to be minor to moderate, as opposed to moderate to major. Projected impacts for most of South Queensferry would also be generally slightly more adverse, due to decreased bridge traffic through South Queensferry under Do-Minimum 1. The areas subject to noise increases rated as significantly adverse may increase in size; and the areas subject to noise decreases rated as significantly beneficial may decrease in size (relative to the impacts as reported under the ES Do-Minimum).

2.6.18 Properties near to the M9 Spur in Kirkliston would likely be subject to moderate adverse noise impacts (as opposed to the minor adverse impacts reported in the ES) due to that bridge traffic being re-introduced onto the M9 Spur.

2.6.19 Following the opening of the scheme, the re-distribution of bridge traffic away from the alternative traffic routes via Kincardine would be likely to result in minor beneficial noise impacts for properties close to the following routes: A985, A994, A977 (north of Gartarry Roundabout), M9 (between Junction 7 and Junction 1A), Kincardine Bridge and the Clackmannanshire Bridge.

2.6.20 On the M90 / A90 north of the Firth of Forth, the re-introduction of bridge traffic to these roads would likely result in predominantly moderate noise impacts to surrounding properties (as opposed to the minor adverse reported in the ES).

2.6.21 Overall noise impacts as assessed under Do-Minimum 1 as opposed to the current ES Do-Minimum would be likely to show at least one (possibly more) additional areas of significant adverse effect(s) compared with those reported in the ES. Also, in some areas, beneficial significant effects would be lessened or absent (relative to the current ES Do-Minimum) due to the diminished predicted beneficial impacts arising from a lower traffic flow for the Do-Minimum on the bridge approach roads. The effects further away from the FRB approaches and the M9 Spur would be expected to be minor or negligible relative to the current ES.

NMUs and Community Effects

2.6.22 Under this baseline scenario the majority of traffic would be utilising the Forth Road Bridge and NMUs would be able to maintain access between North Queensferry and South Queensferry utilising the segregated paths. There is therefore predicted to be little difference in cross-Forth traffic and NMU movements between the cable replacement scenario and the Do-Minimum assessed in the ES. However, as noted in Section 2.2 although there is a reduction in traffic demand overall, the cable replacement works would result in significant congestion and disruption experienced by communities surrounding the Forth Road Bridge. Therefore, with the replacement crossing in place there would be relief from the traffic and associated impacts experienced by these communities and a direct and less congested route would be available for use across the Firth of Forth. The Do-Something scenario would therefore report significant benefits for the proposed scheme if the Do-Minimum was the cable replacement works.

Vehicle Travellers

2.6.23 Compared to the operational impacts of 8 years of traffic management on the bridge required to support cable replacement works, traffic management required to support construction of the proposed scheme would be much less disruptive. Although the works will take place over a number of years, much of this will be off-line, and where online works are required, most works involving reductions to less than two lanes in each direction can be undertaken for short periods at weekends or overnight during weekdays. Therefore, relatively few lane closures during traffic management events are considered likely to be necessary during peak periods.

2.6.24 At Ferrytoll, Echline and M9 Junction 1A some traffic management will be required to support tie-in works. The most significant of these are continuous 24–hour operations expected to last for between 3 and 6 months. These involve narrow lane operations with the posted speed limit reduced to 40 mph. Some works at M9 Junction 1 are expected to last for over a year. Generally, however, these also involve lane narrowing and speed limit reductions to 40 mph. Around 1 year of continuous, 24 hour traffic management (narrow lanes, 40 mph again) is also considered likely to be required at Echline.

2.6.25 Traffic modelling indicates that there will be little change to existing operations north of the Firth of Forth as a result of the tie-in works required at Ferrytoll. South of the river, additional eastbound queuing along the M9 spur is forecast during morning peak periods compared to the assessed Do-Minimum, elsewhere south of the river, little operational change is expected.

2.6.26 The cable replacement works Do-Minimum baseline, results in significant delay for vehicles using the Forth Road Bridge which will result in reduced traffic demand and some vehicle travellers utilising alternative routes via Kincardine and the A977 and A985. In comparison the Do-

Something scenario of a replacement crossing, would mean a shorter and more pleasant route would be available to cross the Firth of Forth, and the disruption associated with the cable replacement works are avoided. Therefore, impacts on vehicle travellers reported would be more positive than the existing assessment presented in the main body of the ES.

