

# Outline/Full Business Case

## Glasgow to East Kilbride

## Corridor and Barrhead

## Corridors Enhancement

AUGUST 2021



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# Part A: Executive Summary

## A.01 Outline/Full Business Case Summary

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This hybrid Outline/Full Business Case (OBC/FBC) is for a scheme to enhance the East Kilbride and Barrhead Rail Corridors in order to decarbonise the corridors and to provide improved access to the rail network for the communities along these corridors. The scheme will make rail services reliable, efficient and attractive to passengers and support modal shift whilst progressing against Scottish Government's target to decarbonising the rail network.

The reason that this is a hybrid OBC/FBC is that the development and costings for the Glasgow to Barrhead component of the scheme is fully progressed (i.e. at a commensurate FBC-compliant level) whilst the Busby Junction to East Kilbride section requires further development and cost refinement, and is at an OBC-compliant level.

### A.01.01 Location of the Scheme and Existing Rail Provision

The East Kilbride corridor connects Scotland's largest (Glasgow) and sixth largest (East Kilbride) urban centres and is an important transport corridor in terms of maintaining and generating economic activity. The Barrhead corridor serves the large settlement of Barrhead and from there the line continues on to stations south of Greater Glasgow, including Kilmarnock and Carlisle. The Barrhead line supports passenger and freight services, and this route section is also used as a key diversionary route for cross-border services.

The corridors serve an area which has seen growth in housing development over the last decade, stimulating further economic activity, with continued growth projected to 2030 (in particular associated with the East Kilbride Community Growth Area).

The East Kilbride and Barrhead corridors are shared along a double track section between Glasgow Central and Busby Junction, beyond which the lines split. There is a double track section from Busby Junction to Barrhead serving the Barrhead line. The East Kilbride line consists of a double track section from Busby junction to Busby and a single track section (~4 miles) from Busby to East Kilbride, where the line terminates in a single platform, apart

from a loop to the east of Hairmyres Station. The route is electrified between Glasgow Central and Muirhouse Central Junction at Pollokshields.

East Kilbride is currently serviced with two trains per hour to Glasgow Central, with an increased peak service provision.

### **A.01.02 The Case for Intervention**

The OBC/FBC concludes that there is a case for decarbonising both the East Kilbride and Barrhead corridors, and that whilst there is a case for double tracking the East Kilbride corridor there is a large degree of uncertainty about forecast passenger demand which impacts on the potential realisation of benefits (and value for money) of double tracking.

### **A.01.03 Changes since the Strategic Business Case (2019)**

The Strategic Business Case (SBC) was completed in Spring 2019 and had been developed in response to observed capacity concerns on the corridor and projected rail growth to 2043 as identified in the [2016 Scotland Route Study](#). In the period of time since the SBC was completed, new government policies have been published which have a direct impact on this project. At the same time, the COVID-19 pandemic has resulted in uncertainty regarding future rail demand.

The OBC/FBC Strategic Case demonstrates alignment with the current policy context, including the **Programme for Government** (2019/20) and the target that Scottish Government set itself for the removal of diesel passenger trains from the Scottish network by 2035 as set out in the [Rail Services Decarbonisation Action Plan](#). The Strategic Case sets out alignment with the [National Transport Strategy \(NTS2\)](#) which sets out a series of actions to support the NTS2 priorities, including a coordinated package of policy interventions to reduce car kilometres by 20% by 2030. The OBC/FBC demonstrates alignment with the [Strategic Transport Projects Review \(STPR2\)](#) which informs transport investment in Scotland for the next 20 years. The **Capital Spending Review (CSR)** in February 2021 sets out annual capital allocation of which underpins the five-year Infrastructure Investment Plan and includes East Kilbride and Barrhead.

## The Case for changes to Traction and Infrastructure

The case for the scheme is centred on the following:

- 1) In order to align with the Scottish Government policy on the decarbonisation of transport, the East Kilbride and Barrhead corridors (which serve a growing population of 100,000 people based on 2011 Census data) would need to be decarbonised. Further, the service frequency to East Kilbride is lower than for comparable towns in the central belt connecting to Glasgow and Edinburgh.
- 2) The diesel rolling stock on these corridors will be life expired by 2025, and a significant amount of development work has already been undertaken on the electrification of both these corridors. Hence it makes sense to progress with electrifying these corridors now.
- 3) Electrification of the line to Barrhead could enable hybrid-battery electric trains to be operated between Barrhead and Kilmarnock, once they have been procured, and as an interim stage of this strategic freight route before it is fully electrified as planned. This enables decarbonisation of a further 26 single-track kilometres.
- 4) As part of the line is shared between the corridors (between Glasgow Central and Busby Junction) it is both cost and operationally efficient to electrify both corridors as part of a single project. There is also the potential for shared rolling stock between the corridors.
- 5) Planned growth in the East Kilbride housing market will result in an increase in population within the catchment area. Facilitating an environmentally friendly, attractive rail service through decarbonisation and introducing improved station facilities enables sustainable travel choices for new and neighbouring residents.
- 6) Ticket gates will be installed at both East Kilbride and Hairmyres stations. These are both key revenue-generating stations and therefore protection of this results in a self-funding initiative.
- 7) Double tracking East Kilbride station will reduce the demand for platform occupation at Glasgow Central (as trains can be stored at East Kilbride and would therefore reduce the need for more expensive investment at Glasgow Central).
- 8) The supporting station improvements, including the relocation of Hairmyres station, will enable the maximisation of active travel links and bus interchange to support

sustainable access to the rail network along the East Kilbride corridor, which will further enhance the attractiveness of rail as a mode of choice for travel to central Glasgow, thereby encouraging modal shift.

- 9) The existing East Kilbride station is a small local station which requires improved passenger facilities (including a new station building, cycle access, and an improved passenger circulation space) to better support the needs of all users of the stations and improve the overall journey experience for rail users.
- 10) The substantial development work already means that the electrification of these corridors can be progressed in the short-term supporting progress in meeting Transport Scotland's decarbonisation targets. [REDACTED TEXT] (excluding land purchased for the relocation of Hairmyres station at [REDACTED TEXT]) has already been spent in the development work for the East Kilbride corridor (with a further [REDACTED TEXT] on the Barrhead corridor), which risks being abortive if the scheme isn't progressed now. Further, if the work was to be paused and then restarted at a future date, it would incur additional mobilisation costs.

### **The impact of future rail demand on the case for providing additional passenger capacity**

The impact of COVID on future demand is uncertain. Various plausible scenarios for future demand are presented in this business case, and in some scenarios future growth is positive, and in others the future rail demand declines further. These scenarios – when compared to the pre-COVID levels of rail passenger demand – suggest a forecast demand range of [REDACTED TEXT] to [REDACTED TEXT] (from pre-COVID levels) by the year 2032. The distribution of travel across peak and interpeak periods is expected to change with a “flatter” peak outcome.

The case for the double tracking of the line is reliant on the assumption that rail demand will return to within 20% of pre-COVID levels on the East Kilbride corridor by the scheme opening year (2025), and demand then continuing to grow beyond that point.

### **The Scheme Objectives**

The Transport Planning Objectives (TPOs) for the scheme are as follows:

- **TPO1** – Removal of rolling stock carbon emissions along the East Kilbride and Barrhead corridors by 2035 in a manner that supports efficient changes to infrastructure, rolling stock, power supply and service operations.
- **TPO2** – Enhancement of rail operational capacity by 2025 to facilitate increased service frequency (4+ trains per hour all day) along the East Kilbride corridor in order to increase rail patronage by 18% and reduce car-kilometres for journeys between East Kilbride and Glasgow city centre by at least 2.4 million by 2030.
- **TPO3** – Provision of enhanced travel choices and connectivity to existing and new residents along the East Kilbride corridor by 2025.

## Description of Preferred Option and timeframes

### Options considered

The OBC/FBC considers a range of options and combinations including traction type along the corridors (i.e. diesel, hydrogen, battery electric or full electric), track infrastructure (i.e. full double tracking) and corridor station improvements. The shortlist of options identified from the options development and appraisal (against the scheme objectives) are:

- Option 1: Full Double Tracking to East Kilbride (facilitating 4tph). EMU services to East Kilbride. EMU services to Barrhead (cost estimate [REDACTED TEXT] including risk and inflation).
- Option 2: No track infrastructure improvements (with the exception of double tracking East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead (cost estimate [REDACTED TEXT] including risk and inflation).

A 6-car operational arrangement is assumed, but cost sensitivities were calculated for 8-car arrangements. Current designs reflect passive provision for 8-car arrangements.

### The preferred option, costs and delivery timeframes

The OBC/FBC sets out the appraisal of these options. Following consideration of the performance of the options against the TPOs, the STAG criteria, the sensitivity of the socio-economic case to forecast passenger demand growth, and the implementation costs, the **preferred option** has been identified as Option 2.

Whilst Option 2 represent a lower BCR compared to Option 1, it is less sensitive to uncertain future demand growth and is likely to be less expensive to implement whilst achieving the majority of the objectives for the scheme, with additional passenger capacity

facilitated by platform extensions and new rolling stock. The recommended option for the East Kilbride corridor is retaining the current track infrastructure and current level of service. However, the introduction of new Electric Multiple Unit (EMU) rolling stock, which hold more passenger capacity than current Diesel Multiple Unit (DMU) rolling stock, is expected to cater for a small rise in demand. Furthermore, passive provision is being designed for 8 car rolling stock at platforms from the current 6 car provision.

Growth forecasts indicate that commuter demand (peak) may not return to pre-COVID levels and off-peak demand forecasts do not demonstrate the requirement to invest capital to deliver 4tph across all scenarios. A 4tph service all day would also increase the net cost of operating Scotland's Railway to Scottish Government.

On balance Option 2 represents the most reasonable option to progress in context of the scheme costs and likely realisation of benefits whilst supporting Scottish Government's goal to decarbonise the rail network in Scotland. The preferred scheme minimises operating cost, will deliver improved reliability for customers, maintain historical levels of peak capacity and provide increased off-peak capacity and journey comfort.

The **preferred option** costs are as follows:

- Capital costs for Barrhead (FBC-compliant) = [REDACTED TEXT] (including risk, inflation)
- Capital costs for East Kilbride (OBC-compliant) = [REDACTED TEXT] (including risk, inflation)
- **TOTAL** = [REDACTED TEXT]

These capital costs include the following scope:

- Barrhead: electrification of the full route between Glasgow Central and East Kilbride (development and costing of which is at a FBC-compliant level)
- East Kilbride: electrification of the branch between Busby Junction and East Kilbride and associated station enhancements, including the relocation of Hairmyres station (further development is required, and presented costing is at an OBC-compliant level)
- Barrhead & East Kilbride: station accessibility enhancements (further development is required, and presented costing is at an OBC-compliant level)

For the recommended option, assuming no significant timetable change, the operational costs are estimated to **reduce by** [REDACTED TEXT] per annum in 2026 compared to a

future scenario in which the existing diesel fleet is replaced with a new diesel fleet (i.e. no electrification). Revenue benefits are expected to be nominal as no service changes are assumed to either of the routes.

For the option of full double-tracking, which includes a significantly enhanced service to today (2 trains-per-hour [tph] increased to 4tph), overall operational costs would rise by [REDACTED TEXT] per annum (due to increased mileage and staffing costs), and whilst revenue would also increase, the extent of this is highly uncertain due to the COVID-19 pandemic and its long-term implications for travel demand.

When combined with revenue, the yearly operational financial position would improve by between [REDACTED TEXT] and [REDACTED TEXT] in the recommended single-track infrastructure option, and between [REDACTED TEXT] and [REDACTED TEXT] per annum for the double-tracking solution.

#### The delivery of the scheme

The OBC/FBC presents robustly developed capital costs for the scheme at [REDACTED TEXT] (mid-range estimate including risk and inflation) supported by a clear procurement and management strategy for the scheme delivery. The key milestone dates for the scheme are for Barrhead entry into service (EIS) for December 2023 (using existing EMU rolling stock), and East Kilbride (EIS) for December 2024. However, this will be subject to the outcomes of the redesign on the East Kilbride corridor.

# STRATEGIC CASE

## Part B: Introduction to Strategic Case

### B.01 Structure of the Strategic Case

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This business case includes the five cases (as per Transport Scotland's Business Case guidance). The Strategic Case sets out the following details reflecting changes that have taken place since the Strategic Business Case (SBC) was submitted in Spring 2019:

- Part C - an overview of the SBC, including a brief summary of the case of intervention;
- Part D - a review of the SBC in the context of changes since the submission of the SBC, including the impact of COVID-19;
- Part E - refreshed evidence on the problems and opportunities included in the SBC;
- Part F – sets out the case for intervention, desired outcomes and revised Transport Planning Objectives (TPOs) that are derived from the review of the SBC;
- Part G - A revised (and expanded) set of options that can address the problems and opportunities identified and achieve the TPOs. The options considered have been expanded from those included in the SBC; and
- Part H – sets out the Benefits Realisation.

## B.02 Overview of the East Kilbride and Barrhead Corridors

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This section sets out a brief overview of the East Kilbride and Barrhead Corridors. A more comprehensive scheme context is included under **separate document - Appendix A**.

### B.02.01 Geographic Context

The East Kilbride corridor connects Scotland's largest (Glasgow) and sixth largest (East Kilbride) urban centres and is an important transport corridor in terms of maintaining and generating economic activity. The East Kilbride corridor serves Thornliebank which contains areas of high deprivation. The Barrhead corridor serves the large settlement of Barrhead and from there the line continues on to stations south of Greater Glasgow, including Kilmarnock and Carlisle. The Barrhead line supports passenger and freight services, and this route section is also used a key diversionary route for cross-border services. Figure 1 shows an overview of the corridors, the existing stations on the corridors, and the key settlements which are serviced by the railway corridors.

The corridors serve an area which has seen growth in housing development over the last decade, with continued growth projected to 2030 (in particular associated with the East Kilbride Community Growth Area). Rail passenger demand on this corridor has grown significantly over the last decade (over 25% growth prior to COVID-19), with particularly heavy demand during peak periods. Other similar routes such as Bathgate to Edinburgh have seen much greater growth following improvements to stations and service frequency.

### B.02.02 Current Infrastructure and Services

Figure 2 shows that the East Kilbride and Barrhead corridors are shared along a double track section between Glasgow Central and Busby Junction (east of Pollockshaws West), beyond which the lines split. There is a double track section from Busby Junction to Barrhead serving the Barrhead line. The East Kilbride line consists of a double track section from Busby junction to Busby and a single track section (~4 miles) from Busby to East Kilbride, where the line terminates in a single platform, apart from a passing loop to the east of Hairmyres Station.

The route is electrified between Glasgow Central and Muirhouse Central Junction at Pollokshields. Signalling is controlled remotely from the West of Scotland Signalling Centre in Cowlands.

Figure 1 – Overview of the East Kilbride and Barrhead Corridors

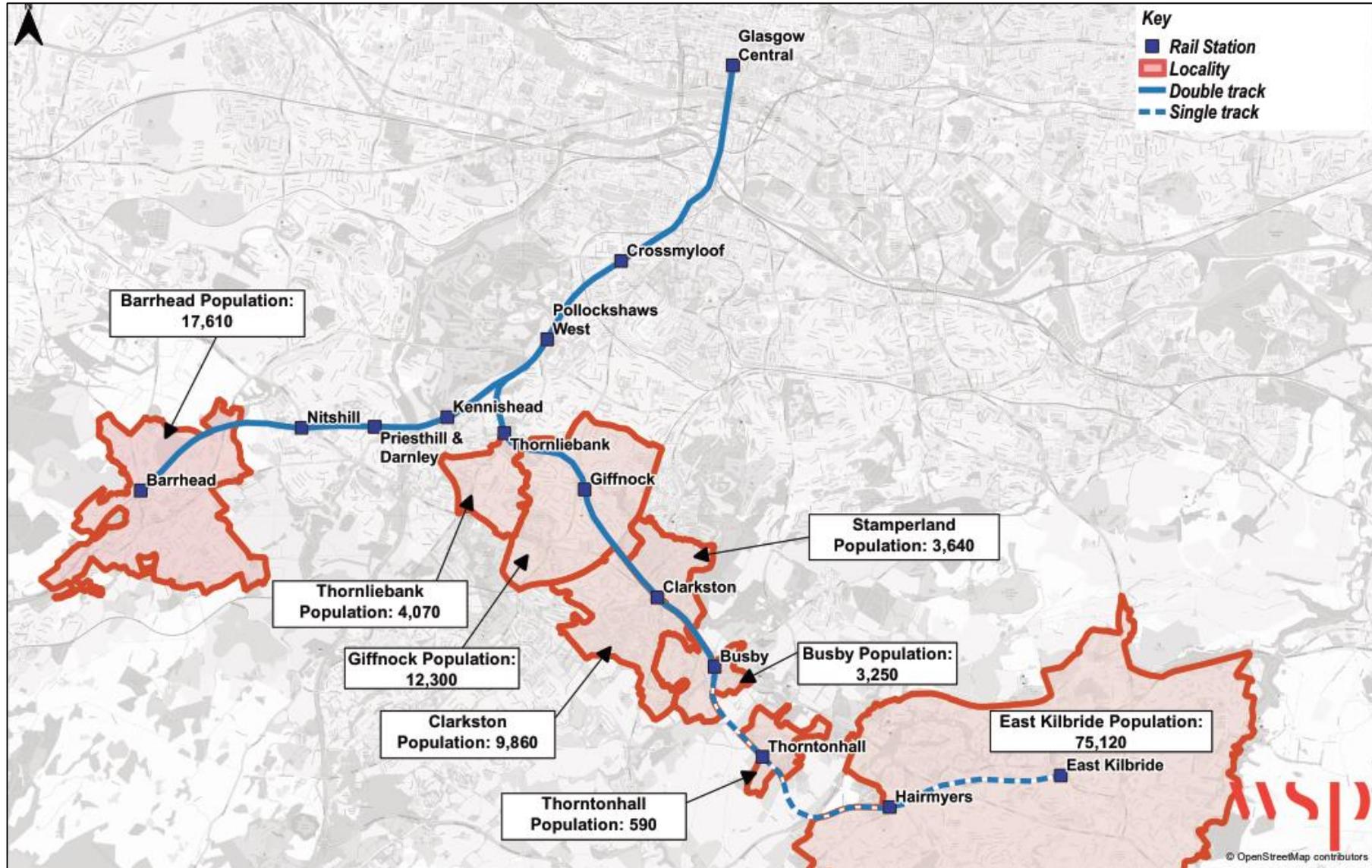
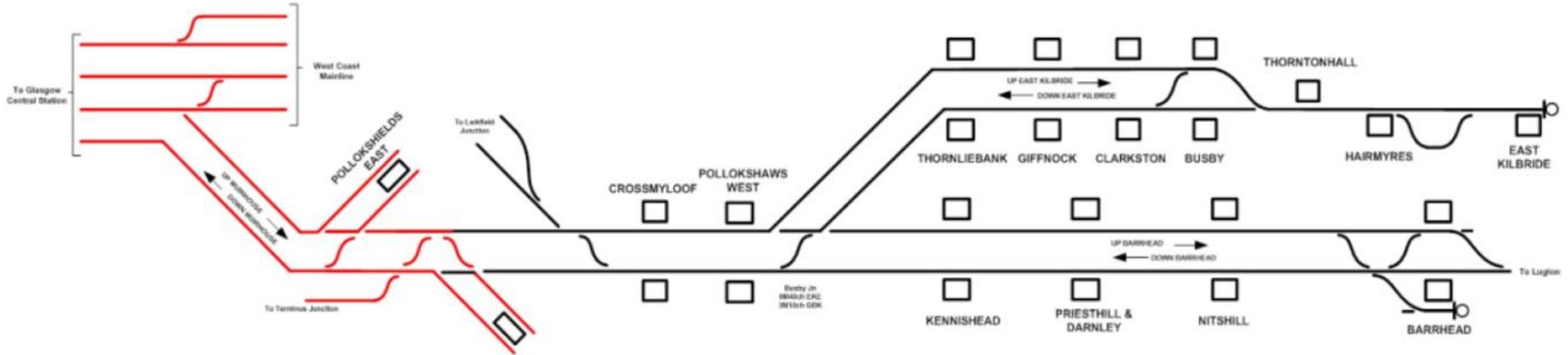


Figure 2 – Overview of the Glasgow Central - East Kilbride-Barrhead Corridors



The May 2021 timetable reflects the pre-COVID timetable on the East Kilbride corridor. The East Kilbride line provides a service frequency of two trains per hour (tph) during the day, with additional services during the peaks. Peak services are a mixture of 4-carriage and 6-carriage in length (the maximum the infrastructure can accommodate), with an off-peak mixture of 2 and 4-carriage services.

May 2021 timetabled services on the Barrhead line consist of a mix of stopping and semi-fast services, representing 3tp through the day, with the semi-fast services forming part of longer distance services to and from Kilmarnock and Carlisle.

**Life expiry of rolling stock:** Class 156 Diesel Multiple Unit trains (DMUs), which will be life expired in 2025, operate on both the East Kilbride and Barrhead lines. This ScotRail fleet has one of the poorest reliability records and is deemed inappropriate to serve the route with poor door access and poor standing capacity for mass transit purposes.

## **B.03 Summary of the Strategic Case**

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### **B.03.01 Review of the SBC**

In the period of time since the SBC was completed in 2019, new government policies have been published which have a direct impact on this project. At the same time, the COVID-19 pandemic has resulted in uncertainty regarding future rail demand.

These changes have meant that the SBC (and the associated TPO and shortlisted options) required revisiting, and the TPO has been revised to form three new TPOs. The options development and appraisal has also been revisited in the OBC/FBC in order to align with the revised TPOs.

The OBC/FBC has been revised to demonstrate alignment with the current policy context. A revised passenger demand forecast was developed in the OBC/FBC with potential plausible future demand scenarios generated. Various plausible scenarios for future demand are presented in this business case, and in some scenarios future growth is positive, and in others the future rail demand declines further. These scenarios –when compared to the pre-COVID levels of rail passenger demand – suggest a forecast demand range of [REDACTED TEXT] to [REDACTED TEXT]

(from pre-COVID levels) by the year 2032. The distribution of travel across peak and interpeak periods is expected to change with a “flatter” peak expected.

### **B.03.02 The case for intervention along the corridors**

The case for intervention along the Barrhead and East Kilbride corridors is centred on the following:

- 1) In order to align with the Scottish Government policy on the decarbonisation of transport, the East Kilbride and Barrhead corridors (which serve a growing population of 100,000 people) would need to be decarbonised.
- 2) The diesel rolling stock on these corridors will be life expired by 2025, and a significant amount of development work has already been undertaken on the electrification of both these corridors. Hence it makes sense to progress with electrifying these schemes now.
- 3) As part of the line is shared between the corridors (between Glasgow Central and Busby Junction) it makes sense to electrify both corridors as part of a single project. There is also the potential for shared rolling stock between the corridors.
- 4) Electrification of the line to Barrhead could enable hybrid-battery electric trains to be operated between Barrhead and Kilmarnock, once they have been procured, and as an interim stage of this strategic freight route before it is fully electrified as planned. This enables decarbonisation of a further 26 single-track kilometres.
- 5) The East Kilbride corridor would need to be double tracked in order to allow additional services to be added into the peak and interpeak periods. Additional services are required to meet projected future peak demand. Additional all day services will improve the rail “offer” between East Kilbride and central Glasgow and support modal shift from car to rail, potentially removing up to 5.5 million car-kilometres per annum from the road network. This will support Scottish Government’s target of removing 20% of car-kilometres from the network by 2030.

- 6) Planned growth in the East Kilbride housing market will result in an increase in population within the catchment area. Facilitating an environmentally friendly, attractive rail service through decarbonisation and introducing improved station facilities enables sustainable travel choices for new and neighbouring residents.
- 7) Ticket gates will be installed at both East Kilbride and Hairmyres stations. These are both key revenue-generating stations and therefore protection of this results in a self-funding initiative.
- 8) Double tracking the East Kilbride corridor at the same time as electrification represents the highest value for money, and if double tracking were to be applied as a separate scheme (at a later date) then additional costs of up to [REDACTED TEXT] will be incurred.
- 9) The supporting station improvements, including the relocation of Hairmyres station, will enable the maximisation of active travel links and bus interchange to support sustainable access to the rail network along the East Kilbride corridor, which will further enhance the attractiveness of rail as a mode of choice for travel to central Glasgow, thereby encouraging modal shift.
- 10) The existing East Kilbride station is a small local station which requires improved passenger facilities (including a new station building, cycle access, and an improved passenger circulation space) to better support the needs of all users of the stations and improve the overall journey experience for rail users.
- 11) Double tracking East Kilbride station will reduce the demand for platform occupation at Glasgow Central (as trains can be stored at East Kilbride and would therefore reduce the need for more expensive investment at Glasgow Central).
- 12) The substantial development work already undertaken means that these corridors can be progressed into implementation now supporting short-term progress in meeting Transport Scotland's decarbonisation

targets. [REDACTED TEXT] (excluding land purchased for the relocation of Hairmyres station at [REDACTED TEXT]) has already been spent in the development work for the East Kilbride corridor (with a further [REDACTED TEXT] on the Barrhead corridor), which risks being abortive if the scheme isn't progressed now. Further, if the work was to be paused and then restarted at a future date, it would incur additional mobilisation costs.

### **B.03.03 The impact of future rail demand on the case for double tracking**

The case for decarbonisation of the East Kilbride and Barrhead corridors is not linked to the future rail demand on the corridors.

The case for the double tracking of the line is reliant on the assumption that rail demand will return to within [REDACTED TEXT] of pre-COVID levels on the East Kilbride corridor by the scheme opening year (2025), and demand then continuing to grow beyond that point. If rail demand does not return to pre-COVID levels, or declines in the future, then the benefits resulting from the double tracking would reduce and it would not represent value for money.

The issue of future demand will be kept under review during the schemes monitoring and evaluation phase.

### **B.03.04 Transport Planning Objectives (TPOs)**

From the case for intervention (which is drawn from the evidence of problems and opportunities, and the review of the policy context), the following revised TPOs were drawn:

- **TPO1** – Removal of rolling stock carbon emissions along the East Kilbride and Barrhead corridors by 2035 in a manner that supports efficient changes to infrastructure, rolling stock, power supply and service operations.
- **TPO2** – Enhancement of rail operational capacity by 2025 to facilitate increased service frequency (4+ trains per hour all day) along the East Kilbride corridor in order to increase rail patronage by 18% and reduce car-kilometres for journeys between East Kilbride and Glasgow city centre by at least 2.4 million by 2030.

- **TPO3** – Provision of enhanced travel choices and connectivity to existing and new residents along the East Kilbride corridor by 2025.

A range of options (expanded from those considered in the SBC) are considered to address the identified scheme outcomes and objectives.

A shortlist of two (2) options was identified for appraisal against the TPOs. Option 1 is the best performing option against all three TPOs as it represents full decarbonisation as well as maximum flexibility for new service frequencies that would support modal shift. Option 2 does not perform as well against TPO 2 but does partially achieve this objective through the provision of additional passenger capacity facilitated by platform extensions and new rolling stock.

# Part C: Overview of the Strategic Business Case

## C.01 The Strategic Business Case (SBC)

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### C.01.01 Overview

The Strategic Business Case (SBC) was submitted to Transport Scotland (TS) in December 2019, supported by the full suite of appraisal documents in accordance with the Scottish Transport Appraisal Guidance (STAG). The SBC (included under **separate document - Appendix B**) was devised in response to observed capacity concerns on the corridor and projected rail growth to 2043 as identified in the [2016 Scotland Route Study](#). Whilst the rationale for investment identified the further opportunities that could be realised through the scheme, the objective of the project was to address the specific problem of passenger capacity.

### C.01.02 Transport Planning Objectives in the SBC

The SBC was focussed on meeting forecast passenger demand and the Transport Planning Objective (TPO) set out for the project in the SBC was:

*“Under normal operating conditions enough seats are provided for passengers to sit down within 10 minutes of boarding in 2023 and across the subsequent 20 years.”*

**NOTE:** Normal operating conditions are defined as a typical weekday, with no significant perturbation or other events impacting on passenger demand for services. Boarding conditions are as defined in the ScotRail franchise, across the morning and evening peak two-hours.

### C.01.03 Options considered in the SBC

The option development and assessment approach considered enhancements to train services required to deliver the passenger capacity objective, from both a rolling

stock and timetable perspective, and then determined the infrastructure enhancements that would be required to facilitate those train service enhancements.

The resulting options consist of a number of core elements, in varying combinations, proposed to be delivered as staged strategies. Those elements were:

- Increased on-train capacity through longer trains (facilitated by platform extensions); and
- Increased train service frequency (facilitated by double tracking of the single-line section and, in some cases, electrification).

The SBC did not include the decarbonisation of the Barrhead line. Options to enhance the Barrhead corridor were paused at the Part 1 stage of the appraisal supporting the SBC in 2019. This was because development work up to that point concluded that neither the forecast passenger demand from Barrhead nor the interworking opportunities between routes into Glasgow Central necessitated this branch being electrified and/or platforms being extended.

The options considered in the STAG Part 2 appraisal are in Table 1.

**Table 1 – Options considered in the SBC**

| Option | Electrification | Service Frequency<br>(peak 2 hours)          | Rolling Stock                                                            | Infrastructure                                                                         |
|--------|-----------------|----------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| A      | No              | No additional                                | 8-car 20m<br>(3+2 seating)                                               | 160m platform<br>extensions                                                            |
| B      | No              | One additional                               | 8-car 23m<br>(3+2 seating)                                               | 184m platform<br>extensions + partial<br>double tracking                               |
| C      | Yes             | Two additional<br>( <i>electrification</i> ) | 8-car 20m<br>(3+2 seating)<br>or<br>8-car 23m<br>(2+2 or 3+2<br>seating) | 160m or 184m platform<br>extensions, partial<br>double tracking and<br>electrification |

| Option | Electrification | Service Frequency<br>(peak 2 hours) | Rolling Stock                                                  | Infrastructure                                            |
|--------|-----------------|-------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------|
| D      | No              | Two or three additional             | 8-car 20m<br>(3+2 seating)<br>or<br>8-car 23m<br>(2+2 seating) | 160m or 184m platform extensions and full double tracking |
| E      | No              | Three additional                    | 7-car 20m<br>(3+2 seating)                                     | Full double tracking                                      |

The options were reviewed against the TPO and STAG criteria which identified that the range of options appraised would all deliver, at least into the medium term, the TPO.

During the development of the SBC it was noted that investment in the corridor to provide peak capacity would also provide the opportunity to enhance services on the corridor throughout the day. This significantly improved the assessed value-for-money of the investment, as the capital investment and operational costs of leasing more rolling stock and more train crew would be utilised throughout the day (with increased frequencies providing connectivity benefits to passengers) as opposed to only enhancing services operating in the peaks.

#### **C.01.04 Conclusions from the SBC**

The conclusion of the SBC was that any of the five core options could be selected to be taken forward to the next stage of development when assessed against the single TPO. Therefore, no options were discounted in the SBC, although Options C and E were recommended to be taken forward and this recommendation was endorsed by IDM.

# Part D: Review of the SBC

## D.01 Key Changes from SBC to OBC/FBC

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In the period of time since the SBC was submitted, new government policy has been published with associated action plans, particularly in relation to the decarbonisation of transport, which have a direct impact on this project. The COVID-19 pandemic has also resulted in unprecedented levels of uncertainty with regard to rail demand. These changes impact upon the Strategic Case for the scheme.

This OBC/FBC considers the changes and in line with Transport Scotland's business case guidance revisits the strategic context of the scheme and the rationale for intervention.

The key changes between the SBC and OBC/FBC are summarised below:

- 1) The **Programme for Government (PfG)** 2019/20 commitment to works commencing on the electrification of the East Kilbride and Barrhead lines, prioritised as part of a rolling programme of electrification.
- 2) Scottish Government set itself the target of removing diesel passenger trains from the Scottish network by 2035. [The Rail Services Decarbonation Action Plan](#) was launched in July 2020, providing a pathway to the 2035 target.
- 3) The [National Transport Strategy \(NTS2\)](#) and the [NT22 Delivery Plan \(published in December 2020\)](#) which sets out a series of actions to support the NTS2 priorities, including a coordinated package of policy interventions to reduce car kilometres by 20% by 2030, decarbonising Scotland's passenger rail services by 2035 and introducing measures to improve the resilience of the rail network through delivering significantly improved rail services and accessibility to stations between East Kilbride and Glasgow (amongst other routes) to meet growing demand.
- 4) The [Strategic Transport Projects Review \(STPR2\)](#) which informs transport investment in Scotland for the next 20 years. Phase 1 of STPR2 reported in February 2021 and includes recommendations for the delivery of the Rail



Decarbonisation Programme and for the provision of access for all at rail stations.

## **D.02 Review of the SBC against Transport Decarbonisation Policy**

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Since submission of the SBC, policies on the decarbonisation of transport have been announced by the Scottish Government, including emissions reduction targets (set in law) to reach net-zero greenhouse gas emissions by 2045 at the latest, with interim targets for reductions of at least 75% by 2030 and 90% by 2040. One of the interim targets set by the Scottish Government is to remove diesel passenger trains from the Scottish network by 2035.