3 Supplementary Do-Minimum 2: Full Closure of the Forth Road Bridge

3.1 Introduction

3.1.1 A less likely Do-Minimum considered in this Appendix is that the Forth Road Bridge would require permanent closure to facilitate undertaking of extensive maintenance and refurbishment works to allow the bridge to continue to operate.

3.1.2 If the Forth Road Bridge were to be closed, existing traffic patterns would radically change e.g. use of alternative routes including the Kincardine Bridge and Clackmannanshire Bridge crossings. Use of these alternative transport routes would transfer the environmental effects (particularly noise and air pollution) to other areas. The changes in traffic patterns within the region may also influence development patterns, which can result in additional effects on the environment. Generally traffic would shift from being on the trunk road network (which is designed to take high traffic flows and Heavy Goods Vehicles (HGVs), designed with appropriate drainage and in many areas has relatively few nearby receptors) to roads less suited to high flows (often single carriageway, passing through towns/villages, often with little or no drainage in place).

3.2 Likely Effect on Traffic Movements

3.2.1 If the Forth Road Bridge were to close in 2017 with no replacement crossing provided in the North/South Queensferry area, this would have a substantial impact on traffic flows across a wide area of east central Scotland. To the north of the Firth of Forth, traffic flows would decline most significantly on the M90/A90 between Perth and Fife to well below existing levels. The strategic nature of the corridor means that a significant proportion of the traffic would divert towards Stirling or Kincardine from a significant distance north of the Firth of Forth, generally at Perth, following the A9 towards Dunblane, or at Kinross, following the A91 westwards.

3.2.2 Traffic would also drop on the A92 East Fife Regional Road, although the forecast decline in traffic would be to levels similar to those currently experienced. This reflects the reduced route choice for travel to and from the areas of Fife i.e. the lack of alternative to the A92. A marginal decline in traffic on the A921 coast road would also be expected, although as this route mainly carries local traffic, the impact would be significantly less than the decline forecast on the trunk road network.

3.2.3 To the west of Dunfermline, traffic would be anticipated to double on the main routes towards Kincardine: the A985 trunk road and the A994 through Crossford. Traffic would also be expected to double on the A977 north of Gartarry Roundabout, principally as result of traffic diverting from the M90 at Kinross via the A91. Taken together, these flows would result in a significant increase in traffic on both the Kincardine Bridge and the Clackmannanshire Bridge west of Kincardine which opened for use in 2008. The forecast increase in traffic would be greatest on the Kincardine Bridge because it is best placed to serve the demand to and from Dunfermline and the south Fife coast. The Clackmannanshire Bridge is better placed to cater for longer distance traffic from the north or northeast of Scotland travelling via the A91 and A977. Forecast traffic flows on the Kincardine Bridge under a ‘no replacement bridge’ scenario would be more than 50 percent above existing levels, consequently significant delays would be likely.

3.2.4 To the south of the Firth of Forth, the additional cross-Forth traffic around Kincardine would result in a significant increase in traffic flows on the M9 (particularly to the east of Junction 7). Forecast traffic levels would be more than twice existing flows between Junction 7 and Junction 1A. A small

increase in traffic using north-south routes from the M9, such as the A801 and B8046 would be expected, but most of the additional traffic would remain on the M9 as far as Junction 1A.

3.2.5 Flows on the A904 would be expected to increase significantly and flows on the A90 east of Echline would be expected to decrease significantly. Traffic on the M9 Spur would be expected to drop significantly, as this would become little more than a local access route to South Queensferry. This also contributes to a reduction in traffic on the M9 between Junction 1A and Newbridge. Forecast traffic flows on the A8 between Newbridge and Gogar and the M8 between Claylands and Hermiston Gait would be broadly similar with and without a crossing at North/South Queensferry.

3.2.6 The adverse impact on traffic flows across east central Scotland, particularly in the vicinity of Kincardine and Falkirk, is substantial enough to imply that closure of the Forth Road Bridge, with no infrastructure improvements on the many diversionary routes, is not a desirable option. Prolonged closure of the Forth Road Bridge, for any reason, would likely necessitate substantial capacity enhancements on these diversionary routes.

3.3 Socio-Economic

3.3.1 As noted in Section 2.3, the Forth Road Bridge is important to the economy locally, regionally and nationally and provides a key link between neighbouring communities (such as Fife) and Edinburgh which are a significant source of labour. If the Forth Road Bridge where to close and no replacement crossing proposed commuters may leave the area in order to be closer to employment opportunities. There could be a lack of available labour in Edinburgh, while the Fife economy would suffer from a lack of development and investment should residents leave the region (Jacobs et al. 2007). Transport investment can also have direct impacts on the economy. Without a viable vehicular route across the Forth economic development is likely to be affected. Fife in particular, as a result of poor transport links, could suffer through lack of investment for new development opportunities, which may consequently lead to impacts on the economy and population. However, should development activities re-locate elsewhere in Scotland; this could in turn result in economic stimulation of other local economies.

3.3.2 The Forth Road Bridge is also part of the strategic road network which connects other major towns and cities including Perth, Dundee, Aberdeen and Inverness with southeast Scotland. Without a crossing of the Firth of Forth in the North/South Queensferry area there would be reduced access between the north of Scotland and the southeast, particularly the eastern central belt. Both recreational users of the bridge, including tourists and day shoppers, and commercial users (particularly haulage firms) would have to follow alternative routes, most likely via Kincardine. Any resulting drop in visitors may lead to adverse effects on the businesses operating in the southeast relying on passing trade. Over time this is likely to influence development patterns and impact on the regional economy.

3.3.3 The baseline under Do-Minimum 2 would therefore be one of poorer socio-economic conditions than at present.

3.4 Illustration of Future Environmental Baseline Conditions for Scenario 2 (Full Closure)

3.4.1 The key changes in environmental baseline conditions for the full closure are described in the following sections.

NMUs and Community Effects

3.4.2 The Forth Road Bridge provides a key community link between Fife and Edinburgh and the Lothians both for motorised vehicles and NMUs. The bridge is also part of National Cycle Route 1 (NCR 1). The loss of the Forth Road Bridge would result in community severance, directly impacting on people in the region who use the crossing as part of their daily commute or for other work and/or recreation. Although the Forth Road Bridge is not the only transport corridor between

these communities, it is currently the most used. In the long term there is expected to be an increase in the frequency of cross-Forth passenger trains. Improved rail services would maintain an effective and commutable transport link between Fife and Edinburgh and could promote modal shift, however, this would not offset the closure of the Forth Road Bridge (Jacobs et. al, 2007).

3.4.3 Full closure of the Forth Road Bridge would result in the loss of a key recreational/commuting route used by pedestrians and cyclists and NCR 1 would be severed. Cyclists may utilise an alternative route via Kincardine, although this would result in an increased journey length which is likely to deter most users. This diversion would be unlikely to be used by pedestrians due to the distance required to travel. Significant increases in traffic levels on the alternative routes may also lead to NMUs abandoning particular routes, as a result of the reduction in amenity value and/or perceived safety potentially leading to additional severance.

3.4.4 Communities located along the diversion routes would also be affected by the changes in traffic patterns. Communities likely to be affected include:

- Adjacent to the A985 – Rosyth, Crombie, Valleyfield and Kincardine.
- Adjacent to the A977 – Kinross, Balado, Crook of Devon, Briglands, Powmill, Gartwhinzean Feus, Blairingone and Forestmill.
- Adjacent to the A994 – Dunfermline, Crossford and Cairneyhill.
- Adjacent to the A904 – Newton.

3.4.5 Significant increases in traffic volumes along these diversion routes could result in community severance, if the increased traffic discourages access to community facilities or reduces the links between neighbouring areas.

3.4.6 The baseline under Do-Minimum 2 would therefore be one of poorer NMU access and increased community severance than are presently experienced.

Noise and Air Quality

3.4.7 In the absence of a replacement crossing, and assuming full closure of the Forth Road Bridge, traffic volumes are anticipated to increase on several routes including:

- North of the Firth of Forth - A9 towards Dunblane, the A91 westbound, A985 and A994 through Crossford, A977 north of Gartarry Roundabout for traffic diverting from the M90 at Kinross via A91.
- South of the Firth of Forth – M9 (between Junction 7 and 1A) and the A904 through Newton.

3.4.8 Depending on the capacity of the road, it is likely that increased traffic flows would result in traffic congestion along stretches of some of the diversion routes, particularly those which are not motorway standard.