The Strategic Business Case for decarbonisation of transport in Scotland has been made in [National Transport Strategy 2 \(NTS2\)](#), the [Update to the Climate Change Plan \(2018-2032\)](#), and in [Strategic Transport Projects Review 2 \(STPR2\)](#).

The Strategic Business Case for decarbonisation of the rail network in Scotland has been made in [Rail Services Decarbonisation Action Plan](#) and [Strategic Transport Projects Review 2 Phase 1 \(published in February 2021\)](#) and Phase 2 (due to be published in Autumn 2021).

The 'Rail Services Decarbonisation Action Plan' was launched in July 2020, providing a pathway to the 2035 target. The plan notes the importance of aligning decarbonisation with the life expiry of diesel rolling stock (pertinent here due to the current Class 156 rolling stock serving both the East Kilbride and Barrhead/Kilmarnock corridors being life expired in 2025) and ensuring that opportunities for modal shift from road to rail are pursued alongside the decarbonisation of rail traction (which could include electric trains that can run off wires due to on-board batteries).

The plan notes the necessity to decarbonise both passenger and freight lines – as, per tonne kilometre, rail freight emits only about a quarter of the total equivalent CO<sub>2</sub> of road freight. A 10% modal shift of HGV traffic to rail would reduce almost as much annual CO<sub>2</sub>e as the entire rail industry emits. Electrification of the network would

extend the capability of existing electric-traction rail freight and encourage conversion from diesel rail freight which, if allied to network improvements such as connections to ports and expansion of freight depots, could make a substantial contribution to achieving modal shift and significantly improving the health of the environment.

Electrification is currently the only credible solution for freight (i.e. viable battery solutions don't exist). In addition to faster journey times and better use of track capacity, freight would benefit from the lower unit costs that electric traction provides, given that freight is run on a commercial basis. As lower costs will benefit both the freight operators and their customers, it will encourage and support modal shift to rail.

Therefore, the mainline electrification of the GSW route from Glasgow Central to Barrhead and then south to Kilmarnock/Dumfries/Carlisle is now part of the wider commitment to provide a diversionary route and enable more freight options.

### **Implication for the Strategic Business Case**

The implication for the SBC is that the TPO and options identified in the SBC do not represent a fit against the transport decarbonisation policy.

In response to this, the OBC/FBC sets out a revised case for intervention that aligns with the transport decarbonisation policy, consider revised TPOs that reflect this and options that could achieve a TPO supporting the decarbonisation of this corridor.

The revised case for intervention is set out in section F.01.

## D.03 Review of the SBC against wider Transport Policy

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Transport Scotland has published its new National Transport Strategy (NTS2) and first phase of their second Strategic Transport Projects Review (STPR2).

### D.03.01 National Transport Strategy (NTS2) and Annual Delivery Plan (2020-2022)

The NTS2, published in February 2020, sets out a vision for a “sustainable, inclusive, safe and accessible transport system, helping deliver a fairer and more prosperous Scotland for communities, businesses and visitors”. The vision is underpinned by the following priorities:

- *Reduce inequalities*
- *Takes climate action*
- *Helps deliver inclusive economic growth*
- *Improves our health and wellbeing; ensuring safety, enabling healthy travel choices and making communities great places to live.*

The [NTS2 Delivery Plan](#) (published in December 2020) sets out a series of actions to support the NTS2 priorities, including:

- *Explore effective options to manage demand* - work across Government to develop a coordinated package of policy interventions to reduce car kilometres by 20% by 2030;
- *Decarbonise Scotland’s passenger rail services by 2035, ahead of the UK’s target of 2040* - advance development of priority electrification projects (benefiting freight and passenger services) and continue exploration of battery and hydrogen-powered train alternative traction, as appropriate across the network; and
- *Measures to improve the resilience of the rail network* - deliver significantly improved rail services and accessibility to stations between East Kilbride and Glasgow, and Aberdeen to the Central Belt, to meet growing demand, drive more usage, and decarbonise rail passenger and freight services.

### Implication for the Strategic Business Case

The implication for the SBC is that the TPO and options identified in the SBC do not represent a fit against NTS2 and the NTS2 Delivery Plan.

In response to this, the OBC/FBC sets out a revised case for intervention that aligns with NTS2 and the NTS2 Delivery Plan and consider revised TPOs that reflect this. The OBC/FBC considers options that could achieve objectives aligned with the need to contribute towards encouraging mode shift in order to support a reduction in car kilometres and therefore wider transport decarbonisation, and to support the ambition of a more resilient rail network, providing significantly improved service.

#### D.03.02 Strategic Transport Projects Review 2 (STPR2)

In 2019, Transport Scotland commenced the second Strategic Transport Projects Review (STPR2) to help inform transport investment in Scotland for the next 20 years. STPR2 will help to deliver the vision, priorities, and outcomes for transport set out in the National Transport Strategy (NTS2) and will align with other national plans such as the National Planning Framework (NPF4) and the Climate Change Plan.

Phase 1, published in February 2021, focusses on recommendations which ‘lock in’ the benefits and travel behaviours of individuals and provide a step change in terms of investment which supports the priorities and outcomes of NTS2.

The Phase 1 recommendations include 20 interventions structured around eight themes, of which two are directly applicable to the East Kilbride and Barrhead lines:

- Enhancing public transport provision (measures to improve the accessibility and reliability of public transport and stimulate a sustainable recovery post COVID-19)
  - Intervention 12 – Infrastructure to provide access for all at rail stations;
- Supporting transition to low-carbon transport (measures that will increase the development and further transition of Scotland’s transport fleet to low carbon)
  - Intervention 14 – Delivery of Rail Decarbonisation Programme (Phase 1);
  - The published recommendations on Intervention 14 include the following text:
 

*Progress is already underway to decarbonise the East Kilbride and Barrhead routes as part of the first phase of delivery against the DAP...*

- *East Kilbride Enhancement: holistic package of enhancement measures including electrification of existing route to Glasgow, allowing fully electric services to run in this corridor to allow these to interwork with Barrhead and other south Glasgow routes.*
- *Decarbonisation of Barrhead services: electrification of network section allowing electric trains between Barrhead and Glasgow.*

### **Implication for the Strategic Business Case**

The implication for the SBC is that the TPO and options identified in the SBC do not represent a fit against the STPR2 Phase 1 recommendations.

In response to this, the OBC/FBC sets out a revised case for intervention that aligns with the STPR2 recommendations and consider revised TPOs that reflect this. The OBC/FBC considers options that could achieve objectives aligned with the need to contribute to enhanced public transport provision, improved accessibility and increased reliability of journeys. The scheme should aim to contribute to ‘locking in’ the sustainable travel behaviours of individuals, encouraging mode shift in order to support a reduction in car kilometres.

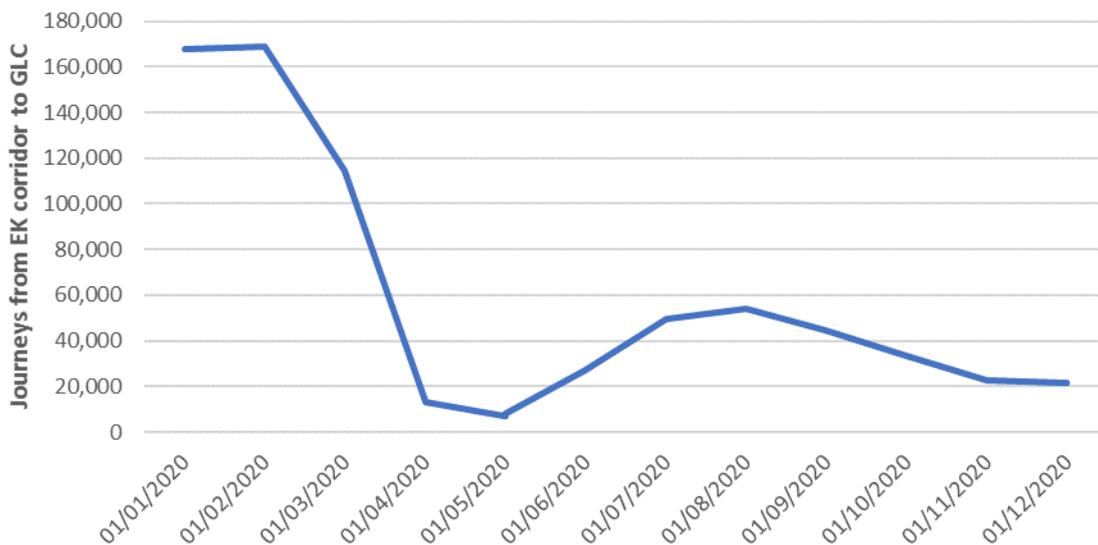
## **D.04 Review of the SBC in context of the impact of COVID-19**

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### **D.04.01 Introduction**

The COVID-19 crisis has had an unprecedented impact on the Scottish economy, and, in turn, the market for rail travel with demand at the time of writing still far below that of pre-COVID levels.

Figure 3 shows the impact which COVID-19 has had on demand on the East Kilbride corridor. Demand reduced by 90-95% in April and May 2020 (from pre-COVID levels in January 2020) and, whilst it has risen slightly since during the summer of 2020, it was still 80-90% lower than pre-pandemic levels.

**Figure 3 – Demand on the East Kilbride corridor (source: Abellio ScotRail)**

These figures correspond with the broader trend across Scotland and highlight just how much of an impact the pandemic has had. Whilst the end of the pandemic appears to be in sight with the rollout of the vaccines, the rate at which the economy (and in turn demand for rail travel) ‘bounces back’ remains uncertain.

#### **D.04.02 Implications for the Strategic Business Case**

The implication for the SBC is that the primary problem identified – from which the TPO was derived – now has a greater degree of uncertainty attached to it. The problem of peak passenger demand exceeding rail passenger capacity could potentially exist in future (if rail demand “bounces back”) or could equally disappear if long-term travel patterns and behaviours change.

The implication for the Strategic Case in the OBC/FBC is that the nature of the COVID impacts should be explored and plausible forecast passenger demand scenarios put forward. The SBC TPO needs to be revised in response to this, with associated options considered that could achieve the revised TPO(s).

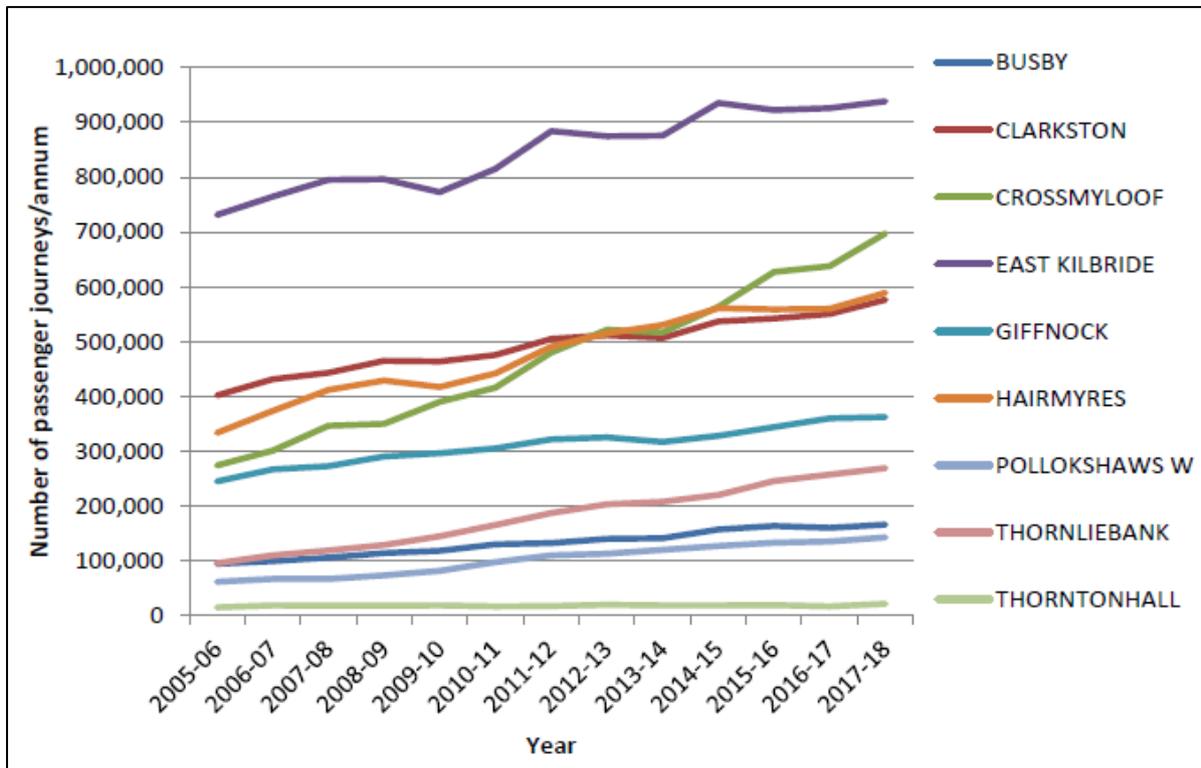
The revised demand forecast – reflecting the impact of COVID – is set out below.

**D.04.03 Revised Forecast Demand Estimate for the OBC/FBC**

In the 10 years prior to COVID-19, passenger demand into Glasgow (along all rail routes) grew by just under 20% and services into East Kilbride were already observed to be full during peak times. This historic growth is similarly reflected in passenger data along the East Kilbride corridor itself, as shown in Figure 4, which shows consistent growth in passenger demand per station at all the stations along the line between East Kilbride and Glasgow Central (with the exception of Thorntonhall Station which has a flat demand profile). The steepest growth is at Crossmyloof Station (which is also served by other lines) and the highest demand is at East Kilbride Station.

However, since March 2020, as with the rest of the GB network, trains have been sparsely used. Whilst there does now appear to be an end in sight for the pandemic, the longer-term impact on rail demand is unknown but potentially significant, as it is likely to have accelerated some key pre-existing behavioural trends.

**Figure 4 – Rail demand per station along the East Kilbride corridor**



There have been previous dips in rail demand, normally linked to broader economic recessions. However, recessions tended to be relatively short-term, and rail demand coped well. This is primarily because not all industries are equally exposed to global recessions, and the sectoral make-up of the Glasgow economy is such that rail demand was (relatively) unaffected through previous recessions.

The impact COVID-19 has had on the planning and delivery of transport services is, in essence, an uncoupling of the previously assumed relationship between markets for employment and the derived demand for travel, which was, in effect, assumed to be an equal relationship. This link was reasonably stable until the mid-2010s (in fact, up until that point in time forecasts of rail demand in regional rail markets had tended to systematically under-forecast rather than over-forecast demand as referenced in [regional flows](#) and [regional demand](#) data by the Rail Delivery Group). However, there is strong evidence that the link between the growth in city centre employment had started to break down in the years prior to 2020 and COVID-19 (referenced in the document “Trends in Rail Commuting Patterns” by the Passenger Demand Forecasting Council, Rail Delivery Group, dated 26 February 2020).

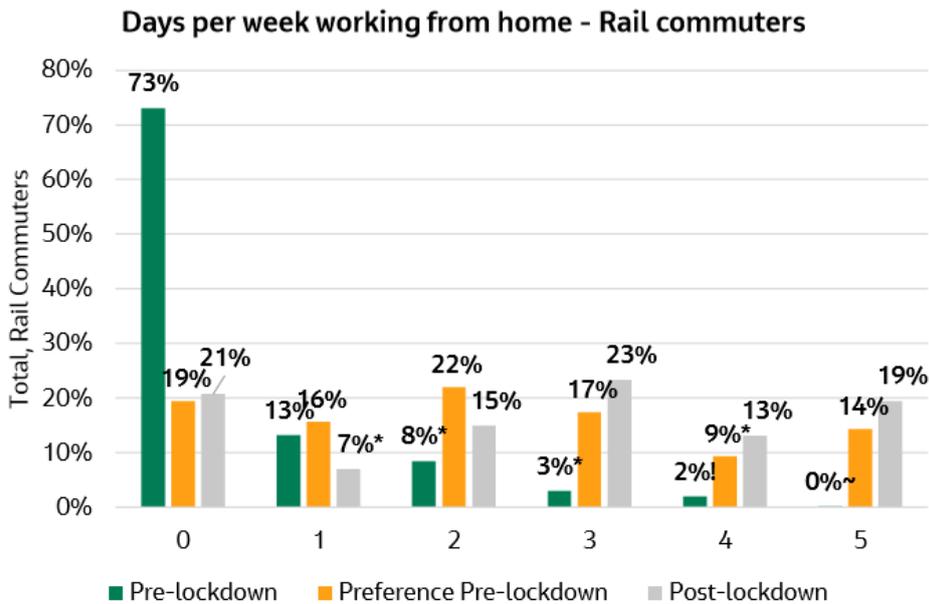
### **The impact on Trip Frequency**

The evidence collated at a GB level suggests that home working has replaced commuting during the COVID-19 crisis. This trend towards working from home was evident pre-COVID-19 as the growth in passenger rail demand slowed, particularly around London but also in regional cities such as Glasgow.

Figure 5 shows rail commuter preference data with regards to “days per week working from home”. The data was sourced from Rail Delivery Group (RDG) data based on YouGov surveys, and shows the pre-lockdown behaviour, pre-lockdown preference and post-lockdown preference to work from home. The data shows that a daily commute was part of rail commuting pre-lockdown, with 73% of respondents not working from home at all, even though their stated preference was for only 19% to not work from home at all. What is notable is, firstly, the extent to which this demand for rail commuting did not match commuters’ preferences, and the extent to which there is a clear preference for more balance between workplace-based and home-based work among commuters. The post-lockdown preference data shows

that the majority of respondents would prefer to work from home (7% at one day per week, 15% at two days per week, 23% at three days per week, 13% at four days per week and 19% at five days per week).

**Figure 5 - Rail commuter preferences, RDG 2020**



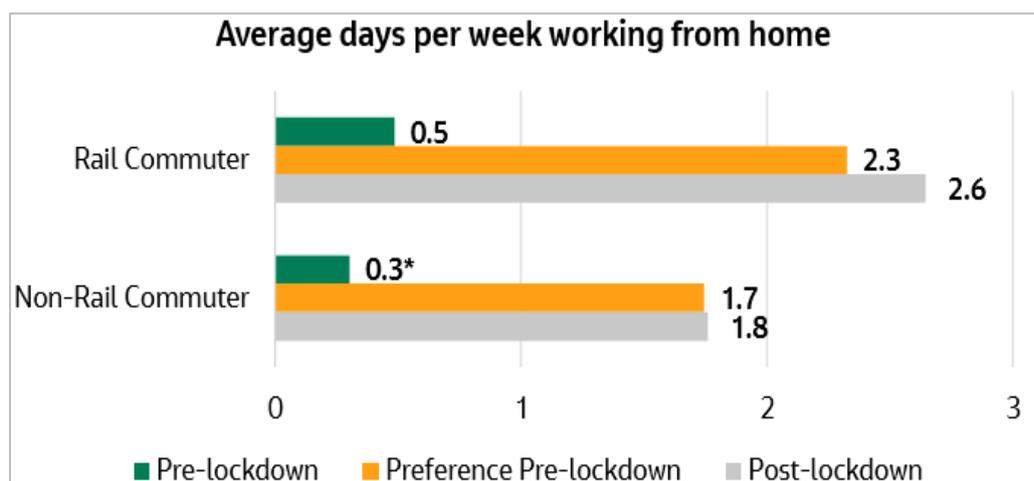
Base n=3,534 (Individuals defined as rail commuters), YouGov survey data

The reasons for this are both technological and societal. For many office-based service sector jobs, the potential now exists to work from home in a way which was either not as technically feasible or as culturally acceptable as it has become during the COVID-19 crisis. And, whilst the evidence base supporting higher productivity of home working versus workplace-based work is not clear cut, both workers and employers now have a credible alternative to office-based working, which had only previously been tested at scale for short periods of time (for example, during the ‘Beast from the East’ extreme weather event in February and March 2018).

Figure 6 was sourced from [Rail Delivery Group data](#) and shows the pre- and post-lockdown preference for average days worked from home for rail and non-rail commuters. It shows that all commuters had a preference for working from home pre- and post-lockdown (2.3 and 2.6 days/week for rail commuters respectively, and 1.7 and 1.8 days per week for non-rail commuters respectively). However, the

observed behaviour pre-lockdown shows regular commuting with average days worked from home at 0.5 days/week for rail commuters and 0.3 days/week for non-rail commuters.

**Figure 6 - Working from home preferences pre- and post-lockdown (Source: RDG)**



The data illustrates that rail commuters were more likely than non-rail commuters to work from home pre-COVID-19, as well as having a stronger preference for working from home prior to and after the pandemic than non-rail commuters. Scotland had the lowest level of homeworking of all the GB regions pre-COVID-19, but the survey suggests that the appetite for home working is likely to be just as strong in Scotland as in other GB nations once the pandemic recedes.

It is likely that the behavioural impact of COVID-19 will be heavily conditioned by the attitude of companies to home working. Companies have clearly adjusted their working practices, with sectors where working from home was seen either as a threat to productivity or technologically unfeasible (usually due to tech-security concerns as shown an [article](#) by the Institute of Chartered Accounts in England and Wales), now allowing their workforce to work from home *en masse*.

The financial services sector, a key component of Central London and both Edinburgh and Glasgow employment (and therefore rail commuting), is arguably the most prominent example of this. Surveys completed by the industry suggest that this policy-enforced change is likely to persist following the forthcoming vaccination

programmes. A recent [survey](#) by the Royal Institute of Chartered Surveyors reported that “93% of respondents envisage businesses scaling back their office footprint over the next two years as people move to home working”. Ultimately, for many, ‘the toothpaste is now out of the tube’ with regard to homeworking, and the impact on future rail demand and revenue is uncertain.

That said, Glasgow will still continue to be a key attractor of discretionary travel, be it to pursue social or cultural activities, or to shop. It is the sixth most visited city in the UK from abroad based on [tourist visitor data](#) from Statista, has a number of exhibition and conference centres hosting major events, and a famed shopping district and night-time economy as noted in an [article](#) by the Moffat Centre.

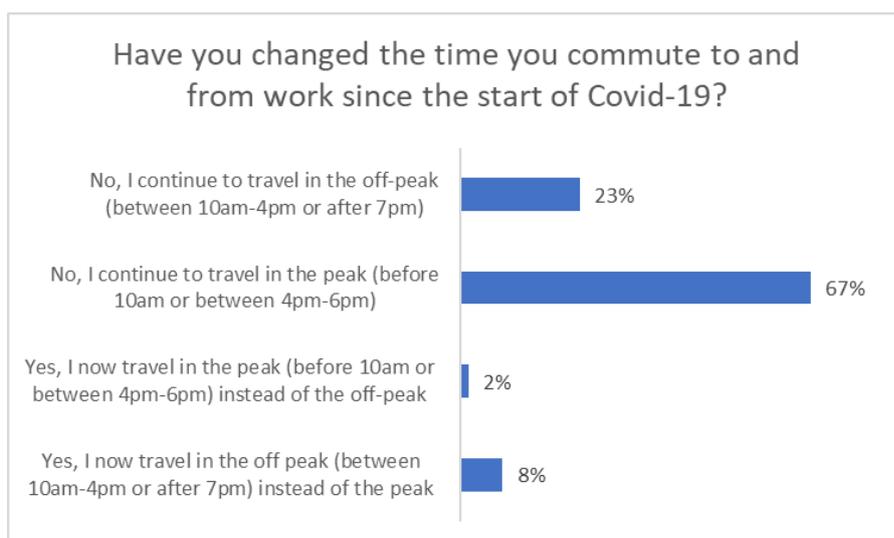
### **The impact on trip timing**

In addition to survey evidence suggesting an increased appetite for working from home across the week a flattening of the peak may mean that passengers are more inclined to travel in the shoulder peaks as opposed to the ‘high peak’ (broadly 08:00 – 09:00), or during the interpeak period. Factors here may be a change in tolerance to crowded trains and stations, encouraging passengers to seek to travel when it is quieter, or the newly afforded flexibility offered by employers, given the uptake in working from home, translating into more varied patterns of trip times.

**Figure 7** Figure 7 shows data from an Abellio Scotrail commuter survey on the question “Have you changed the time you commute to and from work since the start of Covid-19?”. The data shows that 90% of respondents continue to travel in the peak or off-peak as previously. 8% indicated that they have changed to travel in the off-peak instead of the peak.

A flattening of the peak may mean that passengers are more inclined to travel in the shoulder peaks as opposed to the ‘high peak’ (broadly 08:00 – 09:00), or during the interpeak period. Factors here may be a change in tolerance to crowded trains and stations, encouraging passengers to seek to travel when it is quieter, or the newly afforded flexibility offered by employers, given the uptake in working from home, translating into more varied patterns of trip times.

### **Figure 7 - Changes in commuting times (Source: Abellio ScotRail)**



### The impact on long term rail demand

Ultimately the degree and speed at which demand for rail services returns will be reliant on far broader factors than just the rail service offering. It will be influenced by the choice to work from home or a place of work, the choice of which time of day to travel to/from work, and the choice of mode with which to do so.

If the choice is made to travel to a place of work, the choice of rail over car would be impacted the prevalence and cost of car parking in the city centre, which is outside the control or influence of the rail industry. Government could pursue policies such as workplace parking levies or go further and consider road pricing. Given the context around the push towards carbon reduction (such as the commitment to reduce car kilometres by 20% by 2030), these more radical transport policies may be more palatable than they once were. Likewise, policies such as reduced business rates in city centres could stimulate the types of employment, and support travel that is traditionally well served by rail (TfL have considered this referring to 'Contextual' and 'Transactional' environments, which represent the areas within and outwith the organisations reach which can influence their work and decision-making).

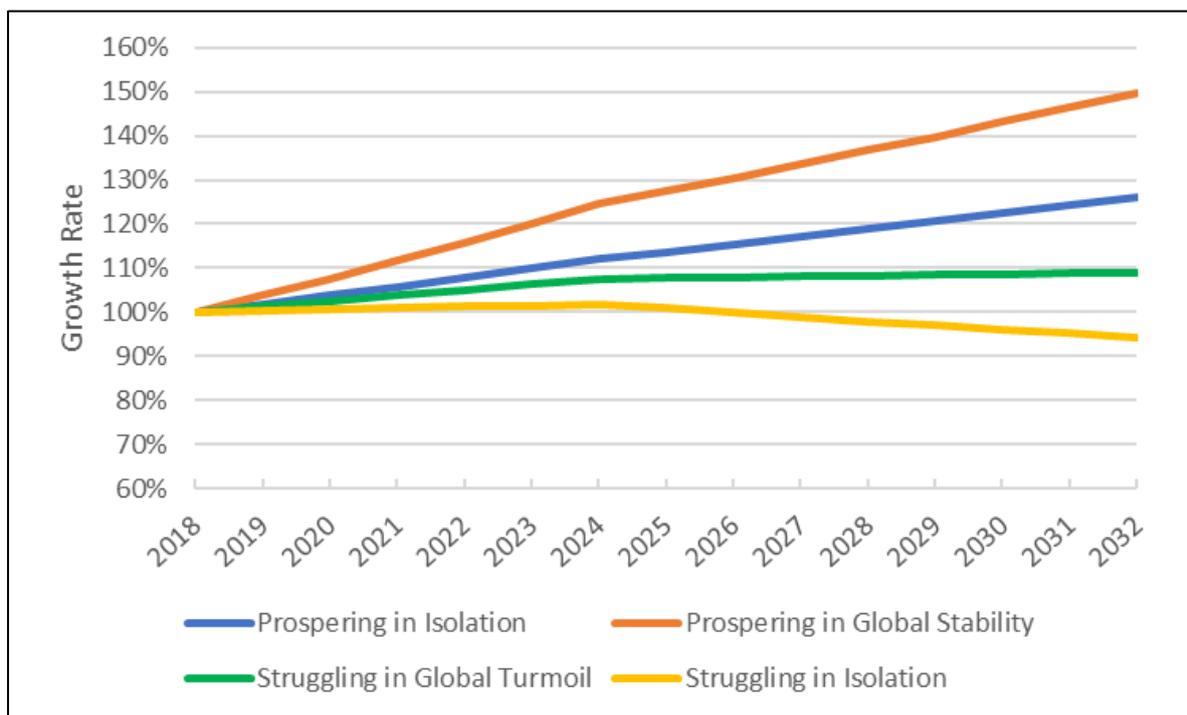
Rail fares on the East Kilbride-Glasgow route are very competitive compared to the costs of car usage (including parking charges) and rail journey times during peak periods are lower than car journey times.

### Implications for the forecast passenger demand informing the OBC/FBC

The most recent rail demand forecasting exercise in Scotland was the Market Study element of the [Scotland Route Study](#), which was completed in 2016. The Scotland Market Study did not identify a recommended or central forecast for growth; instead, it proposed rail corridor-level growth rates based on four scenarios or narratives. Growth rates of 26% ('Prospering in Isolation') and 49.9% ('Prospering in Global Stability') for the period 2018 to 2032 (the fixed STAG demand cap year) were used to inform the Part 2 Appraisal section of the SBC, with further sensitivities included looking at the impact on the value-for-money assessment of the scheme with respect to a longer-term demand cap.

Figure 8 shows the project growth in rail passenger demand between 2018 and 2032 from the 2016 Network Rail Route Study. It shows growth for across the four scenarios considered in the Route Study, with the highest growth for the "Prospering in Global Stability" scenario (50% growth from 2018 demand) and the lowest for the "Struggling in Isolation" scenario (7% decrease from 2018 demand).

**Figure 8 - East Kilbride Corridor Growth Rates (2016 Network Rail Route Study)**



The forecasts were extensive and employed scenarios to account for significant uncertainties (such as employment and population growth, cost of car parking and fuel, rail fares). The scenarios were 'of their day' and did not include the breadth of uncertainty we now face, with arguably more 'upside' than 'downside' factors included at the time.

Ideally, a broader range of growth scenarios than those used at SBC would be considered, supported by extensive research and consultation. This is, however, impractical and potentially inaccurate as the effects of the pandemic and the vaccine rollout is still emerging.

Hence, following discussion with Transport Scotland's Analysis Team, it was agreed that the OBC/FBC should set out plausible forecast demand scenarios that represent a reasonable estimate of the factors influencing rail demand on the East Kilbride corridor and the associated demand forecasts. These, along with consideration of the baseline position (at scheme opening year) provides decision makers with a better understanding of how the uncertainties impact on the strategic rationale for the scheme (and what informs the value for money assessment).

### **Baseline demand - 2025**

Base demand is usually determined by selecting a representative sample from the recent past, established through ticket sales, passenger counts, and other estimation methods. All these methods rely on 'current' demand closely resembling the 'historic' demand. However, no historic pre-COVID estimates of demand correspond well to the current (mid-COVID) market conditions.

The Scottish Demand Forecasting Group (SDFG which includes representatives from Transport Scotland, Network Rail and Abellio ScotRail) has produced 'Strategic Advice' to the industry and to the Scottish Government, advising on how the industry can manage these unprecedented levels of uncertainty within its decision making by considering the whole-system risks. This is based on research undertaken by the Fraser of Allander Institute (FAI).

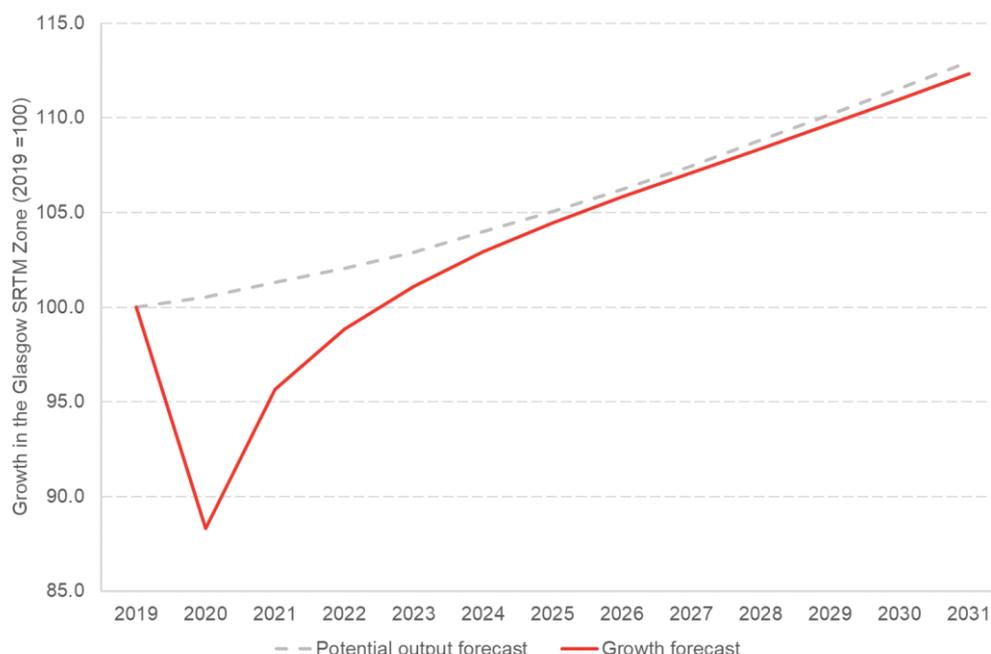
Enhancement business cases usually focus on the long-term outlook for travel and transport demand. However, the short-term outlook is so uncertain at present that it

is necessary to develop a view of a reasonable ‘base’ demand independently of ‘current’ demand.

In order to do this, the OBC/FBC has incorporated forecasts produced by the FAI into this analysis. The FAI forecasts suggest that GVA within Glasgow city centre is likely to have recovered to pre-pandemic levels by the start of 2023, with the long-term growth likely to have returned to the background trend by 2026.

The paper suggests that, in a scenario where the current recession is “V-shaped”, output in the Glasgow city centre economy would be likely to recover relatively quickly compared to the rest of Scotland (see Figure 9 which shows the post-pandemic medium term outlook for the greater Glasgow City area based on data from the Fraser of Allander Institute. The data shows a V-shaped dip in the growth forecast, recovering to pre-pandemic levels by approximately 2026).

**Figure 9 – Post-pandemic medium-term outlook for Glasgow SRTM Zone (FAI)**



However, the paper also indicates that the impact of home-working could erode the vital relationship between city centre employment and commuter rail demand. The sectoral analysis undertaken by FAI suggests that increased homeworking could lead to a [REDACTED TEXT] drop in commuting into Central Glasgow in the short- to medium-term.

Furthermore, in a scenario where the economic downturn is more sustained, the FAI analysis suggests that between 15% and 17.5% of jobs could be at risk. Combining both the medium-term recession and short-term impact of home working suggest that the overall peak demand could decline by between broadly 15% and 30% by 2026 (which aligns with the internal Transport Scotland Strategic Advice Note dated 29/01/2021).

This analysis was compared to work in progress undertaken by Transport Scotland which estimates that rail demand by end 2025 could vary between [REDACTED TEXT] and [REDACTED TEXT] of pre-COVID levels depending on a range of factors linked to vaccine effectiveness, vaccine compliance and behaviour change.

Further, this estimate was considered against the DfT forecast long-term scenarios (version 14) which estimates the overall demand forecast for rail as being [REDACTED TEXT] of pre-COVID demand.

**Conclusion for OBC/FBC forecast demand:** taking all of the above into consideration, a [REDACTED TEXT] reduction in demand at end 2025 (compared to pre-COVID levels) has been assumed for the baseline demand. This value is slightly above the mid-range value from the Transport Scotland analysis (their note remarks that the [REDACTED TEXT] worst case value represents the lowest estimate of all the research they've considered) and is at the lower end of the scale based on the FAI data. The decision to use the [REDACTED TEXT] value (as opposed to [REDACTED TEXT]) is based on the emerging success of the vaccine rollout programme in the UK and the [Upgraded UK Economic Forecast](#).

This timescale broadly aligns with the scheme opening year (2025) and is useful to inform the baseline demand used in modelling the new timetable options. Based on that work, two baseline scenarios are proposed for the OBC/FBC:

- **Baseline scenario #1** = 2019 baseline unadjusted
- **Baseline scenario #2** = 2019 baseline less [REDACTED TEXT]

### Long term demand – beyond 2025

In order to estimate the long-term rail demand along the East Kilbride corridor for this OBC/FBC the Route Study forecasts were combined with the baseline demand scenarios.

As previously discussed, the two highest of the four NR Market Study growth scenarios were used to inform the SBC. For the purpose of informing plausible forecast demand scenarios the following was applied:

- The lower of these two, ‘Prospering in Isolation’ is retained
- The lowest of the four scenarios generated as part of the NR Market Study (‘Struggling in Isolation’).
- Both of these long-term forecasts are applied to the 2 Baseline scenarios identified above, with growth capped at 2032 as per STAG guidance.

There are other factors which could That said, it is plausible that rail demand may return in the next few years post COVID-19 and could, in the medium to long term, grow as previously forecast (or indeed beyond) given the Scottish Government’s ambitious new targets around reducing car kilometres by 2030.

**Conclusion for OBC/FBC forecast demand:** As a result, four long term demand scenarios were generated:

1. Forecast scenario #1 (“optimistic”, with reduction in commuting offset by increased leisure travel and longer-term economic growth) = **Prospering in Isolation + unadjusted pre-COVID demand**
2. Forecast scenario #2 (“positive”, with reduction in commuting and short-term job losses offset by longer-term economic growth) = **Prospering in Isolation + pre-COVID demand less [REDACTED TEXT]**
3. Forecast scenario #3 (“negative” with reduction in commuting offset by increased leisure travel but longer-term economic decline) = **Struggling in Isolation + unadjusted pre-COVID demand**
4. Forecast scenario #4 (“pessimistic”, with reduction in commuting offset, short-term job losses and longer-term economic decline) = **Struggling in Isolation + pre-COVID demand less [REDACTED TEXT]**

- These scenarios are shown in [REDACTED TEXT AND FIGURE]  
, which shows the assumed forecast rail passenger demand scenarios applied to the appraisal in this business case.

**[REDACTED TEXT AND FIGURE]**

The four scenarios presented suggest a forecast demand range of [REDACTED TEXT] to [REDACTED TEXT] to 2032 compared to pre-COVID levels in 2018. The distribution of travel across peak and interpeak periods is expected to change with a “flatter” peak expected.

## **D.05 Review of SBC problems and opportunities**

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### **D.05.01 Review of problems and opportunities presented in the SBC**

This scheme was initiated to address the current (pre-COVID-19) and forecast problem of passenger demand exceeding on-train capacity on the railway corridor between East Kilbride and Glasgow Central during the peak commuting periods.

This was the key problem identified in the SBC.

The problems and opportunities identified in the SBC have been reviewed to assess their continued relevance against changes since the SBC. These reviews are set out in Table 2 and Table 3.

Table 2 – Review of Problems identified in the SBC and implications for the OBC/FBC

| SBC problems (on the East Kilbride corridor)                                                                                                                                                                                                                                                                                                                                                                                                                                        | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Why is intervention required now?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>P1. Current passenger demand during the morning peak period exceeds the seated capacity, with passengers on peak trains during this period standing for longer than ten minutes.</p> <p>Redrafted problem statement (FBC): <i>“Passenger demand during the morning peak period on the East Kilbride corridor may (under certain post-COVID growth scenarios) exceed the seated capacity with passengers on “peak” trains during this period standing for longer than ten</i></p> | <p>There is uncertainty about the long-term impact of COVID-19 on future rail passenger demand, and on the daily profile of demand (with potentially greater peak spreading). The revised demand forecast estimate reflecting the impact of COVID-19 presented in section D.04.03 suggests that there may be future scenarios where the demand will exceed the pre-COVID demand, which would mean that this problem would continue to be applicable to the OBC/FBC.</p> <p>Section D.04.03 also suggests that there are scenarios in which forecast demand may fall below pre-COVID levels, which would mean this problem is not relevant to the OBC/FBC.</p> <p><b>Conclusion: whilst there is uncertainty about forecast demand, there are plausible scenarios wherein this continues to be a problem that should be considered in the OBC/FBC. The evidence for</b></p> | <p>As Scotland begins to transition out of the COVID restrictions, rail passenger demand is expected to return, with up to [REDACTED TEXT] of demand estimated to have returned by end 2025 when the scheme will open. The 97% estimate is extracted from the TS Analysis Team paper “Future Estimates of Public Transport” draft V2.2 dated 26 March 2021.</p> <p>Further, as the Scottish Government implements the policy levers to support the targeted reduction of car-km’s on the network, there will be an increase in demand for sustainable alternatives which may result in an increase in passenger demand. This may result in</p> |

| SBC problems (on the East Kilbride corridor)                                                                                                                                                                                                                                                                                                                                                              | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Why is intervention required now?                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>minutes.</i> "                                                                                                                                                                                                                                                                                                                                                                                         | <b>this problem is presented under section E.02.01.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | an increase in demand for rail travel between East Kilbride and Glasgow due to mode shift from cars for existing residents, and journeys from residents in new developments in the East Kilbride area.                                                                                                                                                                                                                                            |
| <p>P2. Rail track capacity between East Kilbride and Busby limits the introduction of additional services to increase capacity, and platform lengths limit the introduction of longer trains.</p> <p>NOTE: <i>This problem is different from Problem 1, in that it is not related to the passenger demand itself (which is impacted by uncertainty post-COVID) but instead to the capacity of the</i></p> | <p>The evidence for this problem was presented in the SBC and remains applicable – additional services cannot be included during the peak and interpeak periods without a loss of rail operational performance and reliability. If services are increased, the train performance requirement of 92.5% PPM cannot be achieved with single track sections remaining on the corridor. There have been no changes to the infrastructure along the East Kilbride corridor since the SBC.</p> <p>Platforms at all nine stations on the route can accommodate a maximum train length of approximately</p> | <p>The current track infrastructure cannot accommodate additional services (which would be required under certain forecast demand scenarios) without a loss of operational performance and reliability.</p> <p>If this problem is not addressed then there is a risk that future passenger demand may exceed the available capacity, and the track infrastructure would limit the ability to introduce new services. That would force the new</p> |

| SBC problems (on the East Kilbride corridor)                                                                                    | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                    | Why is intervention required now?                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>infrastructure to accommodate additional services during peak and interpeak periods.</i>                                     | <p>140m, constraining the ability to introduce the longer trains as part of “business as usual”. The introduction of longer trains is further constrained by the lack of availability for longer platforms at Glasgow Central Station.</p> <p><b>Conclusion: This continues to be a problem that should be considered in the OBC/FBC. The evidence for this problem is presented under section E.02.02.</b></p> | <p>demand to shift to other modes, which may include car for journeys between East Kilbride and Glasgow.</p> <p>In order to align with policy as set out in NTS2, the OBC/FBC needs to consider the ability of the options to support the ambition of a more resilient rail network, providing significantly improved service.</p> |
| P3. Historic rail demand growth show that demand has been increasing, indicating that current problems will continue and worsen | <b>Conclusion: This problem is effectively described included under Problem 1 and is not applicable to the OBC/FBC.</b>                                                                                                                                                                                                                                                                                         | Refer to Problem 1.                                                                                                                                                                                                                                                                                                                |
| P4. Forecasts of future rail demand indicate a strong growth in demand that will exceed the                                     | <b>Conclusion: This problem is effectively described included under Problem 1 and is not applicable to the OBC/FBC.</b>                                                                                                                                                                                                                                                                                         | Refer to Problem 1.                                                                                                                                                                                                                                                                                                                |

| SBC problems (on the East Kilbride corridor) | Implications for the OBC/FBC (if applicable) | Why is intervention required now? |
|----------------------------------------------|----------------------------------------------|-----------------------------------|
| capacity                                     |                                              |                                   |

**Table 3 – Review of Opportunities identified in the SBC and implications for the OBC/FBC**

| SBC Opportunities                                                                                                              | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Why is intervention required now?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>O1. Scheme options can contribute to the strategic management of rolling stock replacement in the south Glasgow network</p> | <p>The rolling stock on the East Kilbride and Barrhead corridors will be life expired by 2025. If the corridors were to be decarbonised that would influence the choice of replacement rolling stock.</p> <p>Whilst the broader procurement of rolling stock on the Strathclyde region is not yet defined, <i>nor forms part of this business case</i>, there is the opportunity for efficiencies and costs savings to be achieved if the replacement rolling stock on these corridors aligns with the replacement rolling stock in the broader region.</p> <p><b>Conclusion: This continues to be an opportunity that should be considered in</b></p> | <p>As the rolling stock on the East Kilbride and Barrhead corridors will be life expired by 2025 this should be considered now.</p> <p>Whilst this is not the only consideration in the selection of a corridor decarbonisation approach, it should be considered in order to unlock the opportunity for efficiencies and cost savings in rolling stock procurement.</p> <p><u>For example:</u> If the timing aligns, the procurement of the Barrhead, East Kilbride, Fife and Borders fleets could form part of the same procurement exercise for the Class 318/320/334 replacement. This would mean that a large fleet of similar trains would be ordered, all with the same interior</p> |

| SBC Opportunities                                                           | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Why is intervention required now?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             | <b>the OBC/FBC.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | specification, and the difference being in number of carriages and whether they are equipped with batteries for BEMU operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| O2. The scheme can contribute to the efficient utilisation of rolling stock | <p>The rolling stock on the East Kilbride and Barrhead corridors is currently shared. If the same rolling stock (either EMU or BEMU) is procured for the East Kilbride and Barrhead corridors (as part of replacing the life-expired stock) then this sharing could be continued in the future.</p> <p>Further, if appropriate rolling stock is procured for this scheme then it could potentially be shared with other routes in the Strathclyde region.</p> <p>This would support the efficient utilisation of rolling stock and reduce the requirement for “spare” vehicles on the network, reducing costs.</p> <p><b>Conclusion: This continues to be an opportunity that should be considered in</b></p> | <p>As the rolling stock on the East Kilbride and Barrhead corridors will be life expired by 2025 this should be considered now.</p> <p><u>Example #1:</u> an efficiency can be achieved if the East Kilbride and Barrhead fleets are of the same specification as the Strathclyde mass transit EMU fleet (which is planned to be procured later in 2021) to replace the near life expired class 318, 320 and 334’s. The ability to interwork stock between routes will avoid the need for the East Kilbride maintenance spare unit, reducing cost by [REDACTED TEXT] pa.</p> <p><u>Example #2:</u> The introduction of BEMUs on the East Kilbride corridor could allow for BEMUs to be reallocated to serve the discontinuously electrified GSW line south of Barrhead to Kilmarnock.</p> |

| SBC Opportunities                                                                                                                   | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Why is intervention required now?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                     | <b>the OBC/FBC.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p>O3. The scheme can improve connectivity on the East Kilbride corridor (supporting modal shift and transport decarbonisation)</p> | <p>This opportunity was identified in the SBC and continues to be a relevant opportunity.</p> <p>The published policy (NTS2 and STPR2 Report 1) since the SBC place greater emphasis on the need to support modal shift to sustainable modes, including rail, in order to support the decarbonisation of transport.</p> <p>Pre-COVID, the East Kilbride corridor offered fewer train services to Glasgow (as the main urban centre) compared to other comparable locations, and it has a lower rail utilisation (per population) than comparable locations.</p> <p>East Kilbride serves a population of 75,000 and intermediate stations along the corridor towards Glasgow serve populous areas within the southern reaches of the Glasgow conurbation.</p> | <p>The STPR2 Report 1 (Intervention 14) states: “Arguably, COVID-19 provides a once-in-a-lifetime opportunity to ‘re-purpose’ rail as a key contributor to the long-term growth and development of the economy. Investing in rail now will help to avoid a future where “pre-COVID-19” rail users have switched to car and use increasingly congested roads.”</p> <p>If, as part of this scheme, track capacity was to be created (through track infrastructure changes) it would enable additional services to be introduced during the peak and interpeak periods. This would improve the attractiveness of rail as a mode choice between East Kilbride and Glasgow, with shorter waiting times and shorter journey times, and provide an improved sustainable alternative to car.</p> <p>If the capacity for increasing train frequencies is not created now, then the rail offer cannot be</p> |

| SBC Opportunities                                                                                               | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                   | Why is intervention required now?                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                 | <p>Enhancement of the East Kilbride corridor to provide improved connectivity (defined as shorter journey times and increased journey opportunities between East Kilbride and central Glasgow through increased all-day service frequencies) would improve the “rail offer” on the corridor.</p> <p><b>Conclusion: This continues to be an opportunity that should be considered in the OBC/FBC. The evidence for this opportunity is presented under section E.03.01.</b></p> | <p>improved. This creates the risk that new and existing residents in the East Kilbride area may shift to car as their mode of travel to work in Glasgow (currently 40% of journeys – see Table 7 in <b>separate document - Appendix A</b>) and the opportunity to encourage sustainable choices as the country recovers from COVID may be lost.</p> |
| <p>O4. The scheme can contribute to maximising connectivity with local communities (supporting modal shift)</p> | <p>Sustainable access to/from the rail network is an important component to supporting modal shift to sustainable modes, and the reduction in car-kms. Through enhanced access to and from the rail network, both in terms of the station buildings and connections between</p>                                                                                                                                                                                                | <p>There is the opportunity to improve station accessibility and active travel connections between communities and rail stations as part of any infrastructure improvements which may be included within this scheme. This would support “locking in” sustainable travel choices for journeys between East Kilbride (and in particular new</p>       |

| SBC Opportunities                                                                                                                                            | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                        | Why is intervention required now?                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                              | <p>communities and stations, modal shift can be further encouraged.</p> <p><b>Conclusion: This continues to be an opportunity that should be considered in the OBC/FBC.</b></p>                                                                                                                                                                                                                     | <p>communities resulting from planned developments) and central Glasgow.</p> <p>This would build upon work that SLC is undertaking to develop and implement improved walking and cycling links between communities and the rail stations.</p> |
| <p>O5. Through a staged intervention approach the scheme would minimise disruption to passenger services whilst making the most of emerging technologies</p> | <p>This opportunity has been removed from the OBC/FBC as it refers to a specific delivery option instead of a general opportunity on the corridors.</p> <p>The impact of each option considered in the OBC/FBC on passenger disruption is considered as part of the options appraisal.</p> <p><b>Conclusion: This opportunity has been removed, as it refers to a specific delivery option.</b></p> | <p>Not applicable.</p>                                                                                                                                                                                                                        |

## D.05.02 Review of Issues and Constraints from the SBC

The issues and constraints identified in the SBC have been revisited for the OBC/FBC and the impact of the changes identified since the SBC (set out in Part D:) has been considered and is set out in Table 4 and Table 5.

**Table 4 – Review of Issues identified in the SBC**

| SBC Issues                                                                                                                           | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I1. New stations (such as that proposed at Barrhead South) may have an impact on the options considered for this scheme.             | <p>A new station at Barrhead South is no longer going ahead.</p> <p><b>Conclusion: This is no longer an issue that should be considered in the OBC/FBC.</b></p>                                                                                                                                                                                                              |
| I2. Changes to the pricing and quality of local bus services may divert some of the passenger demand growth forecast away from rail. | <p>This issue may affect the realisation of benefits from this scheme (in terms of mode shift to rail) and should be considered in the strategic and socio-economic cases.</p> <p><b>Conclusion: This continues to be an issue that should be considered in the OBC/FBC and is described further under section E.03.01.</b></p>                                              |
| New Issues                                                                                                                           | <b>Identified in the OBC/FBC</b>                                                                                                                                                                                                                                                                                                                                             |
| I3. Glasgow Metro: <a href="#">The Glasgow Connectivity Commission</a>                                                               | <p>The Glasgow Connectivity Commission identified that the first priority of a wider strategy to transform the fixed public network for Glasgow should be the creation of a comprehensive Glasgow Metro for the city.</p> <p>The Glasgow Metro is proposed as a network of high capacity rapid transit lines connecting different parts of the city, such that the fixed</p> |

| SBC Issues | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | <p>transport system supports inclusive growth across all of the city's communities and sustains the international competitiveness of the key employment concentrations in and around the city centre.</p> <p>The Commission Report published in 2019 (including Phase 2 recommendations) suggests that the Glasgow Metro network could be made up of a combination of parts of the existing heavy rail network, re-opened sections of dormant infrastructure, wholly new sections of route, and street-running sections. The indicative coverage of the Glasgow Metro suggests some potential cross-over with the East Kilbride line.</p> <p>At this stage it is not clear how or when the Glasgow Metro scheme may be brought forward and, considering the early stage of the Glasgow Metro scheme development, the impact that it may have on the East Kilbride line is not known.</p> |

**Table 5 – Review of Constraints identified in the SBC**

| SBC Constraints                                                                                        | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>C1. Platform capacity at Glasgow Central is a key constraint to introducing additional services</p> | <p>Services from East Kilbride terminate at Glasgow Central Station. Capacity at Glasgow Central Station, both on its approaches and use of platforms, is extremely constrained. It has been identified through this project and other workstreams that, in order to operate more and/or longer trains into the station, the timetable for a number of routes will need to change.</p> <p>This timetabling work is outside the scope of this project and is being taken forward by an interfacing workstream led by Transport Scotland. This will focus on more efficient use of existing capacity, without the need for further investment. Further strategic work has also commenced to consider longer-term options for Glasgow Central, taking cognisance of aspirations, to enhance a number of service groups that terminate at the station.</p> <p>Investment in double tracking (and the associated extra platform at East Kilbride station) reduces the need for investment in Glasgow Central Station. This is because it would allow for trains to wait in East Kilbride (prior to their timetabled service runs). At present these trains need to wait at Glasgow Central Station. Investment in Glasgow Central Station is likely to be far more costly due to the urban location of the station and the impacts on other lines/services.</p> |

| SBC Constraints                                                                                                     | Implications for the OBC/FBC (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                     | <p>Alternatively, introducing a twin platform station at East Kilbride would enable the timetable to be designed around minimising time in Glasgow Central Station, allowing services to operate from a single platform as trains don't need to lay over at Glasgow Central Station. This would be more convenient for passengers, would free up valuable capacity in Glasgow Central Station, and would improve performance because the trains are less likely to be impacted by delays from other routes (and will also result in fewer delays to other routes).</p> <p><b>Conclusion: This continues to be a constraint that should be considered in the appraisal of options in the OBC/FBC.</b></p> |
| <p>C2. Track capacity at Glasgow Central Station is a key constraint to introducing additional services</p>         | <p>As above for Constraint 1.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p>C3. Station car parking at stations along the East Kilbride line represents a constraint to passenger growth</p> | <p>The effectiveness of the East Kilbride corridor in supporting sustainable modal shift will be impacted by Park and Ride capacity.</p> <p><b>Conclusion: This continues to be a constraint that should be considered in the OBC/FBC, along with consideration of bus interchange and active travel connections between communities and stations.</b></p>                                                                                                                                                                                                                                                                                                                                               |

# Part E: Evidence supporting Problems and Opportunities

## E.01 Introduction

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This section revisits the evidence underpinning the problems and opportunities presented in the SBC (and reviewed under section D.05).

## E.02 Evidence of the Problems

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This section sets out supplemental evidence to that which was presented in the SBC, to support the problems and opportunities set out in section D.05.

### E.02.01 Problem 1: Passenger demand exceeding capacity on the East Kilbride corridor

**Problem Statement:** Passenger demand during the morning peak period on the East Kilbride corridor may (under optimistic post-COVID growth scenarios) exceed the seated capacity with passengers on “peak” trains during this period standing for longer than ten minutes.

**Caveat:** as described in section D.04, the uncertainty around the post-COVID demand has been considered and a range of forecast demand scenarios developed. Under the optimistic and less optimistic scenarios this problem would continue to require consideration. Under the pessimistic and less pessimistic scenarios the demand would be lower than pre-COVID demand, and this problem would not materialise.

#### Evidence for the problem

##### Pre-COVID evidence (historic)

- Historic growth in passenger demand (pre-COVID)

- In the 10 years prior to COVID-19, passenger demand into Glasgow (on all routes) grew by just under 20%.
- This growth is reflected on the East Kilbride corridor which has grown by over 25% in the ten years pre-COVID – refer to Figure 4.
- **Crowding on the East Kilbride corridor (pre-COVID)**
  - Trains between East Kilbride and Glasgow have historically been particularly heavily used during peak periods, with large numbers of passengers commuting to Glasgow for work. The corridor has been highlighted in years prior to the SBC as one of the most crowded rail routes in the country.
  - Services into East Kilbride were observed to be over-crowded during peak times as reported in the 2016 Scotland Route Study (and referenced in sections C.02.01 and C.02.02 in the SBC Pre-Appraisal Report).
  - This crowding represents the number of passengers exceeding the number of seats, resulting in passengers standing on the line from Giffnock station, which means that passengers were standing for more than 10 minutes of their journey.
  - Transport Scotland defines reasonable capacity provision through use of the “ten-minute rule”, i.e. that, on average, no passenger stands for more than ten minutes.

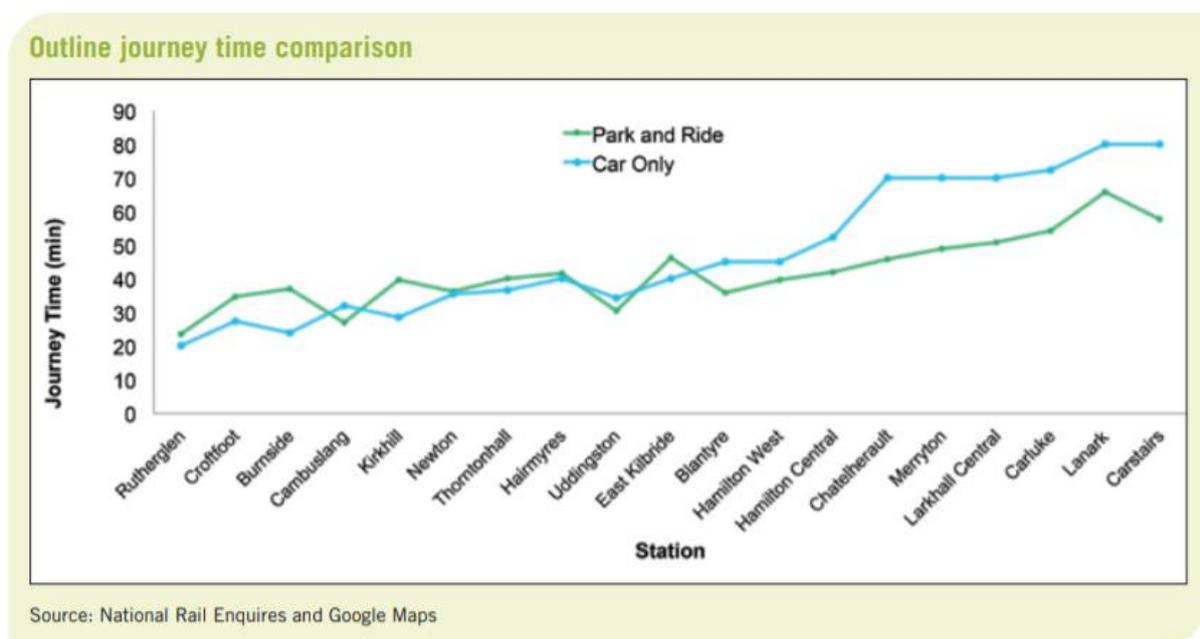
#### Post-COVID evidence (future)

- **Planned development in East Kilbride will generate more demand for travel resulting in more future passenger demand (if rail is an attractive mode choice).**
  - There is planned growth in East Kilbride with more than 3,000 housing units planned for the East Kilbride Community Growth Area, with further development planned for other locations around Hairmyres on the western side of East Kilbride.
  - Growth in population along the corridor will increase the demand for travel to Glasgow, based on historic journey to work patterns as reflected in the 2011 census data which reflected that approximately 25% of residents in East Kilbride commute to Glasgow for employment (see Table 4 in **separate document - Appendix A**).

- If the historic rail mode share for journeys to work or study in Glasgow (from East Kilbride) as reflected in Table 7 in **separate document - Appendix A** continues then approximately 35% of the new journeys to Glasgow would use rail.
- Forecast growth scenarios
  - As set out in section D.04, the uncertainty around the post-COVID demand has been considered and a range of forecast demand scenarios developed. These scenarios represent optimistic and pessimistic growth assumptions. Under the optimistic and less optimistic scenarios the forecast demand will exceed the pre-COVID levels.
- Peak spreading considerations
  - Passenger surveys reflected in A flattening of the peak may mean that passengers are more inclined to travel in the shoulder peaks as opposed to the ‘high peak’ (broadly 08:00 – 09:00), or during the interpeak period. Factors here may be a change in tolerance to crowded trains and stations, encouraging passengers to seek to travel when it is quieter, or the newly afforded flexibility offered by employers, given the uptake in working from home, translating into more varied patterns of trip times.
  - **Figure 7** suggest that 90% of passengers have not changed their commuting times, which may indicate that future peak spreading could be limited and the peak period passenger demand would continue to be much higher than the periods outside the peaks.
  - If more peak spreading does occur it will place greater demands on the off-peak services, which may reduce the passenger demand on peak period services. This is an aspect that is uncertain at the time of drafting this business case and would require further research as the country moves out of COVID restrictions.
- Impacts of transport policy on future rail demand
  - The NTS2 priorities and the NTS2 Delivery Plan reflect a policy position to encourage mode shift from private vehicles in order to support a reduction in car kilometres of 20% by 2030.

- The STPR2 Phase 1 recommendations are to enhance public transport provision, improving accessibility and reliability of journeys, contributing to “locking in” the sustainable travel behaviours of individuals, and encouraging mode shift to sustainable alternatives.
- The enactment of this policy will result in a shift from car journeys for work between East Kilbride and Glasgow (which, pre-COVID, represented 40% of the mode share) to sustainable modes, including rail and bus. Figure 10 (from the South Lanarkshire Park and Ride Strategy) illustrates approximate journey times from stations in South Lanarkshire to Glasgow City Centre for a typical weekday morning outbound journey for a Park and Ride user, compared to the same journey by car only. The journey time by Park and Ride is inclusive of the timetabled journey time by rail and an assumed 15-minute access time by car to the station. The figure shows that rail Park and Ride is a similar journey time to car for Thorntonhall, Hairmyres and East Kilbride stations, and represents a reasonable alternative (in terms of journey time) to car.

**Figure 10 – Journey time to Glasgow (Park & Ride vs Car)**



Source: [South Lanarkshire Park and Ride Strategy 2018-2027](#)

Whilst a detailed multi-modal modelling assessment would be required in order to quantify the potential mode shift from car to rail, it can reasonably be assumed that –

as rail represented 40% of mode share for commuting journeys to central Glasgow pre-COVID – that a proportion of car journeys would shift to rail, thereby increasing the demand for rail travel.

**In conclusion** – under an optimistic passenger growth forecast, peak period passenger demand is likely to exceed train capacity.

#### **E.02.02 Problem 2: A lack of operational (track) capacity on the East Kilbride corridor limits the introduction of additional services**

**Problem Statement:** Track capacity between East Kilbride and Busby limits the introduction of additional services to increase capacity, and platform lengths limit the introduction of longer trains. This problem is different from Problem 1, in that it is not related to the passenger demand itself but instead to the capacity of the infrastructure to accommodate additional services in the peak and interpeak periods.

**Caveat:** as described in section D.04, the uncertainty around the post-COVID demand has been considered and a range of forecast demand scenarios developed. Under the optimistic and less optimistic scenarios this problem would continue to require consideration, as additional train services would be required. Under the pessimistic and less pessimistic scenarios the demand would be lower than pre-COVID demand, and this problem would not materialise.

#### **Evidence for the problem**

The SBC set out that, in order to operate additional services in the peak between East Kilbride and Glasgow Central, the problem of the single-line section between Busby and East Kilbride must be either partially or wholly addressed (dependent on the number of additional services required) in order to maintain operational performance standards on the line.

Platforms at all nine stations on the route can accommodate a maximum train length of approximately 140m, which constrains the ability to introduce the longer trains as part of “business as usual”.

Network Rail have completed an assessment of the operational capacity of the East Kilbride line under different scenarios. This analysis is described in full in the “East

Kilbride Capacity Utilisation Technical Summary” report included under **separate document - Appendix C**.

The note considers three infrastructure options tested against the December 2019 timetable and a four trains-per-hour (4tph) clock face service in both directions (note that a 4tph service was tested as this represents an increase in services – from the existing 2tph outside of the peaks – whilst maintaining a clock-face service pattern):

- Scenario C1: Electrification between Busby Jn and East Kilbride. An additional track between Hairmyres and East Kilbride only.
- Scenario C2: Electrification between Busby Jn and East Kilbride. An additional track between Hairmyres and East Kilbride only, including relocation of Hairmyres Station approximately half a mile west.
- Scenario E: Additional track between Busby & East Kilbride (double track, non-electrified).

Further assessments have been undertaken on the ability of a partial double tracked line to accommodate a 3tph frequency throughout the day.

#### Assessment of train performance with retained single track sections

Train performance is measured in PPM (public performance measure). PPM is the percentage of trains which arrive at their terminating station ‘on time’ compared to the total number of trains planned. A train is defined as ‘on time’ if it arrives at the destination within five minutes (i.e. 4 minutes 59 seconds or less) of the planned arrival time for London and South East or regional services, or 10 minutes (i.e. 9 minutes 59 seconds or less) for long-distance services.

Current and historical (last five years) performance on the route has averaged 94% PPM, against the national target of 92.5%, which indicates that the historic performance of the route is good. However, operational analysis carried out during the feasibility stage of the project (pre-SBC) indicated that, whilst it was theoretically possible to operate two additional services during the morning peak with partial double tracking and electric traction, performance would be negatively impacted.

Track capacity utilisation of greater than 75-80% is considered to pose a considerable risk to train performance (and therefore on the reliability of services on the route, and therefore on the attractiveness of rail services).

The outcome of that analysis is that, even with only two additional morning peak trains (i.e. not an all-day 4tph service), capacity utilisation would reach 82% with the single track remaining between Busby and Hairmyres and, therefore, performance would be very likely to be negatively impacted. This improves to 59% with full double tracking, supporting continued operation of a high-performing railway.

#### Assessment of performance at 4tph throughout the day

Capacity utilisation was also calculated for a 4tph all day clock face service, with partial and full double tracking tested (refer to section G.02.02 for details). This indicated that the railway would be at 100% utilisation with only partial double tracking and electric traction, and therefore it would not be feasible to operate the service. Full double tracking reduces the capacity utilisation to 74%, supporting continued operation of a high-performing railway.