3.4.9 Due to the very large reduction in traffic on the roads linking the M9 and the Forth Road Bridge, properties near to these links would be likely to be subject to moderate (3 to 5dB) to major (≥5dB) noise decreases relative to the ES Do-Minimum. This includes properties near to the M9 Spur in Kirkliston and properties in South Queensferry.

3.4.10 The re-distribution of traffic onto other roads would be likely to result in moderate noise increases relative to the ES Do-Minimum for properties close to the following routes: A985, A994, A977 (north of Gartarry Roundabout), M9 (between Junction 7 and Junction 1A), Kincardine Bridge and the Clackmannanshire Bridge.

3.4.11 On the M90 / A90 north of the Firth of Forth, moderate to major noise decreases relative to the ES Do-Minimum would be likely for properties close to these routes. This is as a result of the reductions in traffic following the closure of the Forth Road Bridge.

3.4.12 Vehicles would have to use the above alternative routes to reach their destinations, and are likely to cross the Forth further upstream at Kincardine increasing the vehicle kilometres travelled. Large reductions in traffic flows on the roads linking the M9 and the Forth Road Bridge would result in improvements to air quality at receptors in the vicinity of these road links relative to the ES Do-Minimum. Areas that would be likely to experience improvements include receptors within 200m of affected road links around the Forth Road Bridge at South Queensferry and Fife and also receptors near the M9 Spur in Kirkliston.

3.4.13 There would be increased emissions of pollutants experienced by communities surrounding the diversion routes (i.e. receptors within 200m of the affected roads in Valleyfield and Kincardine, refer to Section 3.2) as road traffic is re-distributed across the surrounding road network. Additionally, as a result of the increased vehicle kilometres travelled, there would be increased greenhouse gas emissions.

3.4.14 The baseline under Do-Minimum 2 would therefore be one where some areas experience improved air quality and noise, and others experience poorer conditions than are currently experienced.

Other Environmental Impacts

3.4.15 The significant increases to traffic numbers on diversion routes would result in pressure on the road drainage systems (if in place). These systems are unlikely to have been designed to cater for the significant increased volumes of traffic and associated road run-off. Potential impacts which would result are likely to include deterioration of water quality and impacts on aquatic ecology, including impacts on protected species known to exist in the study area (e.g. Atlantic salmon and otter) associated with aquatic habitats. Similarly, on roads where no formal road drainage systems is in place, the surface water runoff would drain directly into the surrounding environment with potential receiving areas including adjacent watercourses, groundwater and agricultural fields. Any additional concentration of pollutants resulting from increased traffic could potentially pollute groundwater and watercourses, resulting in deterioration of water quality and impacts on aquatic species. It should be noted that any existing negative impacts on water quality from the existing road traffic and maintenance activities, including the use of salt, would remain but would occur on the diversion routes.

3.4.16 The additional traffic on the diversion routes may also result in an increased risk of RTAs with protected species such as badger and otter. However, the reduction in traffic on the Forth Road Bridge and approaches would result in a decrease in RTAs.

3.4.17 The baseline under Do-Minimum 2 would therefore be one where some areas experience potentially poorer water quality and more protected species RTAs than under current conditions.

3.5 Comparison of Supplementary Do-Minimum 2 with Stage 3 Impacts

3.5.1 If the environmental assessment used a full closure Do-Minimum, rather than the Do-Minimum which forms the baseline used to determine impacts reported in this ES, it is likely that different impacts would result for some disciplines. This section summarises the key differences in the environmental effects of the proposed scheme which would arise from full closure of the Forth Road Bridge.

Geology (Hydrogeology)

3.5.2 Along the diversion routes where traffic significantly increases due to the closure of the Forth Road Bridge, the baseline groundwater quality of the Do-Minimum scenario 2 may worsen. This would be as a result of increased traffic on diversion routes resulting in increased surface run-off contamination potentially reaching and reducing the quality of local groundwater.

3.5.3 An assessment using this Do-Minimum baseline as a comparison against the Do-Something scenario of a new crossing would likely report improvements to the groundwater quality in the

vicinity of diversion routes (a beneficial impact). This would be due to the proposed scheme traffic levels and associated run-off on the diversion routes being apparently less with the replacement crossing over the Forth in place. In addition, since the proposed scheme would include drainage designed for the anticipated traffic flows, adverse impacts would be unlikely to be significant for the Do-Something scenario.