#### Assessment of performance of other existing routes with single track sections

Routes with comparable characteristics that have experienced high-profile performance issues are the Milngavie branch and the Borders Line. Both retain significant single track sections and consistently perform far worse than the East Kilbride line.

#### Assessment of performance of partial double-tracked line

Capacity utilisation was reviewed for services with a partial double-track implemented (refer to section G.02.02 for details). The tests indicated that, with partial double-tracking, a 3tph service frequency throughout the day could be maintained.

However, a 3tph service does not represent a “clock-face” service and, as a result, would have a negative impact on the operational efficiency of Glasgow Central Station.

**In conclusion** – should there be a requirement to introduce additional services (such as may be required under an optimistic passenger growth forecast) full or

partial double tracking of the East Kilbride corridor will be required to maintain operational performance on the line.

## E.03 Evidence supporting Opportunities

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No additional evidence is included for Opportunities 1, 2 and 4 as the text included in Table 3 captures the relevant information.

### E.03.01 Opportunity 3: The scheme can improve connectivity on the East Kilbride corridor and support modal shift

**Opportunity Statement:** Enhancement of the East Kilbride corridor to provide increased peak and interpeak service frequency would reduce the journey times to Glasgow for residents in East Kilbride and provide improved connections to Glasgow city centre.

The published policy (NTS2 and STPR2 Report 1) position places greater emphasis on the need to support modal shift to sustainable modes, including rail.

Enhancement of the East Kilbride corridor to provide improved connectivity (defined as shorter journey times and increased journey opportunities between East Kilbride and central Glasgow through increased all-day service frequencies) would improve the “rail offer” on the corridor.

In order to support the drive to decarbonise the transport network and address the climate emergency, mode shift from car to rail is required. This is supported by the [NTS2 Delivery Plan 2020-2022](#) to reduce car kilometres by 20% by 2030. Improving the attractiveness of rail as a mode choice between East Kilbride and Glasgow, with shorter waiting times and shorter journey times, would represent an improved sustainable alternative to car.

The shift from car to rail will help to improve air quality (along the routes from East Kilbride and the other settlements along the corridor to the city centre, and in the city centre itself), and support the objectives of the Glasgow Low Emission Zone.

#### Evidence for this opportunity

1. As is shown in Figure 1, the East Kilbride corridor serves a potential existing population of more than 100,000 in South Lanarkshire and East Renfrewshire. Census data (Table 4 in **separate document - Appendix A**) indicates that 25%

of commuting journeys from East are made to Glasgow, and a higher proportion of journeys from East Renfrewshire communities along the corridor.

2. The historic mode share for journeys for work from East Kilbride to Glasgow (Table 7 in **separate document - Appendix A**) indicates a mode split of 35% for rail, 40% for car and 24% for bus. Hence there remains scope for modal shift from car to sustainable alternatives.
3. Analysis of journey times to Glasgow for rail, car and bus modes indicates that rail could provide an attractive alternative to car modes supporting modal shift from car which would remove car kilometres from the network and support the NTS2 Delivery Plan. (refer to *Evidence Point 2* below).
4. At the time of drafting the OBC/FBC the existing level of service provision (i.e. train frequencies) was 2tph throughout the day, with additional services during the peaks. This service frequency matched the pre-COVID service frequency on the East Kilbride corridor. Increasing the service frequency will reduce the generalised rail journey time cost which will encourage modal shift which would remove car kilometres from the network and support the NTS2 Delivery Plan (refer to *Evidence Point 3* below).
5. By comparison, similar corridors in the central belt that provide higher frequency services attract a higher proportion of journeys to rail (by population). Modelling of the impact of frequency changes supports that an increased frequency would attract higher patronage (refer to *Evidence Point 4* below).
6. There is planned development in and around East Kilbride (as set out in section 3.3 of **separate document - Appendix A**) which will generate additional demand on the transport network. If an attractive and competitive sustainable alternative to the car is provided by rail (supported by active travel links to the stations and park and ride capacity), then journeys from new developments can be drawn to sustainable modes from “day 1”. This would remove car kilometres from the network and support the NTS2 Delivery Plan.
7. Providing an improved sustainable travel alternative to car will support other recommended interventions under STPR2 such as ‘Intervention 3 – Influencing travel choices’.

There should, however, also be consideration of the surrounding Glasgow South Suburban rail network, which also serves some of the communities along the East Kilbride corridor. There may be a degree of passenger abstraction from (in particular) the Neilston route (via stations at Williamwood and Muirend that have proximity to Clarkston and Giffnock) if the East Kilbride services are enhanced.

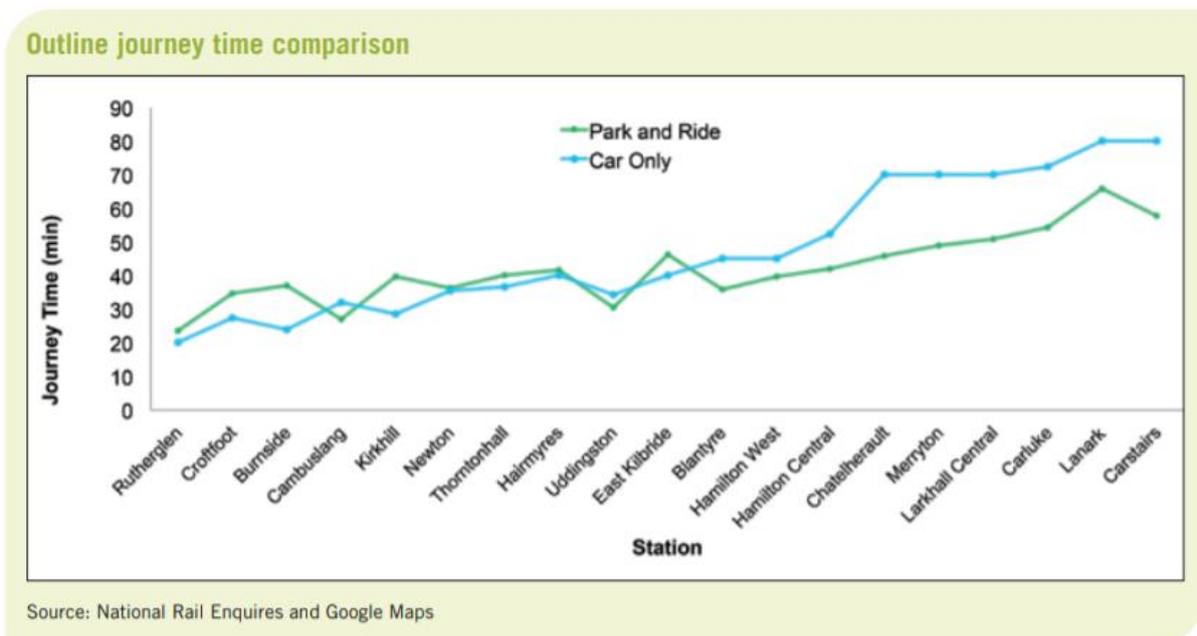
**Evidence Point 2 – Analysis of rail journey times**

NOTE: This section is not intended to represent a full multi-modal analysis of the transport system between East Kilbride and Glasgow city centre. It is intended only to consider the relative current journey times of rail in comparison to other modes.

Rail journey times compared to car

Analysis of rail park and ride journey times compared to car-only journey times, undertaken as part of the [South Lanarkshire Park and Ride Strategy](#) development, is shown in Figure 11 (repeated from earlier in the report). This shows that for Thorntonhall, Hairmyres, and East Kilbride the rail park and ride journey times (which account for the average waiting times based on service frequency) are marginally higher than car-only journeys.

**Figure 11 – Journey time to Glasgow (Park & Ride vs Car)**



Source: [South Lanarkshire Park and Ride Strategy 2018-2027](#)

### *How may this change in the future?*

As is indicated under *Evidence Point 3* below, if the rail service frequency was to be increased, it would reduce the rail park and ride journey times by up to 18% which would reduce rail journey times below the car-only journey times.

If rail park and ride journeys (which can act as a proxy for other sustainable means of accessing the rail network by walking or cycling) are reduced, which shortened waiting times for services (due to higher service frequencies), then rail as a mode choice would be more attractive.

This would represent improved connectivity between East Kilbride and Glasgow, defined as shorter journey times and increased journey opportunities between East Kilbride and central Glasgow through increased all-day service frequencies.

### Rail journey times compared to bus

The bus services that run parallel to the rail network serving East Kilbride and the settlements along the East Kilbride corridor offer high frequencies (with buses every 5-15 minutes). The bus journey times are longer than the rail journey times as shown in Table 6.

**Table 6 – Comparison between bus and rail journey times (minutes)\***

| <b>Station</b> | <b>Bus</b> | <b>Rail</b> |
|----------------|------------|-------------|
| East Kilbride  | 50-60      | 32-35       |
| Clarkston      | 40-55      | 18-19       |
| Thornliebank   | 25-30      | 12-13       |

*\* excludes time to access the bus stops or rail stations, and waiting times at stops*

Bus routes (and associated stops) provide more accessibility to services as stops are more likely to be located within easy walking or cycling distance from homes than rail stations.

### *How may this change in the future?*

The STPR2 Phase 1 recommendations set out, under Intervention 10 (Reallocation of road space for buses), the intention to invest in greater capacity and priority for buses. This reflects the stakeholder feedback, in relation to satisfaction with travel by bus, that dissatisfaction was highest for bus journey times relative to the car (58%)

and for frequency & reliability (53%). Through investment resulting from the recommended interventions from STPR2 the bus journey times between East Kilbride and Glasgow city centre may reduce.

There are currently no bus express services between East Kilbride and central Glasgow. Such services may be introduced as part of the investment arising from STPR2 recommendations. However, due to the length of the route and the need for a minimal number of stops, it is therefore very unlikely that the journey times for buses would reduce by almost 50% (which would be required for buses to represent a lower journey time than existing rail journey times). Anecdotal evidence suggests that previous iterations of “express” services were not commercially viable.

#### Rail journey times compared to cycling

The cycling journey times from East Kilbride to Glasgow are 40-50 minutes (as set out in section 4.8 in **separate document - Appendix A**). If access to the rail station at East Kilbride or Hairmyres is taken into account, the current rail journey time would be similar or higher than cycling. If the rail service frequency was to be increased, it would reduce the (generalised) rail journey times to below that of cycling options.

**Conclusion:** rail journey times are either lower currently, or could be made lower through increased service frequencies, than car, bus and cycling modes. Hence, rail could provide an attractive alternative to car modes supporting modal shift from car which would remove car kilometres from the network and support the NTS2 Delivery Plan.

### **Evidence Point 3 – Service provision**

#### Generalised Journey Time Theory

Convenience is an important factor in mode choice for commuters and other travellers. The more infrequent a public transport service is, the less convenient it is for the passenger. Passengers are required to look up the timetables before travelling and keep to a tight schedule, otherwise the wait time until the next service can be a lengthy one. By contrast, higher service frequencies create what is known

as a ‘turn up and go’ service, which increases convenience for the user and helps to make rail more competitive in attracting trips from other modes.

This is supported by analysis of the Generalised Journey Time (GJT) which is the composite term for station-to-station journey time, train frequency, and interchange time. GJT is one of the prime determinants of rail demand. It differs from Generalised Journey Cost (GJC) in that it excludes factors such as reliability and pricing.

Service interval penalties can be calculated depending on train frequency, as can a penalty for interchanging. Both can be converted into an equivalent time impact, so that, in combination, GJT can be expressed in minutes. As Figure 12 shows, reducing the service interval from 30 minutes (2tph) to 15 minutes (4tph) reduces the service interval penalty from 26 to 15 minutes for full and season ticket users.

For a journey from East Kilbride to Glasgow Central, as Table 7 shows, train frequency accounts for just over 40% of the existing GJT for weekday commuters. Improving journey time and frequency as a result of electrification and a 4 trains per hour service reduces the GJT by 9 minutes, with the frequency uplift accounting for almost 80% of this benefit.

**Figure 12 - PDFH Table B4.10 - Service Interval Penalties**

| Service Interval | Equivalent Time Penalty (by ticket type) |                 |
|------------------|------------------------------------------|-----------------|
|                  | Full & Seasons tickets                   | Reduced tickets |
| 5                | 5                                        | 5               |
| 10               | 10                                       | 10              |
| 15               | 15                                       | 14              |
| 20               | 19                                       | 17              |
| 30               | 26                                       | 21              |
| 40               | 31                                       | 23              |
| 60               | 39                                       | 27              |
| 90               | 51                                       | 33              |
| 120              | 63                                       | 39              |
| 180              | 87                                       | 51              |

**Table 7 – Generalised Journey Time as related to Timetable Frequency**

| Timetable Applicable | Station-to-Station Time | Train Frequency | Total      |
|----------------------|-------------------------|-----------------|------------|
| Baseline timetable   | 32 mins (58%)           | 23 mins (42%)   | 55 mins    |
| 4tph timetable       | 29-30 mins (66%)        | 16 mins (34%)   | 45-46 mins |
| Reduction            | 2-3 mins (22%)          | 7 mins (78%)    | 9-10 mins  |

**Conclusion:** An increase in frequency of services from 2tph (all day) to 4tph (all day) would result in a reduction in GJT of 9-10 minutes, which represents an 18% reduction against the baseline timetable generalised journey time. The percentage impact would be higher for stations closer to Glasgow. Shorter journey times and increased journey opportunities between East Kilbride and central Glasgow (through increased service frequencies) would improve the “rail offer” on the corridor.

**NOTE:** A regular and reliable 4tph service can only be delivered with full double tracking on the East Kilbride corridor.

#### **Evidence Point 4 – Comparison to similar corridors with higher frequencies**

##### Consideration of recent example of service changes

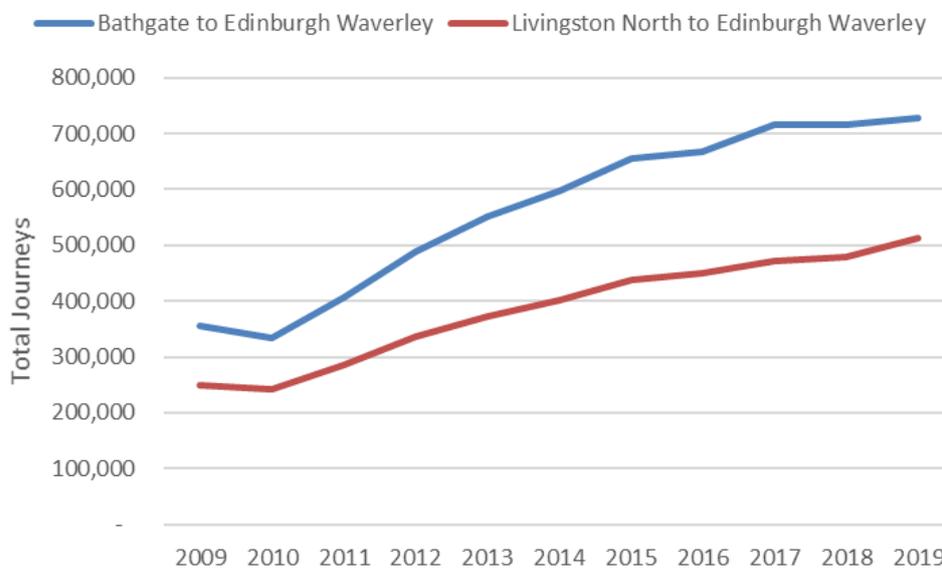
An infrastructure enhancement to facilitate service frequency increases is relatively rare in recent times in Scotland. The best example is the Airdrie to Bathgate project, completed in 2011. It provided an electrified, double-tracked route between Glasgow and Edinburgh, including three new stations. This provided substantially improved connections to Edinburgh from existing stations in West Lothian such as Bathgate and Livingston North, where the hourly frequency of trips to Edinburgh increased from 2 to 4.

The Transport Scotland evaluation report (Airdrie to Bathgate Rail Link Improvement – Stage 2 Evaluation) notes that demand at these stations rose by 67% and 77% respectively at Bathgate and Livingston North for the period 2010/11 – 2018/19, against an overall ScotRail passenger growth of 25% for the same period.

Specifically considering passenger demand to Edinburgh, which is 30 minutes from Bathgate and 25 from Livingston North (comparable to the journey time from East

Kilbride to Glasgow), Figure 13 shows that demand has more than doubled (117% and 111%) at these stations since the service was enhanced. Whilst there are some differences between the two projects (Livingston for example is served by two stations, the markets was likely less mature), there is clear evidence of the impact that a transformative investment in a rail corridor can have on rail passenger demand from major towns into large cities.

**Figure 13 – Change in rail journeys (Airdrie to Bathgate scheme)**



Comparison to other corridors

According to the most recent estimates by National Records of Scotland (Mid-2016 Population Estimates for Settlements and Localities in Scotland), East Kilbride is the 6<sup>th</sup> largest locality in Scotland, and is 2<sup>nd</sup> when cities are removed.

Table 8 compares the levels of provision offered in comparable towns/cities in Scotland, the Office of Road and Rail (ORR) station entry/exit data for each and provides a ratio between rail services per hour and station usage. The average Entries/Exits by population is 36.3.

**Table 8 – Rail use for various Scottish towns and service frequencies\***

| <b>Town / City</b> | <b>Population</b> | <b>Journey Time to City (Rail)</b> | <b>TPH (Average 6am to 8pm)</b> | <b>TPH (AM peak 7am to 9am)</b> | <b>ORR Entries and Exits (18 / 19)</b> | <b>Entries/Exits by population</b> | <b>Rank</b> |
|--------------------|-------------------|------------------------------------|---------------------------------|---------------------------------|----------------------------------------|------------------------------------|-------------|
| Paisley**          | 77,220            | 12 mins                            | 13                              | 16                              | 4,576,210                              | 59.3                               | 2           |
| East Kilbride      | 75,120            | 33 mins                            | 2                               | 3                               | 1,728,800                              | 23.0                               | 7           |
| Livingston         | 57,030            | 20 mins                            | 5                               | 6                               | 1,543,316                              | 27.1                               | 6           |
| Hamilton           | 54,080            | 25 mins                            | 4                               | 4                               | 1,531,028                              | 28.3                               | 5           |
| Dunfermline        | 53,100            | 33 mins                            | 2                               | 3                               | 899,764                                | 16.9                               | 8           |
| Cumbernauld*       | 50,920            | 16 mins                            | 6                               | 8                               | 1,739,938                              | 34.2                               | 3           |
| Coatbridge*        | 43,960            | 18 mins                            | 6                               | 7                               | 1,497,568                              | 34.1                               | 4           |
| Stirling           | 37,610            | 30 mins                            | 3                               | 6                               | 2,771,021                              | 73.7                               | 1           |

\* Towns selected based on largest localities within 35 minutes rail journey of a city centre station

\*\* Represents the combination of local station data

When compared to similar towns in Scotland that are of a similar size and distance from a major city, the pre-COVID service frequency for East Kilbride was joint lowest with Dunfermline, and the entries/exits by population is the second lowest.

East Kilbride had less than 50% of the entries/exits compared to Paisley (with a similarly sized population) and Stirling (at a similar journey time from Glasgow) which have higher service frequencies than East Kilbride.

Evidence from rail demand modelling

Table 16 shows evidence drawn from modelling undertaken to inform the socio-economic case. The results from the MOIRA2 analysis indicate the response in passenger demand against changes to the service frequency. The journey time saving modelled represents the reduction in journey time that would result from decarbonising the East Kilbride corridor. Further reductions may be possible if timetable alterations were made to move calls from East Kilbride services onto Barrhead/ Kilmarnock services.

**Table 9 – MOIRA2 modelling results for traction change and service increases**

| Service option                                                                          | Percentage growth in patronage (%) |
|-----------------------------------------------------------------------------------------|------------------------------------|
| <b>3 minutes journey time saving to/from East Kilbride</b>                              | [REDACTED TEXT]                    |
| <b>3 minutes journey time saving to/from East Kilbride + 4tph to/from East Kilbride</b> | [REDACTED TEXT]                    |

The modelling indicates that an increase in the frequency of services from 2tph to 4tph (all day) would result in an increase in patronage of [REDACTED TEXT].

**Conclusion:** The proportion of rail patronage by population is higher in towns served by higher frequency services, which is supported by rail passenger demand modelling tests. Hence, if the service frequency on the East Kilbride corridor is increased, providing reduced waiting times and more journey opportunities, rail patronage could be expected to increase.

### **E.03.02 Opportunity 4: The scheme can improve accessibility for all to stations on the East Kilbride and Barrhead corridors**

**Opportunity Statement:** The accessibility for all to stations along the East Kilbride and Barrhead corridors could potentially be improved as part of infrastructure changes related to electrification. Measures to improve the accessibility of rail stations can also encourage greater use and mode shift to rail, which will further support Scotland's net-zero ambitions.

In response to the [STPR2 Intervention 12 - Infrastructure to provide access for all at rail stations policy](#), there is an opportunity to revisit the accessibility strategy for the East Kilbride and Barrhead corridors. Whilst full accessibility for all stations on the route was not originally included within the remit of the scheme (SBC), there is an opportunity to review station accessibility alongside the process of design development for the East Kilbride and Barrhead corridors.

#### **The impacts of inaccessible infrastructure**

Inaccessible infrastructure can exclude people from opportunities afforded by access to the rail network. Persons with reduced mobility who may be affected by inaccessible infrastructure can include disabled people, including those with reduced mobility, wheelchair users and those with sensory impairments; elderly people; parents with prams/young children; and pregnant women.

The need to improve equality of access for those with reduced mobility such as those listed previously is reflected in promotion of 'Reducing Inequalities' as a headline priority of the National Transport Strategy (NTS2).

Research undertaken by disability charity Leonard Cheshire ([Get on Board, 2020](#)) has highlighted the impacts that inaccessible transport can have on people with disabilities. Notably, 22% of disabled people reported feelings of isolation because they are unable to participate fully in society due to poor access to transport, while 21% said inaccessible transport had a negative impact on their mental health

The importance of accessible transport to enable people with disabilities to access employment was also highlighted in the research. It is noted that public transport which fails to accommodate a disabled person's needs will have an impact on the

individual (for example delays arriving at their workplace). The anxiety experienced can act as an overall deterrent for people using the railway.

### **The benefits of accessible infrastructure**

STPR2 - Intervention 12 references a recent economic appraisal of six stations that benefitted from accessibility improvements (with benefits as described in a [report](#) on the benefits of improving access) delivered as part of the [UK Government's Access for All Programme](#). Based on calculation of user and nonuser benefits, it showed that each station would be expected to deliver a positive benefit cost ratio (varying between 2.4 to 11.3) with the key benefits being for existing users. The research therefore concluded that at an overall level the Access for All programme was found to benefit users and society more generally, and has a positive business case. In other words, the benefits of improving the accessibility of rail stations by creating step-free access outweigh the costs, even using a fairly narrow business case assessment methodology.

The research further identified a range of wider benefits that are more difficult to capture or monetise in conventional transport economic appraisal. These include:

- Benefits to 'unencumbered' users; accessibility improvements also benefit unencumbered users due to general renewal of station facilities and improved quality of signage, information, lighting, and removal of clutter etc;
- The value of improvements of this nature (i.e. inclusiveness) that the general population (i.e. those who do not use the scheme) place on such interventions, based on their principles and ethics about the role of Government (and by extension Government expenditure) in supporting the development of a more inclusive society; and
- Option values for potential users of the scheme i.e. the value that potential users would derive from the possible future benefits associated with:
  - Anticipation of future need – e.g. people who will have children/get old.
  - Ability to travel if temporarily incapacitated e.g. injured; and
  - The ageing of the population means that in the future more people will likely come into the various disabled categories.

### The opportunity to improve station accessibility

The existing station accessibility along the East Kilbride and Barrhead corridors is shown in the table below.

**Table 10 – Existing station accessibility along the East Kilbride and Barrhead corridor**

| <b>Corridor</b>                        | <b>Stations</b> | <b>Footfall<br/>(2019/20)</b> | <b>Accessibility Status</b>                                                                                                                                                        |
|----------------------------------------|-----------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>East Kilbride to Busby Junction</b> | East Kilbride   | 991,900                       | Step-free access to single platform                                                                                                                                                |
| <b>East Kilbride to Busby Junction</b> | Hairmyres       | 655,570                       | Step-free access to single platform                                                                                                                                                |
| <b>East Kilbride to Busby Junction</b> | Thorntonhall    | 24,034                        | Step-free access to single platform                                                                                                                                                |
| <b>East Kilbride to Busby Junction</b> | Busby           | 175,142                       | Ramped access to both platforms. Connection between platforms via footbridge and 280m route via A727 underpass                                                                     |
| <b>East Kilbride to Busby Junction</b> | Clarkston       | 547,252                       | Ramped access to both platforms. Connection between platforms via footbridge and 365m route via Strawhill Road and Busby Road                                                      |
| <b>East Kilbride to Busby Junction</b> | Giffnock        | 351,084                       | Level access to Glasgow-bound platform via station car park and ramped access to East Kilbride-bound platform. Connection between platforms via footbridge and 750m route via Mary |

| <b>Corridor</b>                               | <b>Stations</b>      | <b>Footfall<br/>(2019/20)</b> | <b>Accessibility Status</b>                                                                            |
|-----------------------------------------------|----------------------|-------------------------------|--------------------------------------------------------------------------------------------------------|
|                                               |                      |                               | Terrace, Braidbar Road and Fenwick Road                                                                |
| <b>East Kilbride to Busby Junction</b>        | Thornliebank         | 279,186                       | Ramped access to both platforms from the B769 with separate pedestrian bridge connecting the two ramps |
| <b>Barrhead to Glasgow via Busby Junction</b> | Barrhead             | 760,512                       | Step-free access to all platforms and an underpass allowing access between platforms                   |
| <b>Barrhead to Glasgow via Busby Junction</b> | Nitshill             | 139,284                       | Step-free access to one platform only                                                                  |
| <b>Barrhead to Glasgow via Busby Junction</b> | Priesthill & Darnley | 170,194                       | Step-free access to all platforms                                                                      |
| <b>Barrhead to Glasgow via Busby Junction</b> | Kennishead           | 94,436                        | Step-free access to one platform only                                                                  |
| <b>Barrhead to Glasgow via Busby Junction</b> | Pollokshaws West     | 188,050                       | Ramped access to on platform only                                                                      |
| <b>Barrhead to Glasgow via Busby Junction</b> | Crossmyloof          | 732,808                       | Step-free access to one platform only                                                                  |

There is a clear opportunity to provide station accessibility improvements along both corridors to the majority of the stations.

## **E.04 Stakeholder Views**

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### **E.04.01 Introduction**

A bespoke stakeholder engagement exercise has not been undertaken as part of the development of the East Kilbride and Barrhead corridors enhancement project.

This is partially because of the nature of the project development prior to the SBC (which was driven by the need to provide passenger capacity in order to meet future demand) which had a single-mode, technical focus on providing future service capacity.

Whilst there have been changes since the SBC (which are described in Part D:), these changes are at a policy level, with the policies underpinned by extensive national consultation.

This section sets out the available data on stakeholder views on the East Kilbride and Barrhead corridors as derived from available survey information, STPR2 stakeholder engagement, and a previous study by SPT.

### **E.04.02 Stakeholder views of problems and opportunities**

ScotRail undertook a survey of rail users in March 2021 which received 1,800 responses. Whilst the survey was primarily focussed on understanding user preferences for access (for construction purposes), there was an opportunity for users to raise general comments.

From these general comments, the following is of relevance to the Strategic Case:

- 32 respondents highlighted the desire for more park and ride car parking spaces with particular reference to East Kilbride and Hairmyres stations; and
- 39 respondents requested additional services / service capacity.

### **General public views – STPR2 Stakeholder Engagement**

Extensive stakeholder engagement was undertaken as part of the development of the Case for Change Report for the Glasgow City Region, as part of Transport Scotland's Strategic Transport Projects Review (STPR2).

The stakeholders were engaged about problems in the region and of greatest relevance to this project are the identified problems around Transport Emissions, Connectivity, Low Uptake of Active Travel, and Capacity Constraints (with mention of highway congestion and concerns about the capacity of rail lines including East Kilbride to Glasgow).

Stakeholders highlighted opportunities with regard to addressing the Climate Emergency (through interventions that shift the focus away from private car use), supporting Economic Activity, and supporting the Night-Time Economy of Glasgow City.

### **General public views – West of Scotland Conurbation Public Transport Study**

The West of Scotland Conurbation Public Transport Study was reported on in 2009. It included information from stakeholder engagement which informed the study.

The stakeholder views reflected problems and issues on the conurbation, and the most relevant issues to the East Kilbride Enhancement project are:

- the need to ensure planned employment and residential areas are linked into the public transport network; and
- tackling localised overcrowding and capacity issues on the railways.

#### Linking Employment and Residential Areas into the Public Transport Network

All local authorities in the SPT region recognised the need to provide sustainable transport links between centres of employment and residential areas. They noted that, if these links can be in place at an early stage and built into the planning process, they will play a far greater role in affecting modal shift away from the car. Crucially, a number of authorities pointed out regeneration areas that currently had no or limited access to public transport, which was acting as a barrier to employment and served to exacerbate existing inequalities.

#### Tackling Overcrowding Issues on the Railways

Consultees highlighted a number of points in the network as being close to, or over capacity, and included the East Kilbride line in this list.

All local authorities in the SPT region recognised the desire to tackle these capacity constraints, if continued modal shift is to be pursued. It was acknowledged that people desire an acceptable alternative to the car and that a rail network operating over capacity will not provide this.

**Conclusion:** The stakeholder views reflect the desire for more sustainable travel, including links to local communities, as well as the desire for additional passenger capacity. This aligns with the Problems and Opportunities identified under section D.05.

# Part F: Scheme Objectives and Options

## F.01 The case for intervention

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The case for intervention responds to the review of the policy fit of the SBC (refer to sections D.02 and 0) and to the revised problems and opportunities (refer to Part D.05).

### F.01.01 The case for decarbonisation of the East Kilbride and Barrhead corridors

The case for decarbonisation of the East Kilbride and Barrhead corridors is as follows:

■ ***Why is intervention required here?***

- The corridors would need to be decarbonised in order to align with national policy to decarbonise the rail network by 2035 (refer to section D.02) and doing so would advance the rail decarbonisation programme.
- A substantial amount of design development has already been undertaken into the required infrastructure changes to support decarbonisation (work on GRIP stage 4 is currently progressing). This means these corridors could be progressed as part of the decarbonisation programme, whilst other parts of the Scottish rail network would require further development before they could be brought forward.
- Intervention here represents the proportionate improvement of the network to enhance services, reduce operational costs and improve environmental impacts.
- Provision of a low emission rail service supports enhancing the attractiveness of rail as a travel choice, encouraging sustainable modal shift.
- Electrification to Barrhead will represent the first phase of decarbonising the line to Kilmarnock and beyond to Carlisle which would allow an acceleration of

OLE installation south of Barrhead after December 2023 as part of longer-term plan to electrify the mainline Glasgow South Western line (GSW).

Electrification of the line to Barrhead could enable hybrid-battery electric trains to be operated between Barrhead and Kilmarnock, once they have been procured, and as an interim stage of this strategic freight route before it is fully electrified as planned. This enables decarbonisation of a further 26 single-track kilometres.

■ ***Why is intervention required now?***

- The existing diesel rolling stock on the East Kilbride and Barrhead corridors will be life expired by 2025 (refer to section B.02.02) and action would need to be taken now in order to prevent the replacement of the expiring rolling stock with diesel vehicles.
- This aligns with [STPR2 Phase 1 - Intervention 14](#) which states that the East Kilbride and Barrhead “...routes have largely been identified for decarbonisation as a first phase due to their alignment with a rolling stock strategy to replace life-expired stock...”.
- The substantial development work already undertaken means that the electrification of these corridors can be progressed in the short term supporting progress in meeting Transport Scotland’s decarbonisation targets.  
[REDACTED TEXT] (excluding land purchased for the relocation of Hairmyres station at [REDACTED TEXT]) has already been spent in the development work for the East Kilbride corridor (with a further [REDACTED TEXT] on the Barrhead corridor), which risks being abortive if the scheme isn’t progressed. Further, if the work was to be paused and then restarted at a future date (principally on RS1), it would incur additional mobilisation costs.

■ ***The case for including the decarbonisation of the Barrhead corridor as part of the East Kilbride enhancement***

- The Barrhead corridor decarbonisation was not included in the SBC. However, following review of the SBC, and identifying the case for decarbonisation of both corridors as set out above, the Barrhead corridor has been included in the scope of the scheme.

- As the Barrhead and East Kilbride lines share the track between Glasgow Central and Busby Junction, it would be efficient in terms of construction effort and minimising disruption to services to decarbonise both corridors as part of a single project.
- The Barrhead and East Kilbride corridors currently share rolling stock which is going to be life expired by 2025. Hence any change in traction type on the East Kilbride corridor has a direct impact on the Barrhead line, and it makes sense to decarbonise both corridors at the same time.

#### **F.01.02 The case to amend the track infrastructure along the East Kilbride corridor**

The case for ***amending the track infrastructure*** along the East Kilbride corridor is caveated by the fact that future passenger demand (post COVID) is projected to potentially increase beyond pre-COVID levels (under the “optimistic” and “positive” growth scenarios) or to remain below pre-COVID levels (under the “pessimistic” and “negative” growth scenarios). Whilst this business case sets out a positive case for intervention, the capacity-driven benefits (and positive value for money) would only be fully realised if future demand increases beyond pre-COVID levels.