Water Environment

3.5.4 With no Forth Road Bridge, water quality is likely to be poorer along the diversion routes as a result of the increased traffic on these routes. This would be as a result of significantly increased traffic and associated surface water run-off potentially contaminating watercourses. This would occur particularly where existing drainage systems are either not in place, or have not been designed to cope with the significant increase in traffic on the road network. Having this as the Do-Minimum baseline would mean that when compared to the Do-Something scenario, an apparent improvement to water quality would likely be reported for watercourses in the vicinity of diversion routes (a beneficial impact). This would be as a result of reduced traffic flows on the diversion routes and increased traffic on the proposed scheme. The new infrastructure of the proposed scheme would include drainage designed for the anticipated flows, therefore, adverse impacts are unlikely to be significant for the Do-Something scenario in the vicinity of the proposed scheme despite the increased traffic flows.

Ecology

3.5.5 As noted above, water quality along the diversion routes is likely to be poorer than the existing situation due to the increased traffic and associated run-off contamination in areas with insufficient or no drainage treatment in place. The decreased water quality is likely to also impact aquatic habitats and associated species in the vicinity of the diversion routes. A comparison of this Do-Minimum baseline against the Do-Something on aquatic habitats/species in the vicinity of diversion routes may result in beneficial impacts. Traffic flows would shift to the replacement bridge resulting in less traffic on the diversion routes with associated improvements in water quality, reductions in surface-water contamination and improved aquatic habitats.

3.5.6 Increased levels of traffic result in increased risk of RTAs with protected species such as badger and otter (refer to Chapter 10: Terrestrial Ecology). Under the full closure scenario potentially increased RTAs may affect the Do-Minimum baseline populations of these species in vicinity of the diversion routes leading to potential fewer adverse impacts reported for the Do-Something scenario.

Noise and Air Quality

3.5.7 Differences in reported noise and air impacts (adverse and beneficial) would result from the assumption of Do-Minimum 2 instead of the ES Do-Minimum. The impacts would depend on the location of receptors in relation to the changing traffic flows, composition and speeds.

Air Quality

3.5.8 Under the full closure Do-Minimum the traffic flows would be significantly higher at locations such as Kincardine and significantly lower at areas around the Forth Road Bridge in South Queensferry. To illustrate the difference this would make to an environmental assessment these two communities are chosen as case study examples.

3.5.9 Under the full closure scenario the majority of traffic which would have crossed the Forth Road Bridge would travel via Kincardine. Therefore, the Do-Minimum air quality in Kincardine would have relatively high levels of pollutant concentrations and noise levels would also be relatively high due the high traffic volumes passing through the community. However, under the Do-Something scenario air quality and noise in Kincardine would both improve, as traffic shifts to use the proposed scheme. Therefore, the environmental assessment based on comparison of this Do-

Minimum against the Do-Something is likely to report beneficial impacts for some receptors in Kincardine. There were no significant impacts resulting from the proposed scheme when comparing the ES Do-Minimum with the Do-Something.

3.5.10 In South Queensferry the opposite situation would arise as air pollutant concentrations and noise levels would be low in the Do-Minimum scenario for the majority of receptors due to traffic flows in the area mainly comprising of only local traffic. When assessing the Do-Something scenario (i.e. traffic crossing Forth via the Forth Replacement Crossing) against this Do-Minimum the assessment would show significantly increased traffic flows at South Queensferry. This would produce a result of an apparent deterioration of local air quality due to increased pollutant levels, rather than an improvement, as reported in the ES.

Noise

3.5.11 Under Do-Minimum 2, reported impacts (and possibly as a result reported significant effects) would change across the noise study area. The main likely changes to the impacts as reported in the ES are listed below.

3.5.12 Projected impacts for the majority of South Queensferry would be more adverse than reported in the ES, due to the fact that traffic flows within South Queensferry under Do-Minimum 2 would essentially comprise only local traffic. In particular:

- Properties surrounding the Forth Road Bridge approach road through South Queensferry and those to the east of the Forth Road Bridge approach road would not be subject to beneficial noise impacts as reported in the ES. Instead, these properties would be likely to be subject to negligible or minor adverse noise impacts due to the scheme.
- Properties in the west of South Queensferry would be subject to moderate and predominantly major magnitude adverse impacts. The areas of significant adverse noise effect would be likely to expand to include most of the western half of South Queensferry.

3.5.13 Properties near to the M9 Spur in Kirkliston would likely be subject to moderate or major adverse noise impacts due to bridge traffic being re-introduced onto the M9 Spur.

3.5.14 Following the opening of the scheme, the re-distribution of bridge traffic away from the alternative traffic routes via Kincardine would be likely to result in moderate beneficial noise impacts for properties close to the following routes: A985, A994, A977 (north of Gartarry Roundabout), M9 (between Junction 7 and Junction 1A), Kincardine Bridge and the Clackmannanshire Bridge.

3.5.15 On the M90 / A90 north of the Firth of Forth, the re-introduction of bridge traffic to these roads would likely result in moderate to major noise impacts to surrounding properties, as opposed to the mainly minor adverse impacts currently reported in the ES.

3.5.16 Overall, noise impacts as assessed under Do-Minimum 2 as opposed to the current ES Do-Minimum would be radically different compared with those reported in the ES. Reported significant adverse noise effects would increase in both extent and magnitude across the existing noise study area. Additionally, beneficial significant effects would be lessened or absent in the existing noise study area, due to the substantially lower traffic flows in Do-Minimum 2 on the bridge approach roads. However, significant beneficial effects would be likely to be reported on roads which make up the alternative traffic routes via Kincardine, due to the re-instatement of a crossing at North/South Queensferry.

NMUs and Community Effects

3.5.17 Under the full closure scenario there would be no existing route for NMUs to cross the Firth of Forth via the Forth Road Bridge. Therefore, there would be existing severance between Fife, Edinburgh and the Lothians. This is significantly different to the assessed Do-Minimum reported in the ES, because the key routes for NMUs over the Forth Road Bridge would not exist. Assuming that the

replacement crossing would have some provision for NMUs an assessment of the Do-Something scenario would result in added connectivity over a crossing of the Firth of Forth, and therefore, beneficial impacts for the proposed scheme would be reported. This is the most likely scenario under this Do-Minimum as the scheme objectives include providing for non-motorised users. However, in the unlikely event that the replacement crossing did not include provision for NMUs, the assessment would report a neutral impact. This is because when the Do-Something is compared to the Do-Minimum, no NMU route would exist over the Firth of Forth.

Vehicle Travellers

3.5.18 The full closure Do-Minimum baseline, results in the need for vehicle travellers to use alternative routes via Kincardine and the A977 and A985, which can become very congested. Some users may also shift modes of travel from vehicle to rail making use of additional train services, increasing the demand on rail services significantly, particularly during peak times. With a replacement crossing, a shorter and more pleasant route, with less congestion, would be available to cross the Firth of Forth and therefore impacts on vehicle travellers would be more positive than the existing assessment using the Do-Minimum assessed in the ES.

4 Conclusion

4.1.1 Choosing an appropriate Do-Minimum to compare against the predicted impacts of the Do-Something scenario is essential to avoid reporting false adverse and beneficial impacts and ensuring the assessment is robust and fit for purpose. This ES is based on a Do-Minimum that assumes an extension of the existing situation, i.e. that in the absence of a new crossing, the Forth Road Bridge will continue to operate as it does at the moment. However, the uncertainties surrounding the extent and timing of the repairs required to the existing bridge are such that there are a range of refurbishment/closure scenarios possible, and to attempt to utilise these as Do-Minimum scenarios could result in significant over or under-estimation of impacts. Based on the latest information from FETA (refer to Section 1.2) a full closure scenario is considered unlikely, and therefore would not be an appropriate Do-Minimum for assessment. A partial closure scenario, to enable cable replacement is, in absence of a replacement crossing, necessary if further cable deterioration occurs. The exact extent of these works is still evolving and dependent on the results of ongoing assessments. The timing of these works will depend on a number of factors including the results from further cable inspections. The decision to proceed with cable replacement would need to take account of the time required for construction and also the timescale within which results from the current cable dehumidification works begin to emerge. The feasibility assessments undertaken to date have concluded that undertaking re-cabling would be undesirable in the absence of a replacement crossing as the impacts on the economy, people and communities would be too severe and forms part of the justification for the need for the scheme (refer to Chapter 2: Need for the Scheme).