If the future passenger growth is assumed to increase above pre-COVID levels then the case for amending tracking infrastructure is as follows:

##### ■ ***Why is intervention required here?***

- The rail service provision along the East Kilbride corridor should align with policy as set out in NTS2, the NTS2 Delivery Plan and the STPR2 Phase 1 recommendations. As such the rail service provision should aspire to:
  - ‘locking in’ the sustainable travel behaviours of individuals and encouraging mode shift in order to support a reduction in car kilometres and therefore wider transport decarbonisation;
  - support the ambition of a more resilient rail network with increase journey reliability and improved service; and
  - improved accessibility to rail services.
- The East Kilbride corridor serves large communities totalling more than 100,000 people, with planned housing and employment development in East

Kilbride. Planned growth in the East Kilbride housing market will result in an increase in population within the catchment area. With a reliable, attractive rail service and station facilities in place, there are opportunities to “lock in” sustainable travel choices for new and neighbouring residents.

- Enhancing track capacity provides a comparable urban centre product to the growing region of East Kilbride, supporting regular, sustainable connectivity to central Glasgow, supporting economic growth and ensuring low emission rail services are as attractive as alternative modes of travel.
- The 2019 SBC made the case that passenger demand at the time (2019) exceeded the peak period passenger capacity, and that additional capacity (in the form of additional services or longer trains) was required. If passenger demand exceeds capacity then rail becomes less accessible and attractive resulting in a shift away from rail, potentially to/back to car.
- The existing single track sections of the East Kilbride corridor constrain the rail operational capacity of the corridor and limit the number of future peak and interpeak services that can be run between East Kilbride and Glasgow Central. This means that additional services cannot be added to the peak or interpeak periods.
- If passenger demand recovers to pre-COVID levels and grows in future, additional services will need to be added in order to meet the service specification set by TS (10 min standing rule). This could not be achieved with single track sections in place.
- Hence either full or partial double tracking of the single track sections along the East Kilbride corridor is required to enable additional services to be run, or platform lengthening should be considered.
- The additional track capacity to provide enhanced services and higher frequencies along the corridor during the peak and interpeak periods will make rail a more attractive alternative to car journeys between East Kilbride and Glasgow Central, thereby reducing car-kilometres and congestion on the highway network and contributing to the NTS2 target of reducing car-kilometres by 20% by 2030.

- *Analysis indicates that up to £5.5 million vehicle-kilometres could be removed from the network following scheme opening due to mode shift from car to rail between East Kilbride and Glasgow.*
  - Investment in double tracking (and the associated extra platform at East Kilbride station) reduces the need for investment in Glasgow Central Station (refer to Table 5) as trains serving the East Kilbride line require less dwell time at the station, freeing up much-needed platform capacity at Glasgow Central high level.
- ***Why is intervention required now?***
- Addressing the rail operational capacity at a future date (i.e. as a separate project to the decarbonisation) would result in additional disruption to passenger services and additional construction costs of up to [REDACTED TEXT] as OLE and/or charging equipment would need to be relocated in order to accommodate the double tracking.
  - Addressing the rail operational capacity at a future date risks “missing out” on the opportunity to “lock in” sustainable travel choices for the aforementioned new residents in the growing East Kilbride area.
  - SLC are currently planning and implementing improved active travel links and bus interchange at East Kilbride and Hairmyres stations. There is the opportunity to improve station accessibility at the same time as track infrastructure and thereby to complement the improved active travel links and bus interchanges being developed by SLC.
  - Addressing the rail operational capacity at a future date risks “missing out” on the opportunity to “lock in” sustainable travel choices for new residents in the growing East Kilbride area. As the [STPR2 Phase 1 Report](#) sets out that “Arguably, COVID-19 provides a once-in-a-lifetime opportunity to ‘re-purpose’ rail as a key contributor to the long-term growth and development of the economy. Investing in rail now will help to avoid a future where “pre-COVID-19” rail users have switched to car and use increasingly congested roads.”

### **F.01.03 The case to improve stations, active travel links and bus interchanges along the East Kilbride and Barrhead corridor**

The case for improving rail stations along the East Kilbride and Barrhead corridor is based around maximising the opportunity for all people to sustainably access the stations, and thereby the rail service, in order to maximise the realised benefits from the decarbonisation of the corridors and the increased service frequencies enabled by track infrastructure improvements.

#### **■ *Why is intervention required here?***

- If the East Kilbride corridor is double tracked then additional infrastructure will be required at Thorntonhall, Hairmyres and East Kilbride stations to facilitate access to the second platform. This presents an opportunity to enhance the accessibility of the stations at the same time (e.g. through the provision of lifts) and an opportunity to enhance the sustainable access to the stations.
- Previous development work has been undertaken to consider improvements to Hairmyres station. The current site capacity constraints alongside a lack of infrastructure for active travel opportunities has meant that access to the rail network is severely constrained, limiting opportunities for modal shift to a more sustainable travel option. Options to address this have been considered and it was identified that relocating the station represents the best option to address the issues identified and to facilitate improved active travel links and bus interchange. There is strong support and financial contributions from Strathclyde Partnership for Transport (SPT) and South Lanarkshire Council (SLC) to support the relocation.
- There is an opportunity to provide improved station accessibility to the majority of stations along both the East Kilbride and Barrhead corridors. Measures to improve the accessibility of rail stations can also encourage greater use and mode shift to rail, which will further support Scotland's net-zero ambitions.
- The existing East Kilbride station is a small local station which requires improved passenger facilities (including a new station building, cycle access, and an improved passenger circulation space) that incorporates placemaking principles to better support the needs of all users of the stations and improve the overall journey experience for rail users.

- There are no ticket gates at the current East Kilbride and Hairmyres stations. Ticket gates are key to the protection of revenue.
- **Why is intervention required now?**
  - Improving the rail stations as part of the enhancement scheme will reduce the degree of disruption to passengers during construction and will allow for cost efficiencies.
  - If the station improvements are carried out at a future point then there is a risk that the benefits of the decarbonisation and increased service frequency may not be maximised.
  - Station accessibility needs to be addressed now in order to align with the prioritised interventions identified by the [STPR2 \(namely Intervention 12\)](#).
  - SLC are planning and implementing improved active travel routes to East Kilbride station and to the new Hairmyres station relocation. The relocated Hairmyres station would link into these, providing enhanced walking and cycling links to the existing and new residents in the development areas in the west of East Kilbride. The upgraded East Kilbride station will link into the improved active travel routes in East Kilbride.

## F.02 Desired Scheme Outcomes

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Based on the case for intervention set out above, the desired outcomes from the enhancement project are as follows:

- **The removal of carbon emissions** due to diesel rolling stock on the East Kilbride corridor in a manner that efficiently supports rolling stock procurement and management;
- **The removal of carbon emissions** due to diesel rolling stock on the Barrhead corridor in a manner that efficiently supports rolling stock procurement and management;
- **Increased rail operational capacity** along the East Kilbride corridor that enables increased rail service frequencies to be provided during the peak and interpeak periods;

- **Reduced rail journey times** between East Kilbride and Glasgow Central and **increased journey opportunities** (through increased service frequencies) to make rail a more attractive alternative to car and encourage modal shift; and
- **Enhanced stations, active travel links and bus interchanges** providing improved accessibility to the rail service and improved sustainable links to local communities, increasing travel choices and improving integration across modes.

## F.03 Revised Scheme Objectives

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### F.03.01 Revision of SBC Transport Planning Objective

At the SBC stage the following Transport Planning Objective (TPO) was set as:

*“Under normal operating conditions passengers will be provided with a reasonable expectation of a seat within 10 minutes of boarding in 2023 and across the subsequent 20 years”.*

Normal operating conditions are defined as a typical weekday with no significant perturbation or other events impacting on passenger demand for services. Boarding conditions are as defined in the ScotRail franchise, across the morning and evening peak two-hours.

As set out in section Part D: the changes to the policy context since the SBC have necessitated that the case for intervention be revisited and following on from that for the TPO to be revised.

The desired outcomes, drawn from the case for intervention, has been referenced in order to generate revised TPOs.

#### **Revised Transport Planning Objectives:**

- TPO1 – Removal of rolling stock carbon emissions along the East Kilbride and Barrhead corridors by 2035 in a manner that supports efficient changes to infrastructure, rolling stock, power supply and service operations.
- TPO2 – Enhancement of rail operational capacity by 2025 to facilitate increased service frequency (4+ trains per hour all day) along the East Kilbride corridor in order to increase rail patronage by 18% and reduce car-kilometres for journeys between East Kilbride and Glasgow city centre by at least 2.4 million by 2030.

- *Achievement of this TPO would support the desired outcome of reduced rail journey times between East Kilbride and Glasgow Central and increased journey opportunities (through increased service frequencies) to make rail a more attractive alternative to car and encourage modal shift.*
  - *The 18% increase is derived from the forecast demand modelling undertaken using MOIRA (see section E.03.01). The modelling indicates that an increase in the frequency of services from 2tph to 4tph (all day) would result in an increase in patronage of 18%.*
  - *The car-kilometres are derived from the “low growth” car diversion projected in the socio-economic case (see section K.04.03)*
- TPO3 – Provision of enhanced travel choices and connectivity to existing and new residents along the East Kilbride and Barrhead corridors by 2025.

Full details on the TPOs (making them SMART) are set out in Table 11.

**Table 11 – Revised Transport Planning Objectives at OBC/FBC**

| <b>TPO (Specific)</b>                                                                                                                                                                                                             | <b>Measurable</b>                                                                                         | <b>Attainable</b>                                                                                                                                             | <b>Relevant</b>                                                                                                                                                                                                        | <b>Timed</b>                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>TPO1 – Removal of rolling stock carbon emissions along the East Kilbride and Barrhead corridors by 2035 in a manner that supports efficient changes to infrastructure, rolling stock, power supply and service operations.</b> | Carbon emissions calculations based on rolling stock miles<br>Train-kms by EMU / BEMU / DMU               | Decarbonisation can be achieved through a number of different track infrastructure and rolling stock combinations in order to remove DMUs from the corridors. | This TPO is aligned with <i>Scotland's Railway Decarbonisation Action Plan's</i> integrated approach to decarbonisation. Existing rolling stock will be life-expired by 2025 and replacement stock should not be DMUs. | Timing is aligned with Scottish Government's target of decarbonising rail passenger services by 2035. |
| <b>TPO2 – Enhancement of rail operational capacity by 2025 to facilitate increased service frequency (4+ trains per hour all day)</b>                                                                                             | Mode share data – to measure mode shift<br>Rail timetables – to measure the increase in service frequency | This objective is attainable as the rail operational capacity enhancement can be achieved through track infrastructure                                        | This TPO is <u>only</u> relevant if passenger demand (post-COVID) rises to above pre-COVID levels.<br>The TPO is linked to the desired outcomes of rail                                                                | Timing is aligned with the Scottish Government target to reduce car-kms by 20% by 2030.               |

| TPO (Specific)                                                                                                                                                                                                  | Measurable                                                                                                                                                                                                                  | Attainable                                                                                                                  | Relevant                                                                                                                                                                                                                                                                                                                  | Timed                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>along the East Kilbride corridor in order to increase rail patronage by 18% and reduce car-kilometres for journeys between East Kilbride and Glasgow city centre by at least 2.4 million by 2030.</b></p> | <p>LENNON ticket data – to measure change in passenger demand<br/>           Rail user surveys - to measure user satisfaction with service frequencies and estimate the number of vehicle-kms removed from the network.</p> | <p>changes. This will facilitate increase service frequencies.</p>                                                          | <p>operational enhancement and reduced rail journey times. These are linked to the problem of peak period passenger demand exceeding capacity, and track infrastructure limiting the introduction of new services. The case for intervention links these together with the current policy context in NTS2 and STPR2.i</p> |                                                                                                                                               |
| <p><b>TPO 3 – Provision of enhanced travel choices and connectivity to existing and new residents along the East Kilbride</b></p>                                                                               | <p>Increase in cycling infrastructure kms.<br/>           Increase in bus interchange points.<br/>           Increase in the number of fully accessible</p>                                                                 | <p>SLC are already committed to implementing active travel link improvements to stations along the corridor, as well as</p> | <p>This TPO is aligned with accessibility standards and with policy in NTS2 and STPR2.</p>                                                                                                                                                                                                                                | <p>In order to maximise the benefits of any rail enhancements these supporting measures need to be in place by the time the scheme opens.</p> |

| TPO (Specific)                                | Measurable                                                                                                                                                                                                              | Attainable                                           | Relevant | Timed |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------|-------|
| <p><b>and Barrhead corridors by 2025.</b></p> | <p>stations along the corridors<br/>           Increase in disabled rail users at more accessible stations.<br/>           User surveys re shift from car or other modes to rail<br/>           Interchange surveys</p> | <p>improvements that facilitate bus interchange.</p> |          |       |

## F.04 Review of Objectives against Policy

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### F.04.01 National Policy – National Transport Strategy (NTS2)

The TPOs align with existing priorities under NTS2 as follows:

- *Reduce inequalities; through fairer access to services, that are easy to use and affordable for all.* Providing improved public transport connections through increased service frequency can support fairer access and reduce inequalities.
- *Takes climate action; helping to deliver the net-zero target, adapting to the effects of climate change and promoting greener, cleaner choices.* Decarbonised corridors will help to deliver the net-zero target. Achieving broader transport decarbonisation, through mode shift resulting from increased service frequency between East Kilbride and Glasgow, will further help to deliver the net-zero target.
- *Helps deliver inclusive economic growth; by getting people and goods where they need to get to through the use of reliable, efficient and high-quality solutions that embrace innovation.* Improving the end-to-end journey times for rail users will support economic growth by providing better access to jobs, education and services, making incremental improvements to future economic growth.
- *Improves our health and wellbeing; ensuring safety, enabling healthy travel choices and making communities great places to live.* Mode shift from car to rail, along with improved active travel access to the stations along the corridor, will support more walking and cycling to the stations, improving health.

**The TPOs are in alignment with the following statements in the [NTS2 Delivery Plan](#):**

- We will advance development of priority electrification projects (benefiting freight and passenger services) and continue exploration of alternative battery and hydrogen powered train traction, as appropriate, across the network.
- We will deliver significantly improved rail services and accessibility to stations between East Kilbride and Glasgow, and Aberdeen to the Central Belt, to meet growing demand, drive more usage, and decarbonise rail passenger and freight services.

## Regional Policy – SPT Regional Transport Strategy 2008-2022 (SPT RTS)

The adopted RTS sets out four key transport outcomes:

- Improved connectivity
- Access for all
- Reduced emissions
- Attractive, seamless, reliable travel

***The TPOs for the project align well with these outcomes – the provision of increased service frequency and/or a decarbonised East Kilbride corridor and improved transport integration will support the achievement of the RTS outcomes. The provision of a decarbonised Barrhead corridor will support the achievement of the RTS outcomes for reduced emissions.***

## Regional Strategy – Strategic Transport Projects Review (STPR2)

The Case for Change Report for the Glasgow City Region (published in February 2020) included the following regional sub-objectives:

- Reduce the consumption of fossil fuels through managing travel demand and enable a shift to more sustainable modes of transport in the Glasgow City Region.
- Increase the share of active travel, particularly for shorter everyday journeys within the region and as part of longer multi-modal end-to-end journeys.
- Increase the share of public transport, with a particular focus on the key corridors in the region that link to the main current and future employment centres.
- Reduce emissions generated by the strategic transport system.
- Increase public transport share by improving the interchange opportunities for active travel and public transport modes to facilitate integrated journeys across the region.
- Reduce the reliance on private car, by improving public transport as a viable alternative for a greater proportion of the region's population, to access hospitals, key employment centres, and further education opportunities (university/colleges) in the region.
- Increase sustainable labour market accessibility to key centres for employment, education and training, particularly focused on those areas not well served by public transport and recognising demand for cross regional movements.
- Increase resilience from disruption on the region's trunk road and rail infrastructure.

***The TPOs for the project align with the regional sub-objectives from STPR2 for the Glasgow City Region. If the TPOs are achieved, the attractiveness of rail as a resilient sustainable mode will be increased (supporting the reduction in reliance on private cars) and, through the decarbonisation of the line, the consumption of fossil fuels and emissions will be reduced.***

#### **Regional Policy – South Lanarkshire Transport Strategy (2013-)**

The SLC Transport Strategy includes policies which seek to support and develop public transport, with the aim of increasing the proportion of journeys that are made by bus and rail (LTP 39). The Strategy includes policies to increase the amount of active travel (LTP 35 and LTP 36) and decrease the rate of traffic growth (LTP 27).

***The TPOs for the project align well with these outcomes – the provision of increased service frequency and journey opportunities on a decarbonised line will support the achievement of the Transport Strategy outcomes.***

# Part G: Review of Scheme Options

## G.01 Revision of Scheme Options from the SBC

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At SBC stage, the options presented included combinations of varying degrees of double tracking of the Busby to East Kilbride section of the route, platform extensions, and electrification. All of these options were developed to address peak period passenger capacity, with electrification also considered.

As is described in Part D: there have been changes since the SBC which have resulted in a revision of the problems and opportunities identified in the OBC/FBC, and in a change to the TPOs.

Hence, the options assessment has been revisited in order to ensure that a full range of traction types and track infrastructure options are considered (expanding upon the options considered in the SBC), in order to identify the options which would best support the achievement of the TPOs.

The optioneering is structured around a consideration of:

- traction types
- infrastructure options
- station enhancements; and
- options which are combinations of these elements.

NOTE: The purpose of this chapter is to present and sift a longlist of options against their ability to achieve the TPOs. Further technical detail on the options is included in the Socio-Economic Case.

## G.02 Overview of Options Considered

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### G.02.01 Traction options

There are four traction types that are being considered across the Scottish network, including the retention of the existing diesel traction:

- Electric trains (Electric Multiple Units - EMU) running on Overhead Line Electrification (OLE)
- Battery-electric hybrid trains (BEMU)
- Hydrogen trains (H2)
- Diesel trains (DMU)

### **Electric trains (EMU)**

Electric trains are powered by Overhead Line Electrification, or OLE. This is the name given to the assembly of masts, gantries, and wires used to electrify railways. The EMU trains contain an electric motor and are connected to the OLE using a pantograph. This is the standard method of electrification in the UK and is how the existing electric rail corridors in Scotland are powered.

The operation of EMUs to East Kilbride and Barrhead would require the electrification of the full extent of both routes from Muirhouse South Junction - a total of approximately 51 single track kilometres.

The surrounding Strathclyde rail network has OLE running EMU trains, with the East Kilbride and Barrhead corridors forming a still-unelectrified “island” with associated operation of DMUs. There is therefore the opportunity (as outlined under Opportunity O1) to align fleet procurement with the replacement of the existing EMU fleet on the surrounding network (subject to this progressing), and to better integrate operation and maintenance of fleets across this region.

### **Battery-electric trains (BEMU)**

Battery-electric hybrid trains also contain an electric motor and have a pantograph to enable them to be powered directly from the OLE like EMUs. However, they also have on-board batteries that enable them to be powered independently of the OLE for extended sections. The batteries can be charged whilst the trains operate under the OLE (opportunity charging) and at stations.

Whilst BEMUs require less capital investment than EMUs due to the reduced quantity of OLE, they are more expensive to operate on an annual basis as the increased complexity of the train, and inclusion of batteries leads to higher lease and maintenance costs. By contrast, BEMUs will reduce the need for maintenance and on-going funding which OLE requires.

Further technical considerations for a BEMU option are:

- Should battery trains be operated on either the East Kilbride and/or Barrhead corridors, these sections of the network would be an 'island' in traction terms, as these will be the only railway section(s) in the Strathclyde network that are not fully electrified and operated by EMUs. The implication of this is that additional resource will be required to operate the BEMU services on these corridors, as the option of being able to interwork between various rail corridors may not be available. It should be noted that new train specification for mass transit units are being designed for a closer alignment between EMUs and BEMUs.
- There is the potential to operate BEMUs south of Barrhead ahead of OLE being put in place on the Kilmarnock branch (which could be tied into a larger order for BEMUs for Fife/Borders which will create cost efficiencies).
- BEMUs would require charging infrastructure and therefore an electrified section (OLE) would be needed from Muirhouse Central Junction to Busby Junction – which is already part of the commitment for mainline electrification of the full GSW route. The OLE would have to be located here to allow overhead opportunity charging for both routes, and also to align with the location of the feeder station from which the power is sourced. To enable sufficient charging time (in addition to opportunity charging), trains would be required to occupy a platform at Glasgow Central during recharging (causing a knock-on impact to the timetable due to the high demand for platforms at Glasgow Central Station). Additional charging infrastructure may be required at Glasgow Central Station.

## Hydrogen trains (H2)

Hydrogen trains represent an emerging technology and have been considered as part of the mix of options for the decarbonisation of the Scotland's railway, including the East Kilbride and Barrhead corridors. Hydrogen technology is currently expensive but does provide flexibility and can be used independently for some types of train service, in conjunction with discontinuous electrification, or as a transition measure prior to full route electrification schemes. Scotland's railway Rolling Stock Delivery Group (RSDG) note that the market will likely have matured and hydrogen traction will be a deliverable option for trains that are introduced towards the end of the 2020's on less densely used sections of the network for which OLE is not suitable.

However, a strategic review has discounted Hydrogen trains as a viable option for these suburban routes. The RSDG has determined that hydrogen trains are not suitable for this route given the service frequency and network usage on Glasgow Central High-level routes. There are also significant risks around the supply chain capability to provide hydrogen in a cost-effective manner within the delivery timeframe of this project and, critically, before life-expiry of the existing diesel fleet.

### **Diesel trains (DMU)**

If the corridors are not decarbonised then the existing Class 156 fleet would need to be replaced with new-build diesel trains. Whilst this would avoid the need for any immediate capital infrastructure investment, it would not meet the decarbonisation objectives of the Scottish Government, and given the target for rail decarbonisation is 2035, the rolling stock would likely be obsolete well before their life expectancy. The wider benefits of electric trains (in terms of environmental benefits, journey times and reliability) would also not be achieved on these corridors.

### **Comparison of traction types**

Speeds/Journey times: EMU and BEMU trains achieve higher speeds than DMUs, particularly on suburban corridors such as East Kilbride and Barrhead, where their better acceleration performance is suited to the stop/start nature of the corridor.

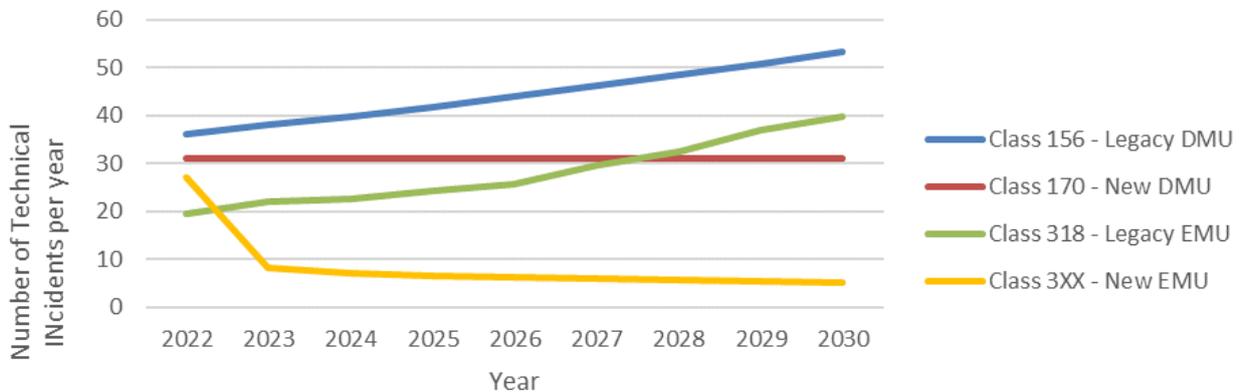
Analysis by Network Rail, reported in the GRIP2 report, indicates that EMU rolling stock would achieve journey time savings of up to 3.5 minutes between East Kilbride and Glasgow Central (calling at all stops), and up to 3.5 minutes between Barrhead and Glasgow Central.

It is currently believed that the performance characteristics of BEMUs will fall somewhere between DMUs and EMUs (based on research) and therefore minor journey time savings could be achieved on some route sections if BEMU is introduced. A full quantification of BEMU journey time impacts requires detailed modelling of the track, traction, and timeabbling which has not been undertaken to date.

Reliability: Figure 14 shows analysis undertaken by ScotRail to assess the reliability of existing (referred to as 'legacy') and new DMU and EMU rolling stock fleets between 2022 and 2030. It illustrates that new EMU rolling stock will be significantly more reliable beyond 2023 than the other traction types, with the new EMU fleet projected to have 70%+ fewer

incidents than a new DMU fleet. It is assumed that a new BEMU would have broadly similar performance characteristics as an EMU train.

**Figure 14 – Reliability of different traction types**



Operational costs: The Operational costs of the varying rolling stock types are discussed in more detail in the Economic Case, with a supporting paper included in **separate document - Appendix D**. In summary, EMU trains require a lower cost to lease and to operate than DMU trains. BEMUs are more expensive than EMUs to operate, but are less expensive than DMUs.

The RSDG has constructed a comparator model for new build rolling stock based on actual costs of the Hitachi class 385 fleet introduced in 2018 and recent market testing undertaken by the RSDG in late 2020.

A comparison of the total annual costs (based on the pre-COVID service patterns) between the different traction types is included in the table below, which indicates that EMU represents a lower capital and annual operational cost compared to BEMU, Hydrogen and modern DMU rolling stock alternatives.

Impact on passenger demand: The Rail Services Decarbonisation Action Plan notes that “newly electrified passenger railway lines often show what is known as a ‘sparks effect’ - a term coined to describe experience in Britain which noted that if a line was electrified patronage increased. The reasons for the increase are due to newly electrified lines often utilising modern rolling stock which is smoother, quieter and faster with the latter altering the relative accessibility of locations to work, leisure and retail destinations”. This would be applicable to all of the new rolling stock options with the exception of diesel traction.

Strategic network impacts: Electrification to Barrhead will enable interworking of BEMUs operating to Kilmarnock with no further infrastructure cost, improving customer experience and removing more diesel trains from service earlier in/out of Glasgow Central. Limited number of diesels would still have to operate for stations south of Kilmarnock to Dumfries/Carlisle. This approach could also allow an acceleration of OLE installation south of Barrhead after December 2023 as part of longer-term plan to electrify the mainline Glasgow South Western line (GSW).

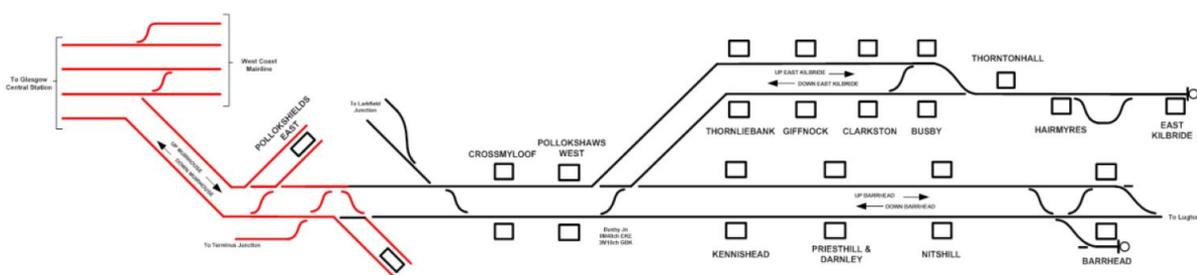
### G.02.02 Track infrastructure options

*(This section is deliberately repeated from section 0 to support a clear understanding of the options under consideration)*

The track infrastructure improvements considered on the East Kilbride corridor were developed as part of the SBC, which considered the relationship between track infrastructure and the ability to introduce new services onto the East Kilbride line. No track infrastructure options have been considered for the Barrhead corridor as it is already a double-tracked line.

The identified requirement for track infrastructure improvements along the East Kilbride line result from the impact of single track options on service capacity, as outlined in section E.02.01 and E.02.02. Figure 15 (repeated from section B.02.02) shows the lines serving the East Kilbride and Barrhead corridors including the single track sections. The East Kilbride and Barrhead corridors are shared along a double track section between Glasgow Central and Busby junction, beyond which the lines split. The route is electrified between Glasgow Central and Muirhouse Central Junction at Pollokshields.

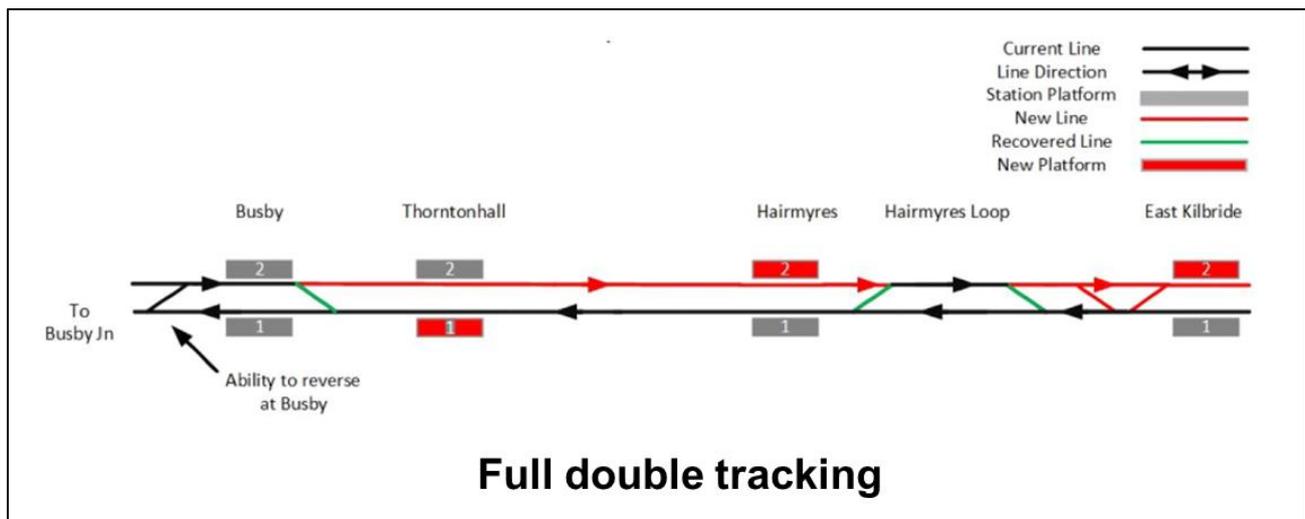
**Figure 15 – Overview of the Glasgow Central-East Kilbride-Barrhead Corridors**



## Full Double Tracking

Fully double tracking the single line section (~4miles) between Busby and East Kilbride stations removes the primary restriction of capacity on the line and would enable 4 trains per hour to be operated throughout the day (in both directions) without losing operational performance (refer to section E.02.02 and **separate document - Appendix C**). Figure 16 provides an overview of this option.

**Figure 16 – Overview of full double tracking**



The single line section also represents a key constraint for timetabling of the rest of the inter-connected south suburban network and Glasgow Central. Fully removing this constraint through double tracking allows for flexibility around the timing of East Kilbride services in both directions with a knock-on positive impact to the design of the timetable for other interconnected routes and, ultimately, more efficient use of Glasgow Central Station. Double tracking gives flexibility to evolve from a DMU-based timetable to an EMU-based timetable.

Sections of single track impose a performance risk. Any late running in one direction will cause a consequential delay to trains operating in the other direction. If an increased service frequency were to be introduced, it is likely that (once they occur) even small delays will perpetually transfer from one train to the next and right time running will only be possible through cancellations.

Full double tracking would enable the possibility of more than 4 trains per hour to be operated to East Kilbride into the longer-term future, subject to constraints on the approaches to and at Glasgow Central Station.

As part of the double tracking, new platforms would need to be constructed. At East Kilbride this will have level step free access, at Thorntonhall and Hairmyres there will be associated lifts and overbridges to make these altered stations fully accessible.

**NOTE:** Partial double tracking was considered in the SBC, wherein only the section between Hairmyres and East Kilbride is double tracked. This has not been progressed in the OBC/FBC as whilst this represents a lower cost option that could facilitate limited additional peak-time services, operational performance analysis indicates it would represent a loss of operational performance (see **separate document - Appendix C**).

### **No Double Tracking**

This option would leave the current single track sections unaltered.

This infrastructure option would not allow for any additional services during the peaks or any all-day frequency changes.

### **Platform Extensions**

Platform extensions are a relatively low-cost (from a capital perspective) option to provide additional seating capacity on existing services. Platforms would be lengthened to accommodate 8-carriage trains (6-carriages currently operate), allowing longer trains to be run.

Extending platforms would incur additional operational costs (leasing additional carriages, per mile costs) and the benefits would be limited to a reduction in any on-train crowding.

This could also potentially be managed by on-train equipment enabling longer trains to be used which only open the doors which are adjacent to the platform (Selective Door Opening).

### **Potential combinations considered**

For the longlist of options, all the potential combinations of traction type and infrastructure options were considered (with platform extensions considered as a potential “add on” to the other infrastructure types).