4.1.2 Section 2.2 of this Appendix demonstrates significant disruption during the cable replacement works. Although Sections 2.4 to 2.6 illustrate that despite a significantly different baseline no material change in the impacts of the proposed scheme would result for the majority of the environmental receptors. However, several assessments i.e. air quality, noise and community effects, indicate that using Do-Minimum 1 as the baseline would result in significantly different impacts than those reported in the main body of the ES. In particular, as impacts on the economy, people and communities in the vicinity of the Forth Road Bridge would be more severe under Do-Minimum 1, beneficial impacts of the proposed scheme relative to this baseline would therefore be greater than those reported in the main body of the ES.

5 References

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Annex A: Committed and Most Likely Changes that will Progress prior to 2017 included in TMfS:05A

- M74 Completion;
- M9 Spur Extension;
- Finnieston Bridge;
- A68 Dalkeith Northern Bypass;
- Ferrytoll Link Road;
- Second Upper Forth Crossing at Kincardine;
- Alloa - Stirling - Glasgow Rail Service;
- Airdrie - Bathgate Rail Reopening;
- Edinburgh Tram Project (Phase 1a);
- Glasgow Airport Rail Link;
- Borders Rail Service;
- M80 Upgrade;
- Aberdeen Western Peripheral Route;
- M8 Baillieston to Newhouse Upgrade (including Raith Interchange and Associated Network Improvements);
- Larkhall to Milngavie rail project;
- Edinburgh Waverley station upgrade;
- A830 Arisaig to Loch Nan Uahm;
- A96 Fochabers to Mostodloch Bypass;
- A90 Balmeddie to Tipperty Dualling;
- Removal of Forth Road Bridge tolls;
- Removal of Tay Road Bridge tolls;
- Heartlands development;
- Pollock development;
- A68 Roundabout at Newton St Boswells;
- A90 New Interchange at Portlethan; and
- A82 Strathleven Roundabout.

<u>Cross-Forth rail scenarios:</u>

- Larbert – Stirling re-signalling;
- Forth Rail Bridge re-signalling;
- Additional park and ride capacity at Kirkcaldy, Markinch, Rosyth and Perth;
- Edinburgh - Aberdeen express services;
- Edinburgh - Dundee services stopping at Fife stations;
- Hourly Edinburgh - Perth service; and

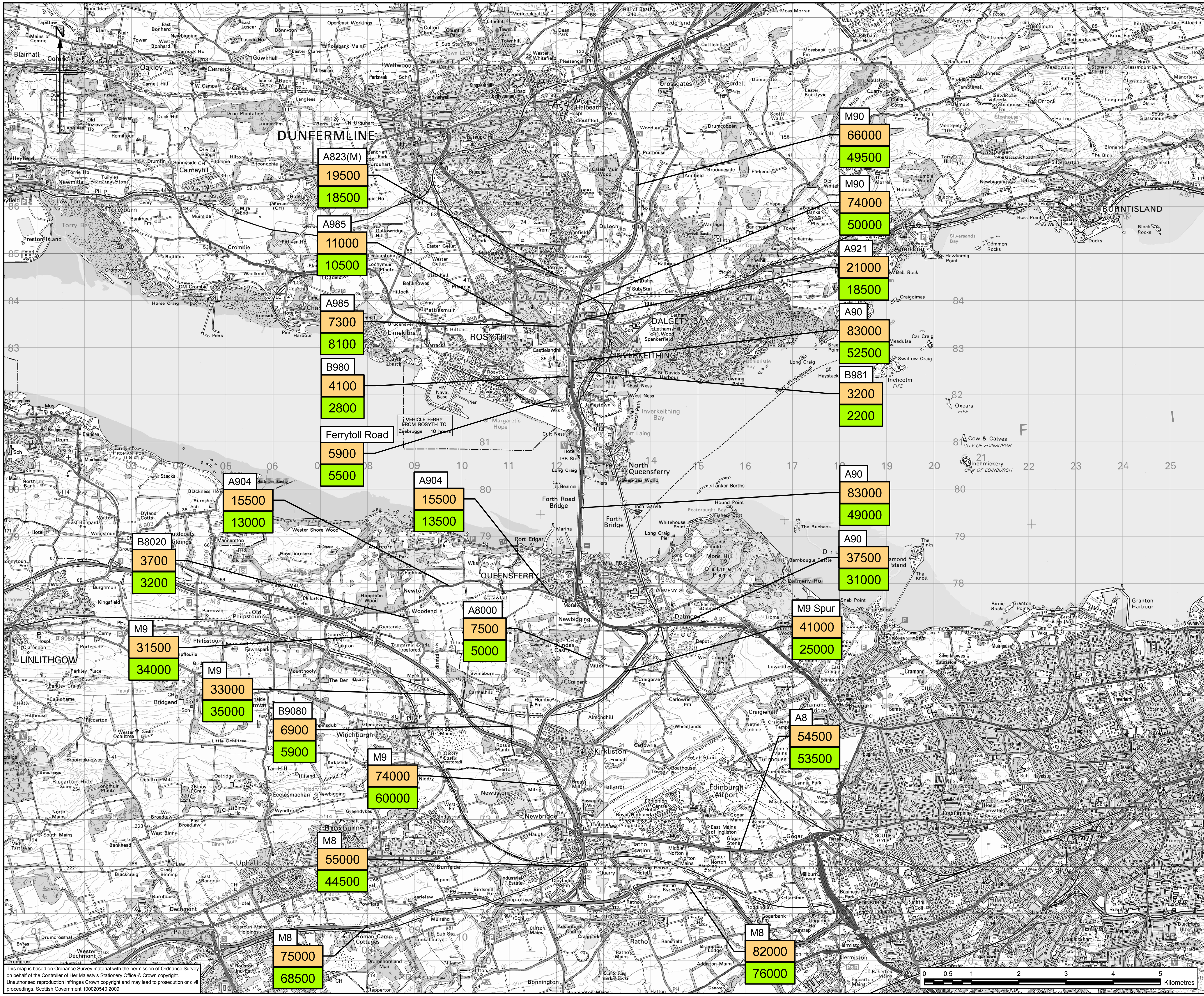
- Newcraighall services extended to Fife (instead of Bathgate / Dunblane).