### **G.02.03 Station improvements - General**

#### **Introduction**

There is an opportunity as part of electrification and as part of any double tracking (full or partial) to provide improved station accessibility with associated lifts and overbridges to make both platforms at the affected stations accessible to all users.

Further design development work needs to be undertaken to identify the appropriate improvements to include, taking anticipated patronage, costs and complexity to deliver into consideration.

Station improvements at East Kilbride station are set out below. Accessibility improvements at Hairmyres station will be addressed through the proposed station relocation.

#### **Benefits of station accessibility improvements**

Improved access for disabled users would reduce the detours required to access both platforms at the stations and the provision of lifts is supported by local accessibility groups (who prefer lifts to ramps).

Improved access for all users at stations along the East Kilbride and Barrhead corridor would reduce barriers to the use of rail services and enable more users to use rail for their journeys to central Glasgow. Making these additional stations accessible ties in with the published [STPR2 Phase 1 Recommendations under Intervention 12](#).

### **G.02.04 Station improvements at East Kilbride**

#### **Overview**

The scheme includes for the upgrading of the existing East Kilbride station to create an enhanced passenger facility. If double tracking is implemented, access to the platforms would be facilitated at the station buffer ends, i.e. there is not a requirement for lifts.

The upgrade would introduce enhanced passenger facilities including a new station building, cycle access, and an improved passenger circulation space.

This design process provides an opportunity to incorporate placemaking principles into the development of the revised station site, to better support the needs of all users of the stations and improve the overall quality of life for all people interacting with the station.

Architecturally rendered 3-dimensional visualisations of a potential design for the new East Kilbride station building are shown in Figure 17.

### Cost estimates

The costs for the station upgrade are estimated at between [REDACTED TEXT] (for a 100m<sup>2</sup> building) and [REDACTED TEXT] (for a 361m<sup>2</sup> building).

### Links to Active Travel Improvements

SLC have progressed the development and design of an improved active network throughout East Kilbride, which includes improvements to routes to East Kilbride station. This will encourage more users to access the East Kilbride station via better Active Travel methods to be served by the upgraded station amenity. An increase in active travel to the stations will result in wider social and economic benefits through healthier lifestyle choices, reducing strain on health services.

**Figure 17 – Visualisation of the new East Kilbride station**



Evidence of the current and planned infrastructure to support active travel, electric vehicle, and bus interchange is detailed in **separate document - Appendix E**, which includes:

- 1) A plan showing planned active travel infrastructure investment across East Kilbride, which highlights new links to East Kilbride station and an active travel corridor linking the relocated Hairmyres station to the East Kilbride Community Growth Area.
- 2) The [East Kilbride Active Travel Network Plan](#)
- 3) Detailed plans for active travel infrastructure around East Kilbride station.

SLC highlight their recognition of the requirement to improve active travel links to the East Kilbride and (proposed relocated) Hairmyres stations, and set out the following in their letter of support (**separate document - Appendix F**):

*“The Council has developed a number of strategies over recent years to support active travel as well as public transport. These include the Local Transport Strategy as well as our Cycling Strategy. Policies and actions within these documents have been discussed with partners and both Strathclyde Partnership for Transport and Sustrans have already supported the Council to bring forward proposals.*

*The first of these was the production of an Active Travel Study for the town of East Kilbride and this was concluded in 2019. The study involved consultation with residents and various stakeholders to identify the actual and perceived barriers to cycling and walking for everyday journeys in and around the town with a view to encourage modal shift and establish East Kilbride as an Active Friendly Town.*

*The consultation identified that new cycling infrastructure was required to serve a variety of destinations including to allow public transport interchange at East Kilbride and Hairmyres Railway Stations. Early priorities were also agreed and both stations were included in this. Finally, the study concluded that supporting the needs of all category of user was necessary and consideration of neighbourhood permeability and multimodality to ensure a network can be provided with particular attention to residential areas towards public transport connections.*

*Since then we have liaised with Sustrans and over recent months we have developed design options for consideration. We have formally submitted a funding bid to construct a new cycle network for the town which includes routes connecting to both the East Kilbride and Hairmyres Rail Stations. In order to provide these details, the Chair of the Council’s Community and Enterprise Resources Committee and a representative from Roads and Transportation Services presented the initial design concepts and network details to*

*Sustrans' Steering Group. This demonstrated that the Council is already fully engaged in developing active travel facilities to support the Rail Enhancement Project.*

*In addition to Park and Ride provision at Hairmyres, I can also advise that we have been liaising with Strathclyde Partnership for Transport with respect to bus and rail interchange options. This has resulted in the initial concept designs incorporating bus stop layby and shelters/potential covered walkways. Whilst discussions are at this early stage we will be engaging with the local bus operators to seek their views on the current conceptual layouts. This will also be undertaken at East Kilbride Rail Station in due course."*

The planned active travel improvements by SLC will be complemented by the improvements to the East Kilbride station as part of this project. These measures will improve the sustainable links between the rail station and the local community and will make rail a more attractive mode of choice as well as reduce longer distance car usage to/from Glasgow.

## **G.03 The Relocation of Hairmyres Station**

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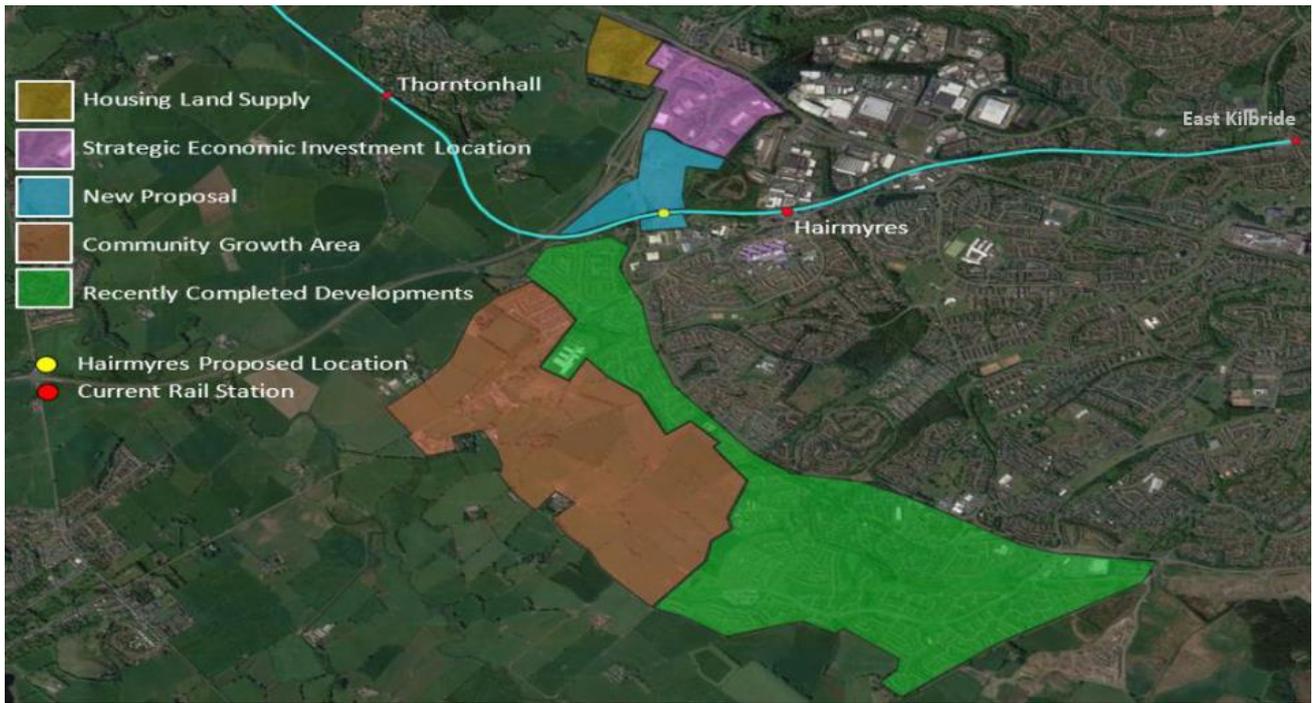
### **G.03.01 Introduction**

The 2019 SBC includes mention of the possible relocation of Hairmyres station but does not include any further detail. Since the SBC, Transport Scotland has progressed a detailed assessment of the existing Hairmyres station and potential options for the relocation of Hairmyres station in collaboration with South Lanarkshire Council.

Figure 18 shows a map with satellite imagery on which the East Kilbride line and the existing Thorntonhall and Hairmyres rail stations, and the proposed Hairmyres station location, are shown. The new Hairmyres station site will be located 600m to the west of the existing station and will facilitate improved walking and cycling access, bus interchange and increased capacity for rail park and ride.

The Strategic Case for the relocation of the station was made in 2020 and was approved by Transport Scotland's Investment Decision Meeting (IDM). Refer to **separate document - Appendix G** for the associated IDM paper and Strategic Assessment Report (STAG-compliant pre-appraisal).

**Figure 18 – Location of the relocated Hairmyres Station**



**G.03.02 Rationale for inclusion of the station relocation in this OBC/FBC**

The station relocation will facilitate improved sustainable access to the rail network from existing and new development areas in the west of East Kilbride. Hence the relocation is complementary to the East Kilbride and Barrhead Enhancement and would increase the benefits realised from the scheme.

The station relocation aligns with **TPO3** and will provide wider travel choices to existing and new residents in the western part of East Kilbride and the East Kilbride Community Growth Area through improved station accessibility, improved active travel links between local communities and stations, and new bus interchange opportunities.

**The funding gap of [REDACTED TEXT] for the station relocation is included in the Financial Case for this business case.**

The rest of this section briefly summarises key elements from **separate document - Appendix G.**

Further relevant points:

- The case for the station relocation was made in the context of the East Kilbride Enhancement project which (at the time of developing the associated IDM paper) had an identified preferred option which was to fully double track and electrify the corridor. It has

been confirmed since that the station relocation is intended regardless of whether the East Kilbride corridor double tracked or not.

- The proposed investment in a new interchange at Hairmyres as an integrated project, given that the facility is intended to integrate active travel, bus and rail connections alongside a new proportionately sized park and ride facility. The new site (located 600 metres towards Glasgow) will also be closer to recent, current and proposed housing developments on the west, south and north of the current station with main road access.
- The estimated overall cost of the transport hub project and land acquisition is around [REDACTED TEXT]. The specific cost for moving the station has been identified at c. ([REDACTED TEXT]) between constructing a fully accessible two platform station at the existing site and the new location. This includes a new large passenger waiting building which would be needed at either location given the poor current facility. Network Rail identified a project saving of around £3.65m by acquiring the land for site compound and been able to deliver the project quicker therefore the rail station relocation is cost neutral.
- The station interchange facility would be constructed and operated by South Lanarkshire Council which will contribute [REDACTED TEXT] (to part fund the park and ride car park, cycle facilities, electric vehicle charging points and active travel infrastructure), plus it has offered the value of its existing car park (estimate [REDACTED TEXT]). SPT will contribute [REDACTED TEXT] to contribute to the delivery of the bus interchange and strategic park and ride.
- There is a resultant funding gap of [REDACTED TEXT].
- In late 2020 IDM approved the purchase of land for the relocated station (the costs of which are excluded from the capital costs reflected in this OBC/FBC).

### **G.03.03 Reasons for relocating Hairmyres station**

The Strategic Assessment Report (included in **separate document - Appendix G2**) sets out the reasons for considering the relocation of the Hairmyres station. It includes the following:

- The current site capacity constraints alongside a lack of infrastructure for active travel opportunities has meant that access to the rail network is severely constrained, limiting opportunities for modal shift to a more sustainable travel option.

- Access to the railway is constraining rail growth, with evidence suggesting that strong historic growth in passenger numbers flattened pre-COVID due to a lack of convenient access for passengers.
- The station parking (to facilitate rail Park and Ride) at Hairmyres station is already operating well above capacity with no available spaces observed at site visits before the end of the morning peak (pre-COVID). Evidence from stakeholders suggests that rail passengers are parking in residential streets, leading to potential traffic disruption and reducing the attractiveness of Active Travel options to/from the station.
  - SLC undertook a consultation as part of a 2019 study into a potential residential parking permit scheme around Hairmyres station. This consultation, along with spot surveys undertaken by the Council, identified that the demand for rail park and ride far exceeded the available rail parking at the station and, in one survey, 200 vehicles parked in residential streets were identified as being linked to rail commuters.
- The existing station car park is close to the local hospital. There is evidence of rail passengers parking in the hospital car park, reducing capacity for patients and NHS staff. The hospital employs over 2,500 staff and there are 600 parking spaces for patients and staff. Parking is already limited without including 'rail' demand and this congestion is impacting on bus services using the hospital grounds.
- Accessibility for vulnerable passengers and passengers with reduced mobility are limited.

The Strategic Assessment Report concludes that:

- The existing station and station parking are not suitable for current levels of demand and expansion opportunities at the site are limited. The immediate station environs consist of substandard walking routes, pavements and access through a small crowded car park area. It is not possible to deliver the longer-term transport policy objectives of sustainable modal shift and improved access for all through maintenance and development of the current station site.
- The proposed new housing developments in the area, which are closer to the new station's location, are likely to further exacerbate this issue.

#### **G.03.04 Analysis of the problems and development of options**

From the analysis of the problems and opportunities the Strategic Assessment Report (**separate document - Appendix G2**) identifies that longer term decarbonisation

commitments, active travel opportunities and delivery of improved passenger benefits can only be generated through targeted infrastructure improvements – particularly where such infrastructure improvements are themselves aimed squarely at reducing longer-distance car traffic on routes to Glasgow, and increasing the public use of sustainable modes, including walking & cycling routes to access the station, as well as the likely increased use of the railway in the longer term.

The Strategic Assessment Report identifies the following TPOs for the Hairmyres station relocation:

1. To provide sustainable solutions to the current and future Park and Ride demand at Hairmyres station and the wider East Kilbride area.
2. To increase travel choices and improve integration across modes to encourage modal shift.

The Strategic Assessment Report considers two options to address the problems and opportunities and achieve the objectives – developing the current site and relocating the station. The appraisal of these options against the TPOs and STAG criteria concludes that relocating the station was the best performing option.

Transport Scotland and SLC have since further developed proposals to relocate Hairmyres station approximately 600m to the west of the existing site. A draft layout for the relocated Hairmyres station car park, showing the provision of electric vehicle charging facilities, bus stops, and cycle parking, is included under **separate document - Appendix E4**.

#### **G.03.05 The impact of station relocation on active travel access**

The Strategic Assessment Report notes under risks and uncertainties that there is a concern that moving the station location could lead to some of the current 36% of people who walk or cycle to Hairmyres station now choosing to use their car to access the park and ride parking. However, given the station is moving closer to new housing developments, this may encourage greater walking, wheeling and cycling from these locations.

However, plans for the station at the new location include improved active travel accessibility with the station being designed with active travel improvements and walkability standards a core requirement of the design. This design, coupled with the good cycle and walking routes already present within the town and the on-going investment in more cycle

routes by Sustrans, should enable a viable access option for those passengers currently walking or cycling to the station.

Furthermore, the development of a new transport hub is expected to provide a focused integrated sustainable transport model that will improve a modal shift towards active travel and away from the reliance on short distance public road use.

The Strategic Assessment Report views this risk as minimal for the reasons stated above.

### **G.03.06 Benefits of relocating the station**

The Strategic Assessment Report notes the following benefits from relocating the station:

- **Aligning with the Scottish Government's decarbonisation agenda.** Current capacity constraints on the rail network limits opportunities to migrate trips from road to rail. Provision of a new transport hub with improved accessibility enables modal shift to a more sustainable mode of transport.
- **Aligning with local transport strategy and providing wider active travel benefits.** SLC has committed [REDACTED TEXT] to fund car park design & construction and new road access. SPT has also committed [REDACTED TEXT] for the car park as well as creation of a bus interchange. Improved active travel provision will also be progressed as a priority at Hairmyres station, complementing plans for active travel provision at East Kilbride station.
- **Provision of additional passenger benefits.** Provision of a new fully accessible station with excellent park and ride and active travel provision will enhance attractiveness of the railway and improve experience for passengers across their end-to-end journey.
- **Reduce the barriers to entry to the transport system, improving social and economic benefit.** Removing the current access constraints provides additional opportunities for the local community to access jobs in Glasgow and along the East Kilbride corridor. The relocated station enables better access to the University Hospital Hairmyres by reducing pressure on the hospital parking from rail users.
- **Relocation removes a constraint to realisation of the benefits of the railway enhancement.**
- **Resolving the current parking situation at Hairmyres hospital and surrounding area.**

- **Construction efficiencies.** Construction of a new Hairmyres station, as an early phase of the overall enhancement programme, would significantly reduce passenger disruption caused by double tracking, electrification and station enhancement works on the section of route between Hairmyres and East Kilbride stations (should these be progressed).

### **G.03.07 Stakeholder views on the relocation of Hairmyres Station**

As is described above the development of a relocated station at Hairmyres has been under development for some time prior to this OBC/FBC. The section below describes the stakeholder views on the proposed relocation.

#### **South Lanarkshire Council (SLC)**

There is strong support for the relocation of Hairmyres station from stakeholders in the form of South Lanarkshire Council (SLC), East Renfrewshire Council, and Strathclyde Regional Partnership for Transport (SPT). Engagement with SLC and SPT during the development of the OBC/FBC has confirmed this support, with SLC highlighting the following:

- SLC has been receiving complaints for almost a decade from residents around Hairmyres station and from the NHS (linked to University Hospital Hairmyres) about the impacts of rail parking on residential streets and the hospital parking.
- SLC undertook a consultation as part of a 2019 study into a potential residential parking permit scheme around Hairmyres station. This consultation, along with spot surveys undertaken by the Council, identified that the demand for rail park and ride far exceeded the available rail parking at the station and, in one survey, 200 vehicles parked in residential streets were identified as being linked to rail commuters.

Letters of support from South Lanarkshire Council and SPT for the relocation of Hairmyres station are included in **separate document - Appendix F**.

#### **Strathclyde Partnership for Transport (SPT)**

SPT states that it recognises the strategic significance of the relocation of Hairmyres station and the benefits to be gained in developing Hairmyres rail station into a modern, integrated transport hub, alongside the opportunity to increase and improve on strategic park and ride provision in the west of Scotland, and to deliver an exemplar for the integration between bus, rail and active travel.

As part of the development of their new Regional Transport Strategy, SPT have been collecting the views of the public on the transport problems and opportunities in the Strathclyde area. These were collected in 2020 and will be reported upon in 2021. This evidence could be included in the Full Business Case for the East Kilbride corridor enhancements.

### **National Health Service (in relation to Hairmyres relocation)**

The University Hospital Hairmyres (NHS Lanarkshire) is located in close proximity to the existing Hairmyres rail station. The NHS has noted the following in their letter of support for the relocation of Hairmyres station (**separate document - Appendix F**): *“longstanding problems caused by indiscriminate parking by rail users within the hospital grounds. As well as compromising parking opportunity for patients, visitors and hospital staff these issues also cause significant difficulties for bus operators seeking to provide access to the hospital. Local bus services are very important as they serve more of the NHS patient base across Lanarkshire and this enables them to travel to/from the hospital. Access for these bus services has become increasingly difficult as the pressure on capacity from commuter parking increases.”*

The NHS state in their letter of support that it is supportive of the relocation of the station *“to a new and suitably sized site provides a fantastic opportunity to improve active travel and will facilitate better integration of bus and rail services while of course providing appropriate parking capacity for rail users and relieving the hospital campus of current difficulties”*.

## **G.04 Commentary on Interdependency with Glasgow Central Station**

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### **G.04.01 Stabling Capacity at Glasgow Central Station**

At present trains serving the East Kilbride route need to wait at Glasgow Central Station. To accommodate the additional rolling stock associated with the increased service frequency investment in Glasgow Central Station will be required. This is likely to be very costly due to the urban location of the station and the impacts on other lines/services.

Historically, more customers have travelled in the peaks on East Kilbride and Barrhead services than off peak. This required more and longer trains to be operated in the peaks compared to off peak, with 6 carriages in the peaks and 2-4 carriages in the off-peak periods. Capacity at Glasgow Central Station is constrained and the operator cannot leave

spare carriages there in the off-peak periods. The availability of spare paths to run surplus carriages to and from depots in the shoulder peak is limited.

The operational ideal is a 10-minute gap between a suburban service arriving at a terminus station and then departing. This allows time for customers to alight and new ones to board, and the train crew to change over if required. It also provides a reasonable performance buffer, so that if the arriving train is a few minutes late the next departure can still be on time.

This situation is made more complex on the East Kilbride route because the terminus station (East Kilbride) only has a single platform. An arriving train must therefore depart and get to the crossing point (just before Hairmyres Station) before the next train arrives. This means services have to be timetabled with East Kilbride as a constraint – arrivals are at xx:20 and xx:49 with departures at xx:28 and xx:57. Whilst a 9-minute turnaround is optimal, it means that arrivals at Glasgow Central Station are x:29 and xx:57 and departures at xx:47 and xx:17.

This results in a layover of approximately 20 minutes at Glasgow Central Station which is not efficient – the trains occupy platforms and (due to the volume of trains using the station) are more likely to be impacted by delays from other services during this layover time. This layover will be longer if the East Kilbride line is electrified as the electric vehicles can travel more quickly and reliably.

#### **G.04.02 Interdependency with Glasgow Central**

From an infrastructure perspective, any improvements to the rail operational capacity on East Kilbride line (e.g. through double tracking and/or an extra platform at East Kilbride station) would reduce the need for investment in Glasgow Central Station. This is because it would allow for trains to wait in East Kilbride (prior to their timetabled service runs), thereby increasing the platform capacity at Glasgow Central.

It would also mean that, following the morning peak, the operator could split a 6 or 8 carriage train and leave 3 or 4 carriages at the East Kilbride station until the evening peak when they would re-enter service. This would reduce the costs (and associated emissions) of running carriages along the line.

Double tracking of the East Kilbride line would allow for the operational isolation of platforms at Glasgow Central Station for East Kilbride services (as trains no longer need to

wait there) which would minimise the reactionary delay during incidents and support the efficient management of Glasgow Central Station.

Introducing a twin platform station at East Kilbride would enable the timetable to be designed around minimising time in Glasgow Central Station, allowing services to operate from a single platform as trains don't need to lay over at Glasgow Central Station. This would be more convenient for passengers, would free up valuable capacity in Glasgow Central Station, and would improve performance because the trains are less likely to be impacted by delays from other routes (and will also result in fewer delays to other routes).

## G.05 Longlist of Options and Sifting – Barrhead Corridor

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Only traction type changes are considered for the Barrhead corridor - the matrix of options that were considered is set out in the table below. The route sections included refer to the section shared with the East Kilbride corridor (Muirhouse Central Junction to Busby Junction) and the section not shared with the East Kilbride corridor (Busby Junction to Barrhead).

**Table 12: Potential Options (long-list) – Barrhead Corridor**

| Traction | Muirhouse Central Junction to Barrhead |
|----------|----------------------------------------|
| EMU      | YES                                    |
| BEMU     | YES                                    |
| H2       | YES                                    |
| DMU      | YES                                    |

### G.05.01 Sifting of Longlist of Options – Barrhead Corridor

The longlist of options was initially reviewed on a qualitative basis in order to sift out options. The options and combinations sifted out, with the accompanying rationale, are set out below.

**Table 13: Options sifted out – Barrhead Corridor**

| <b>Option/Combination sifted out</b> | <b>Rationale for sifting out</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>H2</b>                            | <p>As is highlighted under section G.02.01, Scotland’s Railway Rolling Stock Delivery Group (RSDG) has determined that hydrogen trains are not suitable for this route given the service frequency and network usage on Glasgow Central high-level routes.</p> <p>Further, hydrogen rolling stock would be more expensive to lease and operate than BEMU or EMU alternatives.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>DMU</b>                           | <p>Replacing the existing fleet with non-decarbonised rolling stock would not align with the Rail Services Decarbonisation Action Plan and policy outlined in NTS2 and the STPR2 Phase 1 recommendations.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>BEMU</b>                          | <p><u>Rationale:</u> the Barrhead corridor is part of the strategic rail network (i.e. it is not a branch line) connecting onwards to Kilmarnock and Carlisle. This corridor also serves freight services, as well as being a key diversionary route for cross-border passenger services, and therefore the longer-term benefits of electrification of this full route section to Barrhead are much wider than only the decarbonisation of Barrhead services.</p> <p>The onwards strategic route south must be decarbonised by 2035 at the latest to meet Government policy commitments, and full electrification (i.e. OLE) on the Barrhead corridor would form the first stage of the longer-term electrification of the route to Kilmarnock and beyond, enabling the decarbonisation of freight as well as passenger services (including running BEMUs to Kilmarnock in the short term).</p> <p>Hence a BEMU option on the Barrhead corridor would not future-proof this corridor for onward decarbonisation of the line to Kilmarnock and beyond for freight and passenger services.</p> |

The result of the sifting exercise is a single option for the Barrhead Corridor, which is the full electrification (i.e. OLE with EMU rolling stock).

## G.06 Longlist of options and sifting – East Kilbride Corridor

In theory any traction type can be paired with any track option. Platform extensions are also possible for any option. All options include the station improvements at East Kilbride and the relocation of Hairmyres station. As a result, there is a matrix of options available that can be considered as set out below.

**Table 14: Potential Options (long-list) – East Kilbride corridor**

| Traction/Track Infrastructure | Full Double Tracking | No Double Tracking |
|-------------------------------|----------------------|--------------------|
| EMU                           | YES                  | YES                |
| BEMU                          | YES                  | YES                |
| H2                            | YES                  | YES                |
| DMU                           | YES                  | YES                |

There are 8 options resulting from the combinations of traction and double tracking.

### Sifting of Longlist of Options – East Kilbride Corridor

The longlist of options was initially reviewed on a qualitative basis in order to sift out options. The options and combinations sifted out, with the accompanying rationale, are set out below.

**Table 15: Options sifted out – East Kilbride Corridor**

| Option/Combination sifted out | Rationale for sifting out                                                                                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| H2                            | As highlighted under section G.02.01, Scotland's Railway Rolling Stock Delivery Group (RSDG) has determined that hydrogen trains are not suitable for this route given the service |

| <b>Option/Combination sifted out</b> | <b>Rationale for sifting out</b>                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | <p>frequency and network usage on Glasgow Central high-level routes.</p> <p>Further, hydrogen rolling stock would be more expensive to lease and operate than BEMU or EMU alternatives.</p>                                                                                                                                                                                                                                        |
| <b>DMU</b>                           | <p>Replacing the existing fleet with non-decarbonised rolling stock would not align with the Rail Services Decarbonisation Action Plan and policy outlined in NTS2 and the STPR2 Phase 1 recommendations.</p>                                                                                                                                                                                                                      |
| <b>BEMU</b>                          | <p>The operating costs of BEMU are higher than that of EMU rolling stock and hence on a “like for like” replacement would cost more per annum to operate than EMU rolling stock.</p> <p>Further, investigation as part of other rail schemes within Scotland has highlighted a risk to the deliverability of new BEMU rolling stock within the timeframes required to replace the existing life-expired rolling stock by 2025.</p> |

Hence, following the sifting exercise, 2 options are included in the shortlist, representing a combination of EMU traction with no track changes or full double tracking.

## **G.07 Options to be Appraised**

Following the qualitative sift of options set out in sections G.05 and G.06, the shortlist of options are as set out in Table 16. As the shortlisted option for the Barrhead corridor includes for OLE to be installed from Muirhouse Central Junction to Barrhead, i.e. including the section from Muirhouse Central Junction to Busby Junction, the traction changes for the East Kilbride corridor are only considered from Busby Junction to East Kilbride.

**Table 16: Shortlist of Options (short-list)**

| Traction/Track Infrastructure | Barrhead | East Kilbride - Full Double Tracking | East Kilbride - No Double Tracking |
|-------------------------------|----------|--------------------------------------|------------------------------------|
| EMU                           | YES      | YES                                  | YES                                |

The combinations of traction and track infrastructure have been translated into the numbered list of options below. All options include station accessibility improvements (subject to further design development) including.

- Station accessibility improvements along the East Kilbride and Barrhead corridors
- Station improvements at East Kilbride including accessibility improvements
- The relocation of Hairmyres station and accessibility improvements

#### **G.07.01 Shortlisted Options**

As mentioned in section G.05 above, all shortlisted options include EMU from Muirhouse Central Junction to Barrhead along the Barrhead corridor. All options include the East Kilbride station enhancements and the relocation of Hairmyres station.

- **Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead.**
  - OLE from Muirhouse Central Junction at Pollokshields to Barrhead
  - OLE from Busby Junction to East Kilbride
  - Double tracking from Busby to East Kilbride
  - Option provides the flexibility to operate 4+ tph on the East Kilbride corridor with journey times on both corridors reduced by up to 3.5 minutes
- **Option 2: No track infrastructure improvements (except for double tracking at East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead.**
  - OLE from Muirhouse Central Junction at Pollokshields to Barrhead
  - OLE from Busby Junction to East Kilbride
  - Double tracking at East Kilbride station.
  - Option would not allow for any additional services or journey time improvements on East Kilbride line due to the single track section constraints

- If double tracking was to be introduced on the East Kilbride corridor at a future date it would cost [REDACTED TEXT] more due to the need to shift and reinstall the OLE in order to introduce the double tracking. It would cause additional passenger service disruption.

## G.08 Appraisal of Options against Transport Planning Objectives

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The performance of the shortlisted options against the TPOs is set out in Table 17. The performance of the options against the TPOs is considered in a qualitative manner against a 7-point scale shown in Figure 19.

**Figure 19 – Scoring scale for option performance against TPOs**

| +3            | +2               | +1            | 0                              | -1                                  | -2                               | -3                             |
|---------------|------------------|---------------|--------------------------------|-------------------------------------|----------------------------------|--------------------------------|
| Major benefit | Moderate benefit | Minor benefit | Neutral (no benefit or impact) | Small minor cost or negative impact | Moderate cost or negative impact | Major cost or negative impacts |

The appraisal against the TPOs indicates that **Option 1** is the better performing option. However, as has been highlighted throughout this business case, there is uncertainty about future rail passenger demand, and if the future demand is below pre-COVID levels then investment in rail infrastructure improvements would not represent value for money.

**Option 2** (single tracking) does not perform as well against TPO 2 as limited additional passenger capacity would be provided through platform extensions and new rolling stock.

Table 17 – Review of performance of shortlisted options against TPOs

| Option                                                                                                                               | Performance against TPO1  | Performance against TPO2     | Performance against TPO3     | Commentary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Option 1: Full Electrification of both corridors. Double Tracking to East Kilbride. EMU services to both Barrhead and East Kilbride. | <b>+3 (major benefit)</b> | <b>+2 (moderate benefit)</b> | <b>+3 (major benefit)</b>    | <p>TPO1 – Option would decarbonise both corridors and provide full electrification along both corridors.</p> <p>TPO2 - Option would enhance the operational capacity and provide the flexibility to provide 4tph+ service levels throughout the day between East Kilbride and Glasgow Central. It would allow additional services to be provided in the peaks to serve passenger demand.</p> <p>TPO3 – Provides improved station accessibility at upgraded East Kilbride station and relocated Hairmyres station and at other stations along both corridors. Provides improved connectivity as a result of increased service frequency.</p> |
| Option 2: Full Electrification of both corridors. No                                                                                 | <b>+3 (major benefit)</b> | <b>+1 (minor benefit)</b>    | <b>+2 (moderate benefit)</b> | <p>TPO1 – Option would decarbonise both corridors and provide full electrification along both corridors.</p> <p>TPO2 - Option would provide limited improvement to the</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Option                                                                                                                              | Performance against TPO1                                                                                                                                                                                                  | Performance against TPO2                                                                                                                                                                                                                                                                                                                                                                         | Performance against TPO3                                                                                                                          | Commentary                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| infrastructure improvements (except for double tracking at East Kilbride station). EMU services to both Barrhead and East Kilbride. | <p>Removal of rolling stock carbon emissions along the East Kilbride and Barrhead corridors by 2035 in a manner that supports efficient changes to infrastructure, rolling stock, power supply and service operations</p> | <p>Enhancement of rail operational capacity by 2025 to facilitate increased service frequency (4+ trains per hour all day) along the East Kilbride corridor in order to increase rail patronage by 18% and reduce car-kilometres for journeys between East Kilbride and Glasgow city centre by at least 2.4 million by 2030.</p> <p><i>[ASSUMES PASSENGER GROWTH ABOVE PRE-COVID LEVELS]</i></p> | <p>Provision of enhanced travel choices and connectivity to existing and new residents along the East Kilbride and Barrhead corridors by 2025</p> | <p>existing connectivity, with additional capacity provided through platform extensions and new (higher capacity) rolling stock.</p> <p>TPO3 – Provides improved station accessibility at upgraded East Kilbride station and relocated Hairmyres station and at other stations along both corridors.</p> |

## G.09 Delivery Risks

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### G.09.01 Key delivery risks

The main strategic risk to the realisation of benefits from this project is the unknown long-term passenger demand impact of COVID-19.

The key project deliverability risks are:

- Funding - timely confirmation of full funding
- Access – any change to the agreed strategy
- Mining Remediation – current unknown extent of required remediation
- Local Authority Interfaces – including potential unavailability of road closures
- Land Take – potential late design change if areas required for purchase prove impossible in timescales

The project risk register is included under **separate document - Appendix O** and the risk management strategy is considered under the Management Case.

# Part H: Benefits Realisation

Benefits realisation and evaluation is an integral element in understanding how well a scheme has delivered its intended objectives, what benefits have been realised, and to satisfy scrutiny from other parties. It is also beneficial in informing future scheme developments and for building the evidence base to support future decision making.

A Benefits Realisation Plan (BRP) is included under the Management Case of this OBC/FBC. The key benefits that the scheme will generate are summarised in this section.

The scheme outputs, outcomes and impacts (benefits) are shown in Figure 20 (for Option 1) and Figure 21 (for Option 2) and the measurement of benefits realisation is shown in Table 18.

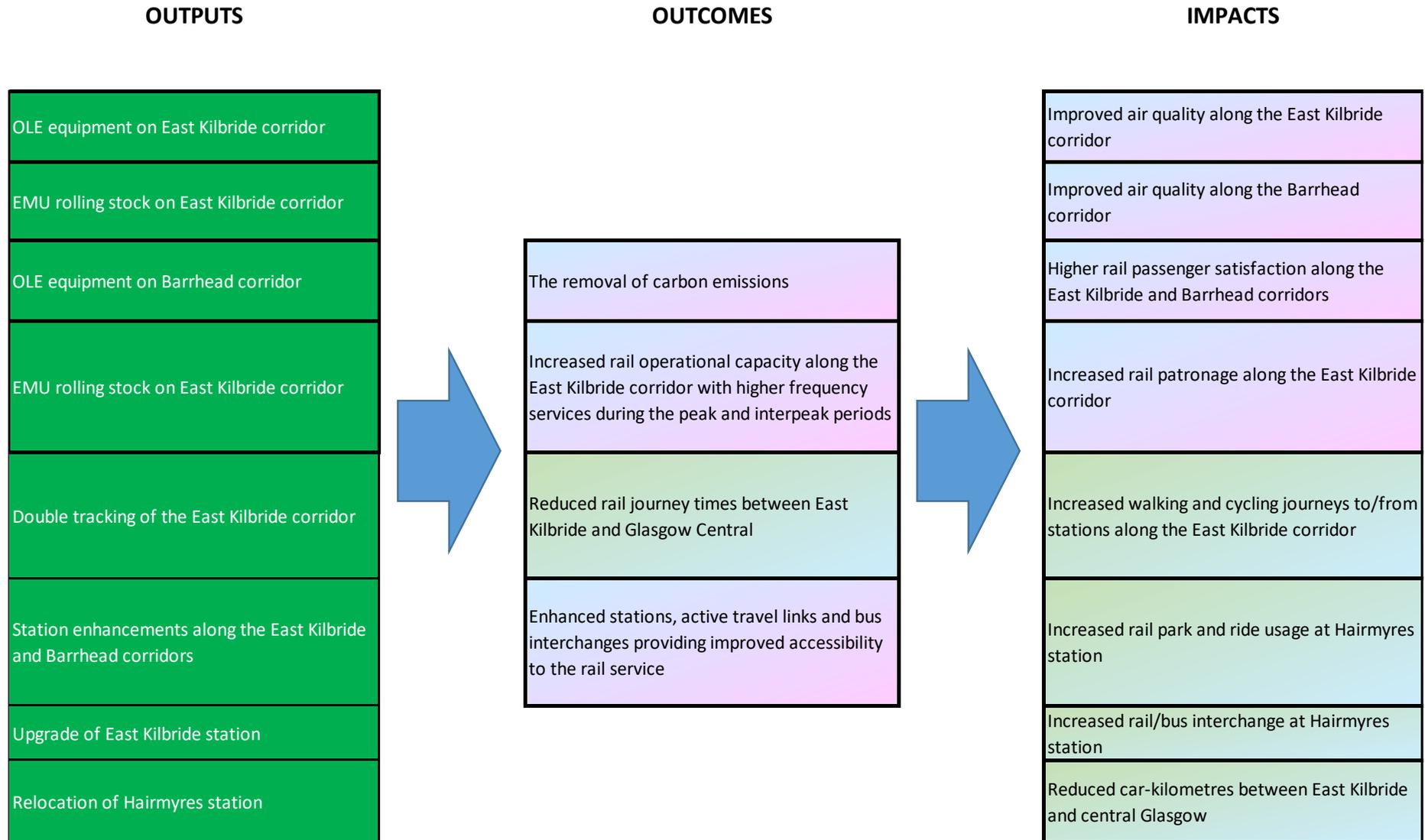
**Table 18 – Measurement of Benefits Realisation**

| <b>Impact (Benefit) to be Realised</b>                                                   | <b>Measurement of Benefit Realisation</b>                                                                                       |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Improved air quality along the East Kilbride corridor</b>                             | Change in air quality at key receptors along the corridor from the baseline prior to scheme opening                             |
| <b>Improved air quality along the Barrhead corridor</b>                                  | Change in air quality at key receptors along the corridor from the baseline prior to scheme opening                             |
| <b>Higher rail passenger satisfaction along the East Kilbride and Barrhead corridors</b> | Positive change in passenger satisfaction with the rolling stock from the baseline prior to scheme opening                      |
| <b>Increased rail patronage along the East Kilbride corridor</b>                         | Increase in passenger numbers above that of the general growth in Scotland and compared to the baseline prior to scheme opening |

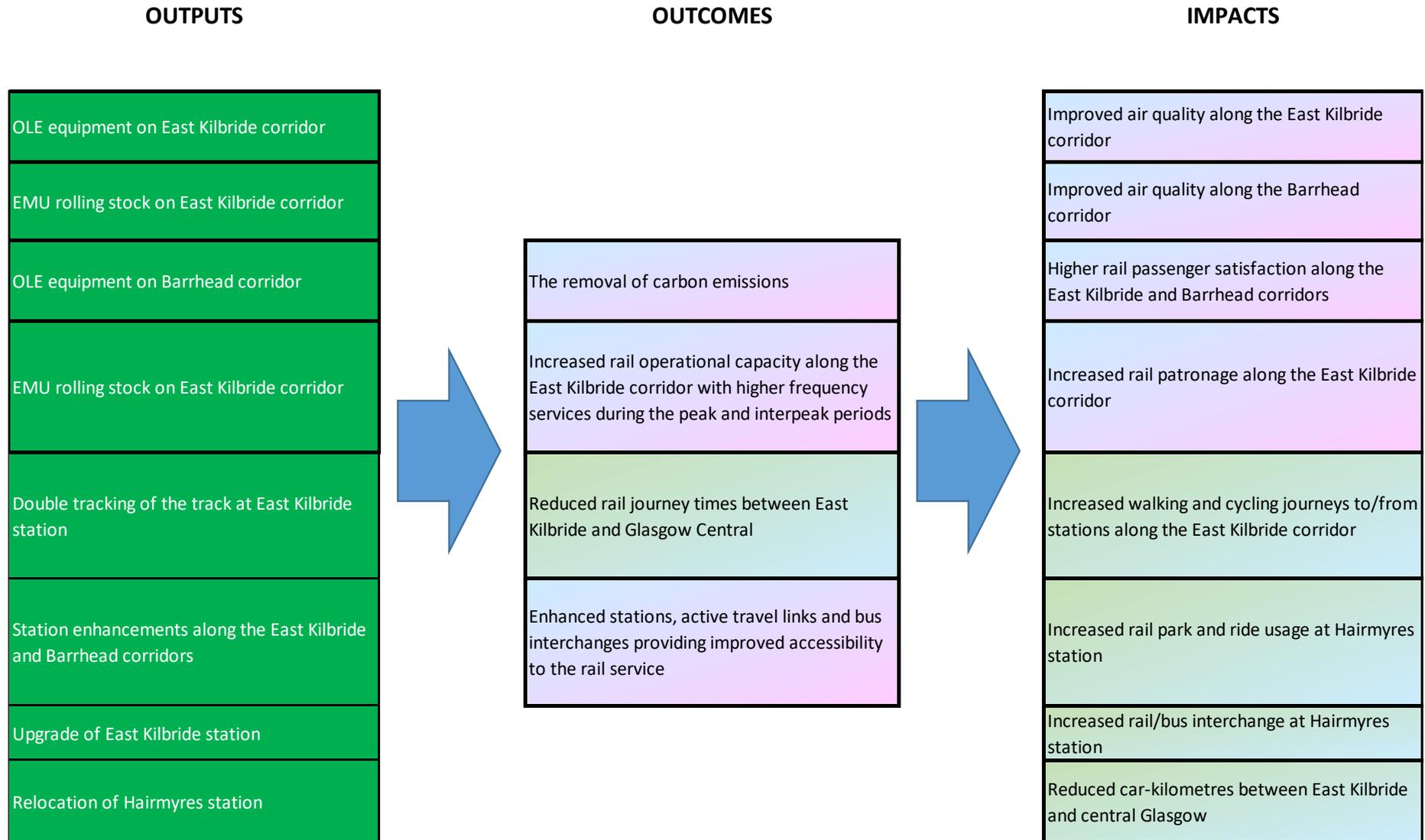
| Impact (Benefit) to be Realised                                                                 | Measurement of Benefit Realisation                                                                                                                                |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Increased walking and cycling journeys to/from stations along the East Kilbride corridor</b> | Increase in number of rail users accessing the stations by walking or cycling modes compared to the baseline prior to scheme opening                              |
| <b>Increased rail park and ride usage at Hairmyres station</b>                                  | Increase in number of rail users accessing the stations by rail park and ride at Hairmyres station compared to the existing station following scheme opening      |
| <b>Increased rail/bus interchange at Hairmyres station</b>                                      | Increase in number of rail users accessing the stations by bus (using interchange at Hairmyres station) compared to the existing station following scheme opening |
| <b>Reduced car-kilometres between East Kilbride and central Glasgow</b>                         | Reduction in the number of car journeys from East Kilbride to central Glasgow compared to the baseline following scheme opening                                   |



**Figure 20 – Outputs, Outcomes and Impacts (Benefits) – Option 1**



**Figure 21 – Outputs, Outcomes and Impacts (Benefits) – Option 2**



# SOCIO-ECONOMIC CASE

## Part I: Introduction to Socio-Economic Case

### I.01 Introduction

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The Socio-Economic Case describes the performance of the shortlisted options against the STAG criteria (Environment, Safety, Economy, Integration and Accessibility and Social Inclusion).

The case concludes with the identification of a preferred option with a supporting value for money statement.

Typically, in accordance with STAG, the OBC/FBC would be building upon a Part 2 Detailed Options Appraisal underpinned by full technical analysis, revisiting the STAG criteria. However, in the case of this scheme, due to the changes since the SBC the SBC does not fully represent a STAG Part 2 analysis for the options presented here.

Hence, this socio-economic case includes a fresh analysis of the options under consideration in this OBC/FBC. A proportionate approach has been taken to the quantification of the appraisal against the Environment, Safety, Integration and Accessibility & Social Inclusion criteria.

### I.02 Options Appraised

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#### I.02.01 Background to Options Development

As set out in the Strategic Case, following review of the SBC in context of the contextual changes between the SBC and the OBC/FBC, the potential options were re-considered. The options considered include the full range of traction types and infrastructure changes as set out in Part G:.

Those options which performed best against the TPOs (as shown in section G.08) were appraised within the Socio-Economic case.

### I.02.02 Options Appraised in the Socio-Economic Case

The shortlisted options considered in the socio-economic case are:

- **Option 1:** Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead.
- **Option 2:** No track infrastructure improvements (except for double tracking at East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead.

All options include the implementation of EMU services to Barrhead (i.e. from Busby Junction to Barrhead).

### I.02.03 Appraisal against STAG Criteria

The following chapters describe the impact of the options against the five STAG criteria, consisting of Environment, Safety, Economy, Integration, and Accessibility & Social Inclusion.

The STAG seven-point scale assessment is shown below and was undertaken for each option against the five STAG criteria shown in Figure 22 (repeated). Where impacts cannot be monetised, the approach considers the relative size and scale of the likely impacts (benefits / negative) in qualitative terms:

**Figure 22 – Scoring scale for option performance against TPOs**

| +3            | +2               | +1            | 0                              | -1                                  | -2                               | -3                             |
|---------------|------------------|---------------|--------------------------------|-------------------------------------|----------------------------------|--------------------------------|
| Major benefit | Moderate benefit | Minor benefit | Neutral (no benefit or impact) | Small minor cost or negative impact | Moderate cost or negative impact | Major cost or negative impacts |

# Part J: Economy Criterion

## Appraisal

### J.01 Overview

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#### J.01.01 Purpose

The purpose of this section is to assess the detailed evidence of economic impacts in a way that will support the investment decision-making process, and which is proportionate to the decision being taken. Economic impacts will arise in both the capital investment (i.e. construction) and operational phases of the project and are closely related to the Strategic Case for Change.

#### J.01.02 Understanding risk and uncertainty

The economic evidence collated in this section is based on assumptions, based on the best evidence available to the project team. Where the analysis of the economic case is strongly impacted by particular assumptions, sensitivity tests have been run to understand the impact of this uncertainty.

#### J.01.03 Options Appraised

The short-list of options to be appraised here are:

1. Full Double Tracking to East Kilbride. EMU services to East Kilbride, EMU services to Barrhead.
2. No track infrastructure improvements (except for double tracking at East Kilbride station). EMU services to East Kilbride, EMU services to Barrhead.

### J.02 Sources of Benefit

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There are a range of benefits and costs monetised to inform the economic appraisal. These include those related to the proposed service output, the operational benefits of electrification of the line and the enhanced accessibility at various stations along the corridor.

### **J.02.01 User Benefits: Generalised Journey Time**

Generalised Journey Time (GJT) is a variable used to appraise transport schemes. In a rail context GJT is a function of the timetable and consists of three components:

- the station-to-station journey time,
- the service frequency; and
- the interchange time.

Hence, GJT aims to capture the end-to-end journey experience. Options which reduce the GJT (either via more services, quicker services or both) will stimulate new demand on the corridor.

The methodology for this is based on MOIRA2. MOIRA2 is a demand forecasting model which the rail industry uses to assess the impact of timetable changes on patronage in terms of passenger numbers and revenue. MOIRA2 is an elasticity-based model, and as such is more suitable for assessing the impact of relatively small timetable changes rather than large-scale strategic or transformational changes to the network. It is also designed to assess the impact of timetable changes on passenger crowding, which is key to this study.

It was suggested in the SBC that an alternative approach using a broader mode choice model (SRTM) could be used during the OBC/FBC. Further investigation of this would suggest that this model is more suited for comparison of multiple modes, and the granularity of the model is not suited to the level of detail required here. The MOIRA2 approach allows detailed changes to the timetable to be examined, which would otherwise not be available, and is designed to consider the impact of on-train crowding, which is important for the capacity elements of the scheme.

Further advantages of this approach are that it provides a baseline to start from (with adjustments applied to reflect the impact of COVID-19) and it allows the appraisal work completed at OBC/FBC to be compared with that of the SBC.

### **J.02.02 User Benefits: Crowding (Value of Time benefit)**

As [PDFH Notes](#), crowding is a source of concern to many passengers. Whilst some passengers are content to stand (normally for a short period of time), most prefer to sit and will sit if seats are available. Peoples' response to crowding will vary (and indeed may have changed due to COVID-19), but some may choose to travel at a different time, some may choose to not travel by rail, or some may choose to accept that the train is crowded. It is important to note that crowding dis-benefits apply not just to those who are standing, but to everyone on the train. The impact of crowding is quantified by applying a Value of Time multiplier dependent on how busy the service is, beginning at services being 60% full. As per the GJT benefits, the value of crowding will be appraised using MOIRA2.

### **J.02.03 Non-User Benefits**

Non-user benefits tend to form the basis for government intervention in the railway. In a scheme that seeks to improve capacity for the commuting market, the principal non-user benefit will be benefits associated with reduced road congestion and the removal of diesel trains from the network. These will include environmental and road safety impacts, resulting from modal shift from road to rail.

### **J.02.04 Air Quality**

Air quality impacts reflect the damage that rail-based emissions impose on local communities and on users of the railway in terms of both health and amenity.

The estimate of air quality impact has been calculated using an emission factor (g/km) covering Nitrogen Oxide and Particulate Matter, which is derived from RSSB's research pieces (RSSB2769 and T1187).

## J.03 Assumptions

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### J.03.01 The Do Minimum

The baseline timetable is taken from December 2019, which utilises diesel rolling stock. Demand is also based on 2019 (pre-COVID) data, with as discussed scenarios undertaken to understand the impact of a lower baseline on results.

### J.03.02 Exogenous Demand Forecasts

The approach to demand forecasting, and a broader consideration of the uncertainties of future demand is discussed in more detail in the Strategic Case under **Part D**.

Four long term demand scenarios were generated (with the plausible forecast scenarios referencing the 2016 Network Rail Route Study forecast scenarios):

1. **Forecast scenario #1** (“optimistic”, with reduction in commuting offset by increased leisure travel and longer-term economic growth) = Prospering in Isolation + unadjusted pre-COVID demand
  2. **Forecast scenario #2** (“positive”, with reduction in commuting and short-term job losses offset by longer-term economic growth) = Prospering in Isolation + pre-COVID demand less [REDACTED TEXT]
  3. **Forecast scenario #3** (“negative” with reduction in commuting offset by increased leisure travel but longer-term economic decline) = Struggling in Isolation + unadjusted pre-COVID demand
  4. **Forecast scenario #4** (“pessimistic”, with reduction in commuting offset, short-term job losses and longer-term economic decline) = Struggling in Isolation + pre-COVID demand less [REDACTED TEXT]
- These scenarios are shown in [REDACTED TEXT AND FIGURE]
- .

[REDACTED TEXT AND FIGURE]

### J.03.03 Capital Costs

Capital costs were taken from the GRIP 3 estimate provided by Network Rail. Optimism Bias (18%) has been applied on top of the estimate (including risk) as per TAG Unit A5.3. The scheme is assumed to be completed in 2025. There is an assumed renewal cost included, at [REDACTED TEXT] of the Capex estimate, due 30 years after the opening year (2055). No optimism bias has been included for the renewal cost, as per the [Traction Decarbonisation Network Strategy](#).

The costs are set out in the table below, shown for 6-car platforms, and include the cost of electrification to Barrhead.

**Table 19: Option Capital Cost Estimates**

| <b>Option</b> | <b>East Kilbride – Decarbonisation</b> | <b>East Kilbride – Track Infrastructure</b>                 | <b>Barrhead</b>                   | <b>Cost Estimate (incl. risk and inflation)</b> |
|---------------|----------------------------------------|-------------------------------------------------------------|-----------------------------------|-------------------------------------------------|
| <b>1</b>      | OLE and EMU services to East Kilbride. | Full Double Tracking.                                       | OLE and EMU services to Barrhead. | [REDACTED TEXT]                                 |
| <b>2</b>      | OLE and EMU services to East Kilbride. | No track infrastructure improvements (no passive provision) | OLE and EMU services to Barrhead. | [REDACTED TEXT]                                 |

The costs for the East Kilbride corridor include for the station improvements at Giffnock and Thorntonhall, the Hairmyres station relocation, the new Hairmyres station building and for the new East Kilbride station building. SLC/SPT will construct a large adjoining park & ride, and bus interchange facility. SLC/SPT will demolish the existing station infrastructure. These, along with the purchase of land for the new station location, are funded separately to this OBC/FBC.

#### **J.03.04 Operating Costs**

The operational costs of new rolling stock (included within this OBC/FBC) have been taken from work completed by Abellio ScotRail and Transport Scotland as part of their EMU fleet procurement project undertaken in 2020. Optimism Bias (21% at GRIP 3, as per the DfT’s guidance in the July 2021 TAG update) will be applied as per TAG for the Economic Appraisal. They are as set out in the table overleaf.

**Table 20: Operational Cost Assumptions by traction type**

| <b>Traction Type</b> | <b>Leasing Cost (£/carriage/year)</b> | <b>Fuel</b>                  | <b>Maintenance</b>           | <b>VTAC</b>                  |
|----------------------|---------------------------------------|------------------------------|------------------------------|------------------------------|
| New EMU              | [REDACTED TEXT]                       | [REDACTED TEXT] per veh mile | [REDACTED TEXT] per veh mile | [REDACTED TEXT] per veh mile |
| New BEMU             | [REDACTED TEXT]                       | [REDACTED TEXT] per veh mile | [REDACTED TEXT] per veh mile | [REDACTED TEXT] per veh mile |
| New DMU              | [REDACTED TEXT]                       | [REDACTED TEXT] per mile     | [REDACTED TEXT] per mile     | [REDACTED TEXT] per mile     |

**Note:** The costs of a new DMU fleet for the line are assumed to be the same as the cost of a new BEMU, as per the Rolling Stock Delivery Group fleet procurement exercise.

An assumption of an additional [REDACTED TEXT] per mile per year for OLE has been assumed, based on some analysis undertaken by the NR Finance Team. It is also assumed that the operational costs for Hairmyres Station will increase by [REDACTED TEXT]/year (based on a comparison with the cost of East Kilbride Station, provided by Abellio Scotrail), which includes an allowance for staff at the station.

Estimated changes in rolling stock requirements have been provided by Abellio ScotRail. It is assumed that [REDACTED TEXT] vehicles will be required in the future, though the paper does note that this number could reduce to [REDACTED TEXT] if EMUs are procured in conjunction with the wider Strathclyde fleet. It is assumed that were the fleet be replaced by new DMU units, [REDACTED TEXT] vehicles would also be required (this is more than currently is needed to operate the services). A cost per mile of maintaining the additional OLE has also been included.

It has also been assumed that in the scenarios where traction is changed and the timetable remains as today (Option 2), the quantum of rolling stock required to be leased would be the same as for the options where the frequency is enhanced. This

is because the rolling stock requirement would still be driven by the peaks in these scenarios.

The rolling stock requirements for each option are summarised below.

**Table 21: Leasing Unit Assumptions**

| Scenario                                                                                                       | EMUs required<br>(for EK &<br>Barrhead) | BEMUs required<br>(Kilmarnock) |
|----------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride & Barrhead. BEMUs to Kilmarnock | [REDACTED<br>TEXT]                      | [REDACTED<br>TEXT]             |
| Option 2: No track infrastructure improvements. EMU services to East Kilbride & Barrhead. BEMUs to Kilmarnock  | [REDACTED<br>TEXT]                      | [REDACTED<br>TEXT]             |

It is assumed that [REDACTED TEXT] additional train crews (driver + ticket examiner) will be required to run the enhanced service in Option 1, with a salary of [REDACTED TEXT] and [REDACTED TEXT] respectively, as advised by Abellio ScotRail. It has been assumed that throughout the appraisal period trains are operated by drivers and an additional member of staff (as opposed to Driver Only Operation).

**NOTE ON OPERATING COSTS ASSUMPTIONS**

This OBC/FBC includes the best reasonable estimate of the operating costs associated with the infrastructure options. However, as would be clear to the reader, there are potentially a wide range of potential combinations of rolling stock and services (under various timetabling arrangements). It would not be proportionate to include all of these under the OBC/FBC appraisal.

**J.03.05 Timetables**

The following timetable service patterns have been assumed to East Kilbride, with the Barrhead timetable remaining as today:

- Full Double Tracking: 4tph from 7AM to 8PM, 2tph otherwise
- No Double Tracking: No change in timetable

In terms of journey time savings, under EMU operation a 2-minute end-to-end journey time saving to Barrhead has been assumed, and a 3-minute saving to East Kilbride. No Journey time savings have been assumed to East Kilbride unless there is full double tracking. It is unclear at this stage what journey time saving BEMU services to East Kilbride could have, so no savings have been included (with a sensitivity test conducted to understand the impact on the VfM of a journey time reduction with BEMUs).

### J.03.06 Key appraisal assumptions

Other key appraisal assumptions are shown below:

**Table 22: Key Appraisal Parameters**

|                                  |                                              |
|----------------------------------|----------------------------------------------|
| <b>Appraisal Period</b>          | 60 years                                     |
| <b>TAG Version</b>               | July 2020                                    |
| <b>Scheme Opening Year</b>       | 2026                                         |
| <b>Discount Rate</b>             | 3.5% for years 1-30, 3.0% for years 31 to 60 |
| <b>Appraisal Base Year</b>       | 2021                                         |
| <b>Appraisal Base Price Year</b> | 2010                                         |
| <b>Car Diversion Rate</b>        | 27%                                          |

**NOTE:** The 27% abstraction from car is a generic TAG assumption used for the appraisal. It forms a part of the Socio-Economic appraisal as the ‘Non-user benefits’ are monetized and included in the BCR/NPV values. The abstraction factor only relates to a relatively small portion of these benefits (5-10%).

## J.04 Value-for-Money Appraisal Results

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The results of the appraisal are shown in Table 23 below. Results are shown as a range to reflect the range of results due to the four growth scenarios assessed.

**Table 23: VfM Results Summary**

| <b>Option (all 6-car)</b>                                                                                 | <b>Present Value of Capex + Opex (2010 prices)</b> | <b>Benefit Cost Ratio (BCR)</b> | <b>Net Present Value (2010 prices)</b> |
|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------|----------------------------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead. | [REDACTED TEXT]                                    | [REDACTED TEXT]                 | [REDACTED TEXT]                        |
| Option 2: No track infrastructure improvements. EMU services to East Kilbride. EMU services to Barrhead.  | [REDACTED TEXT]                                    | [REDACTED TEXT]                 | [REDACTED TEXT]                        |

The associated Transport Economic Efficiency (TEE) tables are included in **separate document - Appendix I**.

## J.05 Discussion of Results and Sensitivity Testing

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### J.05.01 Overall

As can be seen in Table 23, Option 1, which has the largest scope, has the strongest value-for-money (VfM) with a BCR of [REDACTED TEXT] to [REDACTED TEXT]. The key differences in the results are discussed below.

### J.05.02 Sensitivity of results to assumed growth factors

The VfM results show how the growth factor used influences the results, with Table 24 showing a wide BCR range for Option 1. This shows the impact of assumptions around COVID-19 on the value for money of Option 1 (double tracking), and the smaller range for Option 2 (single tracking). The extent to which demand returns to the railway will dictate the revenue generated by the corridor, and thus the financial value of the additional connectivity. In present value terms, over the 60-year appraisal the revenue generated varies from [REDACTED TEXT] depending on the growth rate, with the socio-economic benefits (User and Non-User benefits) also impacted by the growth assumed.

It is worth noting that the growth rates are capped at the year 2032 (7 years after the scheme is due to complete) in line with STAG guidance (but different to that used by the DfT for example).

**Table 24: Appraisal results for Option 1 against all Growth Scenarios**

| <b>Growth Scenarios applied to Option 1</b>                                                     | <b>Benefit Cost Ratio (BCR)</b> | <b>Net Present Value (2010 prices)</b> |
|-------------------------------------------------------------------------------------------------|---------------------------------|----------------------------------------|
| Optimistic - 2019 Baseline: 'Prospering in Isolation' with no drop from pre-COVID               | [REDACTED TEXT]                 | [REDACTED TEXT]                        |
| Positive - 2019 Baseline: 'Struggling in Isolation' with no drop from pre-COVID                 | [REDACTED TEXT]                 | [REDACTED TEXT]                        |
| Negative - 2019 Baseline with [REDACTED TEXT] drop from pre-COVID: 'Prospering in Isolation'    | [REDACTED TEXT]                 | [REDACTED TEXT]                        |
| Pessimistic - 2019 Baseline with [REDACTED TEXT] drop from pre-COVID: 'Struggling in Isolation' | [REDACTED TEXT]                 | [REDACTED TEXT]                        |

### **J.05.03 Sensitivity of results to a reduced interpeak timetable**

As part of efforts to reduce operational costs of the railway, ScotRail have reduced the numbers of trains running elsewhere on the network. Whilst this is a relatively short-term decision, with it not clear how long the reduced timetable will last, a sensitivity has been considered to understand what the impact on the VfM would be should the

double tracking not be as fully utilised. A timetable consisting of 4tph for the AM and PM peak two hours was considered, with 2tph at other times. The impact on the VfM results are shown below.

**Table 25: Sensitivity of Option 1 to a reduced interpeak timetable**

| <b>Option</b>                                                                                                                  | <b>BCR</b>      | <b>NPV (2010 prices)</b> |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride (4tph all day)                                  | [REDACTED TEXT] | [REDACTED TEXT]          |
| Sensitivity: Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride (4tph in 2hr peak, 2tph otherwise) | [REDACTED TEXT] | [REDACTED TEXT]          |

Reducing the train service to 2tph will reduce the per-mile operational costs, but the leasing costs will likely remain unchanged as the overall fleet size tends to be driven by the peaks. Train crew numbers would likely reduce too, subject to detailed diagramming.

As can be seen the results change significantly with the reduced timetable, with the benefits of all-day services removed. The present value of benefits drops from [REDACTED TEXT] (2010 prices) for the highest growth scenario, with only a small drop in operating costs due to reduced mileage. The sensitivity may be conservative as it assumes the same leasing costs and staff requirements, but the impact on benefits is significant regardless.

#### **J.05.04 Sensitivity of results to platform lengthening**

A comparison for Option 1 (with the highest growth rate) with 6-car and 8-car platforms is shown below.

**Table 26: Platform Extensions Sensitivity (highest growth)**

| <b>Length of Extension</b> | <b>BCR</b>      | <b>NPV (2010 prices)</b> |
|----------------------------|-----------------|--------------------------|
| Option 1: 6-car            | [REDACTED TEXT] | [REDACTED TEXT]          |
| Option 1: 8-car            | [REDACTED TEXT] | [REDACTED TEXT]          |

The results show that the VfM for the 8-car option is lower than the 6-car. This is because the benefit of the longer trains (crowding relief) does not outweigh the combination of the additional capital expenditure and operational costs (additional carriage leasing costs and additional per mile costs).

Given the uncertainty around passenger demand, and the lower growth rates used that during the SBC development, the results suggest there is little benefit from a value-for-money perspective of 8-car trains.

## **J.06 Wider Economic Impacts**

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Wider economic impacts (WEI) are ‘impacts in non-transport markets that are either of importance from a policy or distributional perspective or which affect the net value that society attributes to the outcomes of a transport intervention’ (with reference to STAG Technical Database section 9.3.1).

Whilst decarbonising the corridor and improving access to Central Glasgow is the central objective, the more significant improvements are likely to improve overall journey times in the off peak (because the service will become more intense than it currently is) far more than they will in the peak (where a 4tph service already operates in the peak hour). Improving access in the off peak is likely to have a more significant impact on access for non-work, non-commuting journey purposes than for work-based and commuting journey purposes.

Enhancing capacity and reducing the Generalised Journey Times along the corridor will support housing growth, by ensuring suitable access to the labour market of Glasgow city centre is provided. However, the additional benefits of non-transport impacts are likely to be minor, firstly because of the existing frequency of service between East Kilbride and Glasgow and, secondly, because the additional demand on

the East Kilbride-Glasgow corridor maybe abstracted from other corridors in the Greater Glasgow conurbation.

### **J.06.01 Job Creation**

With the Scottish Government committing to the removal of diesel rolling stock from the network by 2035, there is the need for significant expertise in overhead line engineering. This scheme will generate roles for all stages of rail electrification, from development to overhead line engineering and rolling stock engineers, as well as new roles for ongoing maintenance.

There is already a forecast skills gap for the rail industry over the coming years based on data from The National Skills Academy Rail (document entitled “NSAR – An overview” published in 2019). Opportunities to begin to grow the sector and supply chain in advance of such significant investment in this area of the ‘Green Economy’ are important, with a subsequent rolling programme of electrification (currently under development) able to benefit from this corridor enhancement.

## **J.07 Scoring against Economy Criterion**

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Whilst Option 1 has the highest VfM rating, the results need to be considered in the context of uncertainty around background demand, which will impact on the VfM, and ongoing revenue generated by the scheme. Whilst Option 2 does not alter the timetable and therefore performs poorly in terms of BCRs, it does lead to operational cost savings for the railway.

In terms of appraisal against the STAG criteria, Option 1 (which under the most optimistic growth scenarios has a BCR of more than [REDACTED TEXT]) has been scored **+1 (minor benefit)**.

**Table 27: Qualitative Appraisal Scores for Economy**

| <b>Option</b>                                                                                                                                               | <b>Benefit Cost Ratio (BCR)</b> | <b>Appraisal score against Economy STAG Criteria</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------------|
| Option 1: Full Double Tracking to East Kilbride (facilitating 4tph). EMU services to East Kilbride. EMU services to Barrhead.                               | [REDACTED TEXT]                 | [REDACTED TEXT]                                      |
| Option 2: No track infrastructure improvements (except for double tracking East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead. | [REDACTED TEXT]                 | [REDACTED TEXT]                                      |

# Part K: Environment Criterion

## Appraisal

### K.01 Introduction

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STAG sets out several criteria that need to be considered as part of the environmental appraisal of the options considered. These include:

- Noise and Vibration;
- Global Air Quality – Carbon Dioxide (CO<sub>2</sub>);
- Local Air Quality – Particulate Matter (PM<sub>10</sub>) and Nitrogen Dioxide (NO<sub>2</sub>);
- Water Quality, Drainage and Flood Defence;
- Geology;
- Biodiversity and Habitats;
- Landscape;
- Visual Amenity;
- Agriculture and Soils; and
- Cultural Heritage.