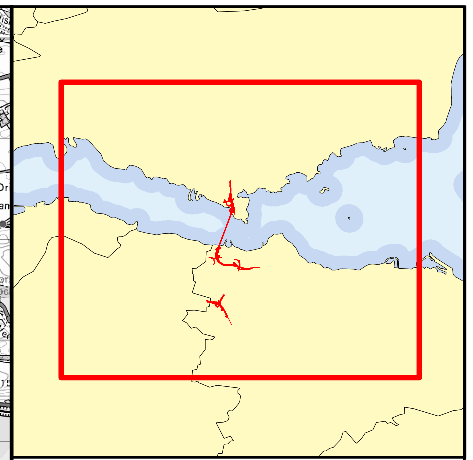
Scotland's Railway short-term Infrastructure

- Laurencekirk station (2 hourly service);
- Bishopbriggs platform extension (6-car services between Glasgow - Dunblane);
- Elgin & Insch platform extensions (6-car services between Aberdeen – Inverness);
- Lugton to Stewarton Loop – ½ hour Kilmarnock to Glasgow service;
- Haymarket station (no model impact); and
- Gourock Transport Interchange (no model impact).

Additional developments considered likely to progress but not yet committed and included in the TMfS:05A reference case

- Bishopton;
- Glasgow East End Regeneration Route;
- A77 South of Whitlett duelling; and
- Cross-Forth rail scenarios;
    i. Additional park and ride capacity at Cupar, Dunfermline Town, Leuchars, Markinch and Dunfermline Queen Margaret;
    ii. Hourly Edinburgh - Inverness service;
    iii. Remove Dalmeny / North Queensferry stops from Fife Circle; and
    iv. Borders rail service to Inverkeithing stopping all stations.





Legend

19500	Assessed Do-minimum
18500	Supplementary Do-minimum 1 (Re-cabling works)

Client

TRANSPORT SCOTLAND

An agency of The Scottish Government

JACOBS ARUP

Project

FORTH REPLACEMENT CROSSING
Environmental Statement

Drawing title

Comparison of assessed do-minimum and supplementary do-minimum 1 (re-cabling works) 2017 Annual Average Daily Traffic (AADT) flows TMfS:05A

Drawing Status	FINAL
Scale	1:75,000 @ A3 — DO NOT SCALE
Client no.	RD001675
Drawing number	FIGURE A5.1
Rev	0