For some options a range of impacts have been predicted, reflecting the potentially varying impacts that may result from the scheme itself (e.g. implementation / construction) and its outcomes (e.g. modal shift).

### K.02 Environmental Assessment Evidence

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Following the completion of the GRIP2 stage, Network Rail drafted an Environmental Impact Assessment (EIA) screening report, which is included in **separate document - Appendix G**. The screening report has assessed the proposed development against receptors present along the route. There are several statutory environmental and built heritage designations, habitats which may support protected/notable species and varying values of biodiversity. Watercourses and core paths traverse the railway corridor and there is evidence of historic contamination. The route passes through

open countryside and built-up areas and sensitive uses have been identified. The EIA screening is based upon Option 1 (full electrification and full double tracking) in order to represent the “worst case” impact on the environment.

This screening report, which sets out the key sensitivities, impacts and mitigations for the scheme implementation, concludes that the project is Schedule 2 development but will not have a significant adverse effect on the environment, and an EIA Report will not be required. The local authorities (SLC, ERC and GCC) responded with a confirmation that an EIA is not required.

### **K.03 Key Baseline Sensitivities and Designations**

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The key baseline sensitivities and designations along the East Kilbride corridor include:

#### **■ Barrhead Corridor**

- High flooding risk at White Cart Water which borders Pollock Country Park and is channelled beneath the scheme and at Auldhouse Burn which runs along the existing railway.
- There is the potential for direct impact on a number of Category B Listed Buildings along the route due to demolition of overbridges and potential upgrades to stations.
- Potential works fall within the edge of conservation areas (Pollock Park, Giffnock, and Strathbungo). Works within a Conservation Area may require Conservation Area consent.
- The Network Rail GRIP Stage 3 Option Selection Report which considers the Electrification of the Glasgow to Barrhead route notes that Otters and Water Voles have been identified at Auldhouse Burn, Kennishead. The EA for Barrhead notes that aerial mapping indicates the presence of trees, scrubs, watercourse and grassland habitats within the railway corridor; which can provide a habitat for a range of legally and notable species.

#### **■ East Kilbride Corridor**

- There is the potential for indirect impacts on the setting of a Category B Listed Building near to overbridge 21.

- There is potential for impacts on protected species and indirect effects on ancient woodland and the Cart and Kitch Valley Site of Special Scientific Interest (SSSI).
- The route is primarily located in a built-up area which has a number of residential receptors in close proximity to the existing railway line. Therefore, there is the potential for amenity effects (e.g. visual, noise, vibration and air quality).

Select key mitigation (full list included under section 5.2 of **separate document - Appendix G**) for all the options considered would be expected to include:

- Construction phase - Construction Environmental Management Plan (CEMP) in place for all compounds and construction sites;
- Design phase – Loss of protected/notable species: planning of works to minimise disruption to seasonally sensitive species;
- Construction phase – increase construction traffic: use of rail to bring in materials, plant & equipment where appropriate;
- Construction phase – Noise and Vibration: careful siting of compound layout including location of generators especially next to sensitive uses identified. Works are along a linear site so that any disturbance by activities will be at a specific location for a short time and not along the entire route or length of works; and
- Operational phase - Biodiversity net gain through implementation of Detailed Biodiversity Net Positive Assessment.

The appraised impacts against the Environment sub-criteria are set out below.

## **K.04 Noise and Vibration**

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### **K.04.01 Construction Impacts**

For all options there may be noise and vibration impacts on residences and businesses along the corridor during construction. However, these impacts would be short term and would be mitigated as part of the construction planning. Specific sensitive sites along the route have been identified and will be considered as part of the construction planning (refer to Table 9 in **separate document - Appendix G**).

## K.04.02 Operational Impacts – qualitative appraisal

The decarbonisation of the corridors will deliver a net reduction in the noise impact of the operation of the railway. Noise from the operation of trains has three principal components:

- aerodynamic noise;
- rolling rail contact noise; and
- engine noise.

Electric trains are generally quieter in engine operation than diesel stock although all rolling stock including diesel are quieter than the recommended legal limit in residential areas. This reduction in noise will also translate into an improved on-board environment for passengers on multiple unit-operated services as underfloor diesel engines are not required.

**Table 28 – Noise and Vibration - Qualitative Appraisal**

| Option                                                                                                                                                      | Impact                                                                                                                                                                                       | Appraisal Score |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead.                                                   | The introduction of electric trains on the corridor will reduce the noise and vibration impacts both for current service levels and if the frequency of services is increased in the future. | +1              |
| Option 2: No track infrastructure improvements (except for double tracking East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead. | The introduction of electric trains on the corridor will reduce the noise and vibration impacts.                                                                                             | +1              |

The scoring for Option 1 considered that although the reduction in noise and vibration – in comparison to the existing diesel traction - will be greater against a future increase in

the frequency of services (which full double tracking would facilitate), there will be greater noise impacts during construction than for other options.

### K.04.03 Operational Impacts – quantitative appraisal

The monetised benefits (based on the Marginal External Costs impacts of mode shift to rail) are shown in the table below and represent a **minor benefit (+1)** for all options.

**Table 29 – Noise and Vibration – Quantitative Appraisal**

| Option   | Car Miles Diverted (2025) High Growth | Car Miles Diverted (2025) Low Growth | Noise Benefits (2010 prices) High Growth | Noise Benefits (2010 prices) Low Growth |
|----------|---------------------------------------|--------------------------------------|------------------------------------------|-----------------------------------------|
| Option 1 | 3.4M                                  | 1.5M                                 | [REDACTED TEXT]                          | [REDACTED TEXT]                         |
| Option 2 | 0.1M                                  | 0.1M                                 | [REDACTED TEXT]                          | [REDACTED TEXT]                         |

## K.05 Global Air Quality (CO<sub>2</sub>)

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### K.05.01 Operational impacts - qualitative appraisal (all options)

Operation of increased services along the East Kilbride corridor would result in increased electricity use for railway locomotives with associated carbon emissions. However, in comparison to the existing diesel fuel usage this would represent a reduction in carbon emissions as the electricity can be sourced from renewable sources.

Reductions in car traffic flows on routes between East Kilbride and Glasgow (due to mode shift to rail) are predicted to have minor beneficial impacts on emissions from reduced overall vehicle kilometres.

## K.05.02 Operational Impacts – quantitative appraisal

The monetised benefits (based on the Marginal External Costs impacts of the change in traction to electric and mode shift to rail) are shown in the table below. All the options are anticipated to have a **moderate benefit (+2)** on global air quality.

**Table 30 – Global air quality (Greenhouse gases) – Quantitative Appraisal**

| Add heading | Greenhouse gases – Benefits (2010 prices)<br>High | Greenhouse gases – Benefits (2010 prices)<br>Low |
|-------------|---------------------------------------------------|--------------------------------------------------|
| Option 1    | [REDACTED TEXT]                                   | [REDACTED TEXT]                                  |
| Option 2    | [REDACTED TEXT]                                   | [REDACTED TEXT]                                  |

## K.06 Local Air Quality (PM<sub>10</sub> / NO<sub>2</sub>)

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### K.06.01 Qualitative appraisal (all options)

There are no Air Quality Management Areas close to the route sections and thus no potential for works to adversely impact on air quality standards set by AQMA Action Plans.

In respect of general air quality standards, there is likely to be a temporary increase in emissions as a result of the construction phase of the project, for example, construction traffic, use of generators, dust generation from excavations/levelling. The use of Construction Environmental Management Plans will assist with mitigating the impacts, for example, dust prevention measures, use of efficient generators, traffic management measures. The impacts are small-scale and localised given the linear nature of the works.

In the long-term a change from diesel trains to electric trains will reduce emissions along the line of route with a positive net gain for air quality.

## K.06.02 Operational impacts - quantitative appraisal

Air quality impacts reflect the damage that rail-based emissions impose on local communities and on users of the railway in terms of both health and amenity.

The estimate of air quality impact has been calculated using an emission factor (g/km) covering Nitrogen Oxide and Particulate Matter, which is derived from RSSB's research pieces (RSSB2769 and T1187).

This has been quantified through the modelling of existing trips (shifted from diesel to electric traction) and new trips (induced by the scheme) that have shifted from other modes. An abstraction rate of 27% from road to rail has been assumed in line with TAG.

The monetised benefits (based on the Marginal External Costs impacts of the change in traction to electric and mode shift to rail) are shown in the table below. All the options are anticipated to have a **minor benefit (+1)** on local air quality.

**Table 31 – Local Air Quality – Quantitative Appraisal**

| Add heading | Local air quality – Benefits (2010 prices) | Local air quality – Benefits (2010 prices) |
|-------------|--------------------------------------------|--------------------------------------------|
|             | High Growth                                | Low Growth                                 |
| Option 1    | [REDACTED TEXT]                            | [REDACTED TEXT]                            |
| Option 2    | [REDACTED TEXT]                            | [REDACTED TEXT]                            |

## K.07 Water Quality, Drainage and Flood Defence

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### K.07.01 Qualitative appraisal (all options)

It is a key environmental objective of the scheme to protect all water resources through project design and implementation. In addition, the development must not cause an increase in flood risk.

A preliminary assessment has been made of the number of watercourse receptors (including culverts) which pass through or run alongside the site to determine if any physical works may adversely impact on them. There are ten watercourses which pass

under/culverted under the existing railway corridor and the location of these are set out in **separate document - Appendix G**.

Where land is required for double-tracking in the vicinity of a culvert an assumption is made that the culvert may have to be modified in some way to accommodate the new rail corridor width. Where only electrification is to be carried out an assumption is made that OLE apparatus can be installed within existing rail corridor without alteration to culverts underneath, or in the case of watercourses, that OLE apparatus can be installed on bridges without impact to the watercourse below.

The assessment concludes that the impacted receptors are of low environmental quality and the impact is low and temporary. The Local Biodiversity Sites and the SINCs are all within areas where only electrification will be carried out and there is considered to be no/negligible impact. There are no new structures proposed affecting watercourses.

All works around watercourses will be subject to SEPA licensing arrangements under the Controlled Activities Regulations (CAR, 2011 as amended). Construction Environmental Management Plans will be put in place to ensure good practice standards will be applied. Flood Risk Assessments will be carried out for all sites with flood risk potential to ensure the development is appropriately designed to take account of the flood risk areas and will not increase flood risk.

Overall all the options are anticipated to have a **neutral (0)** impact on water quality, drainage and flood defence.

## **K.08 Geology**

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### **K.08.01 Qualitative appraisal (all options)**

The works are not anticipated to impact on any sensitive geological areas, nor to impact upon local geological resources to the limited degree of expansion of infrastructure (for double tracking) and the fact that where there is double tracking it is predominantly within the existing rail corridor. Any excavated material should be re-used for filling in earthworks and landscaping and remaining transferred off site for reuse if of suitable quality.

Overall all the options are anticipated to have a **neutral (0)** impact on geology.

## K.09 Biodiversity and Habitats

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### K.09.01 Qualitative appraisal (all options)

#### Biodiversity

A Biodiversity Net Positive baseline assessment for Option 1 was carried out. The assessment quantifies the baseline biodiversity units, and thereby the potential biodiversity impacts and opportunities, associated with the scheme option.

A small area of the Proposed Development is an irreplaceable habitat - Ancient Woodland at the Cart and Kittoch Valleys SSSI (see first entry in Table 4 in **separate document - Appendix G**). As such it is excluded from biodiversity unit calculations. Nearly half (43.61%) of the total area of scheme options presently is of low overall value for biodiversity, with 14% of the total area being medium and 2.3% of the total area of high value for biodiversity. The habitats currently generate 210.6 BU over 69.45 ha and a total of 2,456 LU contributed by hedgerows on the full rail corridor.

As many habitats within the scheme option area are of low value to biodiversity, with relatively few areas of medium or high value, the main recommendation for scheme designs is to minimise the total area of habitat loss and to avoid loss of high biodiversity areas where possible. The area of irreplaceable habitat is below an elevated railway and will be undisturbed. As recommended by the report, a Detailed Biodiversity Net Positive Assessment will be carried out, once the preferred option for the proposed scheme have been finalised, and thereafter the recommendations will be incorporated in the final development to achieve a net positive biodiversity contribution.

#### Habitats

The Initial Ecology Report supporting the EIA Screening Report found that habitats present within the Study Area are suitable for the following species: bats, badger, otter, water vole, birds, reptiles, amphibians and fish.

In respect of bats, it considers that the study area presents suitable habitat to support foraging, commuting and roosting bat activity and that the rail corridor itself presents optimal bat habitat. As there is potential for disturbance as a result of the Proposed Development bat surveys should be undertaken in advance of any works.

Badger activity was recorded within the Study Area which offers suitable habitat to support badgers. Some areas along the rail corridor are more suitable e.g. embankments of dense scrub and woodland, and the corridor is likely to be used as a commuting route. As there is potential for disturbance and/or destruction of setts along the rail corridor during works associated with the Proposed Development, badger surveys would need to be undertaken and replacement setts established in advance of development.

The Study Area and some of the multiple watercourses which cross the railway have suitability to support otters and water voles. However, it is not anticipated that there will be any direct impact on the water environment from the scheme options and there are no specific recommendations in relations to otters and water voles.

Suitable breeding bird habitat is present within the Study Area, including woodland, scrub, and isolated trees. No active nest sites were identified during the field survey, however this was undertaken after the main breeding bird season. The management of vegetation along the route will be required in advance of the development activity to reduce the impact on breeding birds.

Scrub, woodland, tall herb, and marsh vegetation offer suitable habitat within the Study Area for reptiles, but no desk-top records of reptiles were returned from up to 2km away. It is not anticipated that there will be any direct impact from the Proposed Development.

The wider Study Area crosses multiple watercourses of varying size and suitability to support fish, including (but not limited to) the River Clyde, White Cart Water, Auldhouse Burn, Brock Burn, and Levern Water. Brock Burn and Levern Water do not run adjacent to or cross the rail corridor. None of the other watercourses listed as suitable to support fish are identified in Table 5 as watercourses where works may have a potential impact. Fish species will therefore not be impacted by the proposed works.

Overall all the options are anticipated to have a **minor negative (-1)** impact on biodiversity and habitats.

## K.10 Landscape

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### K.10.01 Qualitative appraisal (all options)

The scheme options are not predicted to directly or indirectly affect any regionally or locally designated landscape areas.

Construction works could give rise to temporary impacts on landscape from construction activity and associated movements of plant and vehicles although these would be short term and are not predicted to be significant.

**Core Paths:** Along the line of route there are thirteen core paths which cross the railway line. Seven of the core paths will not be affected by the works, the remaining six may require to be temporarily diverted to allow works to the bridge such as deck works, OLE attached or parapet works. No core paths will be required to be permanently stopped up and diversions will be agreed in advance with local authorities and publicly notified. The Proposed Development would therefore have a low and temporary effect on access around the railway which can be mitigated using barriers signs and diversion measures.

Overall all the options are anticipated to have a **neutral (0)** impact on landscape.

## K.11 Visual Amenity

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### K.11.01 Qualitative appraisal (all options)

All of the scheme options will include the introduction of OLE equipment on some or all of the corridors. The potential impacts are localised and relate to the siting and visual appearance of OLE equipment. The route is an established rail corridor with typical railway features e.g. cuttings, embankments, signalling cables and equipment boxes, stations, bridges, etc. but careful consideration will still be given to the design and siting of OLE equipment balanced against the technical requirements of electrifying the line. The impacts are likely to be low/mitigated against.

There are B-listed structures and a B-listed station which will require amendment to incorporate OLE equipment. All works will be subject to the listed building consent process and designs will be developed on a site-by-site basis to mitigate against an adverse visual impact on the character of the listed structures and their setting.

The rail station improvements at Giffnock and Thorntonhall (to include lifts) will have a minor negative visual impact which will be mitigated through the design process. The upgraded station at East Kilbride and the relocated Hairmyres station will be developed in accordance with SLC's planning policies to mitigate the impact on visual amenity.

Overall all the options are anticipated to have a **minor negative (-1)** impact on visual amenity.

## **K.12 Agriculture and Soils**

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### **K.12.01 Qualitative appraisal (all options)**

There are no designated contaminated land sites currently identified in either of the three local authorities that are within vicinity of the Proposed Development where consideration needs to be given to creation of pathways (Part IIA of the Environmental Protection Act 1990).

The Network Rail national hazard directory and NR GIS database (GeoRINM) have been used to determine the presence of historic contamination on or near the GBK and EKE railway lines. On the GBK line the risk of migration of landfill gases has been identified along the stretch of railway at a former Victorian Pottery, east of Blackbyres Road, Barrhead. On the EKE line the risk of migration of landfill gases has been identified at Burnfield Road in Thornliebank, Westerton Lane in Busby, Mushroom Fields in Thorntonhall and Burley Place, East Kilbride.

Further investigation of historic contamination is required to detail potential source-pathway-receptor pollutant linkages from contaminated land and to ensure that no pathways are created. The project will take steps to deal with all contamination that is identified as a risk to receptors and will design out or mitigate the risk that contaminated land may present to site users and the wider environment.

Overall all the options are anticipated to have a **neutral (0)** impact on agriculture and soils.

## K.13 Cultural Heritage

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### K.13.01 Qualitative appraisal (all options)

Based on geographic location the route has potential to impact on six conservation areas, five listed structures/station and two TPOs. It is therefore necessary to consider what works are proposed in these locations.

In respect of the conservation areas, the works in those areas will be associated with electrification only and there will be no changes to the rail corridor width i.e. no encroachment into conservation areas. The potential impacts are localised and relate to the siting and visual appearance of OLE equipment. The impacts are likely to be low/mitigated against.

In respect of the listed structures, there are three underbridge structures all B-listed. Full design details are still to be developed but it is highly likely that works will be required to attach OLE equipment to the bridges. The C-listed footbridge doesn't have the clearance height necessary for electric lines to pass under and options require to be developed.

The parapets would also be considered non-compliant for electrification purposes in terms of height, stepping and perforations. Finally, there is a B-listed station which will require some platform lengthening and OLE equipment installed. All these works will be subject to the listed building consent process and designs will be developed on a site-by-site basis to mitigate against an adverse visual impact on the character of the listed structures and their setting.

Both Tree Protection Orders are in areas associated with electrification only and there will be no changes to the rail corridor width which would require the removal of any protected trees. The Scheduled Monument is beyond the development site (80m) and separated from railway by White Cart Water. The proposals will not impact on the site.

Therefore, in respect of cultural heritage and archaeology there are not expected to be any significant effects as a result of the scheme, and a **neutral (0)** impact on cultural heritage is anticipated.

## **K.14 Summary of the Environmental Appraisal**

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### **K.14.01 Qualitative**

The summary of the qualitative impact of the scheme options on the Environmental sub-criteria is included in the table below.

**Table 32 – Summary of Environmental Criteria Appraisal (Qualitative)**

| <b>Option</b><br><i>(all options include EMU to Barrhead)</i>                                             | <b>Noise and Vibration</b> | <b>Global Air Quality (CO<sub>2</sub>)</b> | <b>Local Air Quality (PM<sub>10</sub> &amp; NO<sub>2</sub>)</b> | <b>Water Quality, Drainage and Flood Defence</b> | <b>Geology</b> | <b>Bio-diversity and Habitats</b> | <b>Land-scape</b> | <b>Visual Amenity</b>  | <b>Agriculture and Soils</b> | <b>Cultural Heritage</b> |
|-----------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------|----------------|-----------------------------------|-------------------|------------------------|------------------------------|--------------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead. | +1<br>(minor benefit)      | +2<br>(moderate benefit)                   | +1<br>(minor benefit)                                           | 0<br>(neutral)                                   | 0<br>(neutral) | -1<br>(minor negative)            | 0<br>(neutral)    | -1<br>(minor negative) | 0<br>(neutral)               | 0<br>(neutral)           |
| Option 2: No track infrastructure improvements (except for double tracking)                               | +1<br>(minor benefit)      | +2<br>(moderate benefit)                   | +1<br>(minor benefit)                                           | 0<br>(neutral)                                   | 0<br>(neutral) | -1<br>(minor negative)            | 0<br>(neutral)    | -1<br>(minor negative) | 0<br>(neutral)               | 0<br>(neutral)           |

| Option<br><i>(all options include EMU to Barrhead)</i>                           | Noise and Vibration | Global Air Quality (CO <sub>2</sub> ) | Local Air Quality (PM <sub>10</sub> & NO <sub>2</sub> ) | Water Quality, Drainage and Flood Defence | Geology | Bio-diversity and Habitats | Land-scape | Visual Amenity | Agriculture and Soils | Cultural Heritage |
|----------------------------------------------------------------------------------|---------------------|---------------------------------------|---------------------------------------------------------|-------------------------------------------|---------|----------------------------|------------|----------------|-----------------------|-------------------|
| East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead. |                     |                                       |                                                         |                                           |         |                            |            |                |                       |                   |

### K.14.02 Quantitative Appraisal Summary

The economic appraisal generated monetized estimates of the environmental benefits of the scheme, which include both the benefits of the removal of diesel services and the environmental benefits of modal shift from road to rail. These are summarised for each option in the table below, and sum the noise, local air quality and greenhouse gases benefits.

**Table 33 – Summary of Environmental Criteria Appraisal (Quantitative)**

| Option                                                                                                                                                      | Monetized Forecast Environmental Benefit (2010 prices) High Growth | Monetized Forecast Environmental Benefit (2010 prices) Low Growth |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead.                                                   | [REDACTED TEXT]                                                    | [REDACTED TEXT]                                                   |
| Option 2: No track infrastructure improvements (except for double tracking East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead. | [REDACTED TEXT]                                                    | [REDACTED TEXT]                                                   |

# Part L: Safety Criterion Appraisal

## L.01.01 Appraisal Overview

The most significant safety benefit would come from a modal shift from road to rail as a result of improved service frequency, as statistical accident risk on local and trunk road networks is a function of traffic volume (based on [Transport Appraisal Guidance Unit 5.4](#)) and modal shift would reduce road traffic accident risk on the corridor as a whole. The provision of additional train capacity may also alleviate crowding on trains and at stations, with a corresponding (albeit minor) reduction in associated safety risk.

The environmental benefits section outlines a number of key aspects where improving air quality will bring significant benefits to staff. Whilst air quality improvements are required in a significantly shorter timescale than decarbonisation deployment of traction decarbonisation will provide a permanent long-term solution to staff exposure to diesel fumes.

Whilst not a new risk, deployment of significant volumes of electrification infrastructure will increase the potential for operations and maintenance staff to come into contact with live equipment.

In terms of a quantified safety benefit, this can be estimated in terms of the amount of new rail passenger trips, some of which are assumed to be abstracted from the roads, therefore reducing the risk of accident.

**Table 34: Monetized Safety Benefits**

| Option                                                                                                                                                      | Monetized Forecast Safety Benefit (2010 prices) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead.                                                   | [REDACTED TEXT]                                 |
| Option 2: No track infrastructure improvements (except for double tracking East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead. | [REDACTED TEXT]                                 |

Given that the scale of these savings is relatively small over a 60-year period, and the differences between options is also small, all options have been rated as **Neutral** against the STAG Safety criteria.

# Part M: Integration Criterion

## Appraisal

### M.01.01 Introduction

The options have been appraised taking account of integration in relation to:

- Transport integration: consideration of options in terms of services and ticketing, infrastructure and information;
- Transport and land-use integration: an assessment of the impact of options on proposed or existing land-use developments; and
- Policy integration: a check of options against national policy and specific accessibility issues such as disability, health, rural affairs and social inclusion.

### M.01.02 Transport Integration

Benefits in terms of transport integration will be derived from the relocation of Hairmyres station (all options) where there will be improved integration between bus and rail services. The appraisal scoring for Option 1, where there are increased service frequencies on the East Kilbride corridor, are at moderate benefit (+2) as the higher frequencies/shorter waiting times for rail services will support improved timetable matching between bus and rail services at stations along the corridor. The appraisal scores are summarised in Table 35.

### M.01.03 Transport and Land Use Integration

The transport and land use sub-objective considers whether:

- there are conflicts with the land requirements for the option;
- the option fits with policy at all levels concerning transport and land use; and
- the option conflicts with any other existing or planned development.

A positive impact will arise from the relocation of Hairmyres station (for all options) as the new location is closer to planned development and will be better connected with the development (through active travel links) and with other transport modes (through bus

interchange and park and ride capacity). The appraisal scores are summarised in Table 35.

#### M.01.04 Policy Integration

The policy integration sub-objective considers the options in the wider Scottish policy context. This includes consideration of the contribution of the options to meeting the Government’s purpose and national transport policy objectives.

Drawing upon the review of TPOs against policy in section F.04 of the Strategic Case, which showed alignment between the TPOs and policy. The appraisal of options against the TPOs in section G.08 of the Strategic Case indicated that Option 1 scores moderate or major positive benefits against all three TPOs. Option 2 scores as minor benefit against TPO2 (as no track infrastructure is included).

The resultant appraisal scores against the policy integration criteria are summarised in Table 35.

**Table 35: Appraisal Scores for Integration**

| Option                                                                                                                                                      | Transport Integration | Transport and land-use integration | Policy Integration    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------------|-----------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead.                                                   | +2 (moderate benefit) | +1 (minor benefit)                 | +2 (moderate benefit) |
| Option 2: No track infrastructure improvements (except for double tracking East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead. | +1 (minor benefit)    | +1 (minor benefit)                 | +1 (minor benefit)    |

Overall, Option 1 has been rated as **Moderate Benefit (+2)** against the Integration criteria, reflecting the improved station and local community accessibility and

integration with other modes due to the station improvements including the relocation of Hairmyres station. Option 2 is scored as **Minor Benefit (+1)** due to lower transport and policy integration scoring.

# Part N: Accessibility and Social Inclusion Criterion Appraisal

## N.01 Introduction

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### N.01.01 Introduction

While the project does not increase the geographical coverage of the public transport network, there is significant investment being made into how stations are accessed, and how accessible they are to the varying needs of those who use them.

### N.01.02 Public Transport Accessibility

Access to the public transport network will be enhanced via increased frequencies, particularly in the off-peak, providing more opportunities to travel for the options which double track the rail network.

## N.02 Accessibility at Stations

---

### N.02.01 Overview of changes to stations

A number of enhancements are proposed to accessibility provisions at stations along the East Kilbride and Barrhead corridors for all options:

- East Kilbride Station to be rebuilt created a 'concourse' style that will provide step free access to both platforms and better walking / cycling access;
- Hairmyres Station will be relocated, and the new provision will have a footbridge and lifts, creating step free platform to platform access; and
- Station accessibility improvements will be provided at other stations along the East Kilbride and Barrhead corridors (subject to further design development).

The new stations (East Kilbride and Hairmyres) and any station accessibility improvements will be designed in accordance with the joint code of practice produced by the Department for Transport and Transport Scotland 'Design Standards for Accessible Railway Stations' and be fully compliant with the Equalities Act 2010. There

are no perceived negative impacts as facilities will be delivered in line with the relevant Network Rail standards for stations, the Department for Transport/Transport Scotland [Design Standards for Accessible Railway Stations 2015](#) and all works will comply with the Interoperability regulations PRM NTSN's relating to accessibility.

The project intends to have further consultation with the general public once the designs are further developed but have carried out significant stakeholder engagement with key groups, including access panels. In January 2020, the project provided an overview to the South Lanarkshire Access Panel and have committed to sharing the GRIP 5 designs and continuing engagement with the group. The project has also consulted with ERDA (East Renfrewshire Disability Action) and The Me 2 Club in September 2020. Internally, the project presented to the BEAP (Build Environment Access Panel) in October 2019 and will present to them again before the completion of GRIP 5. The project Communications Plan details further engagement with these groups, Community Councils and the internal DAP (Design Assurance Panel).

#### **N.02.02 Conclusion & scoring against STAG criteria**

Both options perform positively in terms of accessibility and both options have been rated as **Moderate Benefit (+2)** against the Community Accessibility and Comparative Accessibility criteria, reflecting the improved station and local community accessibility through the station improvements, including the relocation of Hairmyres station.

**Table 36: Scoring against Accessibility & Social Inclusion STAG criteria**

| Option                                                                                                                                                      | Appraisal score against Accessibility & Social Inclusion STAG Criteria |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead.                                                   | +2 (moderate benefit)                                                  |
| Option 2: No track infrastructure improvements (except for double tracking East Kilbride station). EMU services to East Kilbride. EMU services to Barrhead. | +2 (moderate benefit)                                                  |

# Part O: Summary and Conclusion

The quantitative and qualitative appraisal results are set out against all the shortlisted options in Table 37 and Table 38.

The associated Options Summary Tables (OSTs) are included in **separate document - Appendix J**.

The appraisal indicates that Option 1 is the best performing option against the STAG criteria and represents the best value for money.

**Table 37: Summary of Quantitative Appraisal Scores**

| Option (all 6-car)                                                                                        | Present Value costs of Capex + Opex (2010 prices) | NPV             | Benefit Cost Ratio (BCR) |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------|--------------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead. | [REDACTED TEXT]                                   | [REDACTED TEXT] | [REDACTED TEXT]          |
| Option 2: No track infrastructure improvements. EMU services to East Kilbride. EMU services to Barrhead.  | [REDACTED TEXT]                                   | [REDACTED TEXT] | [REDACTED TEXT]          |

## Selection of Preferred Option

Following consideration of the performance of the options against the TPOs, the STAG criteria, the sensitivity of the socio-economic case to forecast passenger demand growth, and the implementation costs, the **preferred option** has been identified as Option 2.

Whilst Option 2 represent a lower BCR compared to Option 1, and does not perform as well against the STAG criteria, it is less sensitive to uncertain future demand growth and is likely to be less expensive to implement whilst achieving the majority of the objectives for the scheme, with additional passenger capacity facilitated by platform extensions and new rolling stock.

**Table 38: Summary of Qualitative Appraisal Scores**

| <b>Option</b><br><i>(all options include EMU to Barrhead)</i>                                             | <b>Environment</b><br>(sub-criteria with neutral scores for all options are hidden)<br><b>Noise and Vibration</b> | <b>Environment</b><br>(sub-criteria with neutral scores for all options are hidden)<br><b>Global Air Quality (CO<sub>2</sub>)</b> | <b>Environment</b><br>(sub-criteria with neutral scores for all options are hidden)<br><b>Local Air Quality (PM<sub>10</sub> &amp; NO<sub>2</sub>)</b> | <b>Environment</b><br>(sub-criteria with neutral scores for all options are hidden)<br><b>Bio-diversity and Habitats</b> | <b>Environment</b><br>(sub-criteria with neutral scores for all options are hidden)<br><b>Visual Amenity</b> | <b>Safety</b>  | <b>Accessibility and Social Inclusion</b> | <b>Integration</b><br><b>Transport Integration</b> | <b>Integration</b><br><b>Transport and Land Use Integration</b> | <b>Integration</b><br><b>Policy Integration</b> | <b>Economy</b>     |
|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------|--------------------|
| Option 1: Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead. | +1<br>(minor benefit)                                                                                             | +2 (moderate benefit)                                                                                                             | +1<br>(minor benefit)                                                                                                                                  | -1<br>(minor negative)                                                                                                   | -1<br>(minor negative)                                                                                       | 0<br>(neutral) | +2 (moderate benefit)                     | +2<br>(moderate benefit)                           | +1 (minor benefit)                                              | +2 (moderate benefit)                           | +1 (minor benefit) |
| Option 2: No track infrastructure improvements. EMU services to East Kilbride. EMU services to Barrhead.  | +1<br>(minor benefit)                                                                                             | +2 (moderate benefit)                                                                                                             | +1<br>(minor benefit)                                                                                                                                  | -1<br>(minor negative)                                                                                                   | -1<br>(minor negative)                                                                                       | 0<br>(neutral) | +2 (moderate benefit)                     | +1 (minor benefit)                                 | +1 (minor benefit)                                              | +1 (minor benefit)                              | 0 (neutral)        |

The recommended option for the East Kilbride corridor is retaining the current track infrastructure and current level of service. However, the introduction of new Electric Multiple Unit (EMU) rolling stock, which hold more passenger capacity than current Diesel Multiple Unit (DMU) rolling stock, is expected to cater for a small rise in demand. Furthermore, passive provision is being designed for 8 car rolling stock at platforms from the current 6 car provision.

Growth forecasts indicate that commuter demand (peak) may not return to pre-COVID levels and off-peak demand forecasts do not demonstrate the requirement to invest capital to deliver 4tph across all scenarios. A 4tph service all day would also increase the net cost of operating Scotland’s Railway to Scottish Government.

On balance Option 2 represents the most reasonable option to progress in context of the scheme costs and likely realisation of benefits whilst supporting Scottish Government’s goal to decarbonise the rail network in Scotland. The preferred scheme minimises operating cost, will deliver improved reliability for customers, maintain historical levels of peak capacity and provide increased off-peak capacity and journey comfort.

# COMMERCIAL CASE

## Part P: Commercial Case

### P.01 Introduction

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This chapter presents the Commercial Case for the East Kilbride and Barrhead Rail Corridors enhancement scheme. It summarises the procurement strategy proposed for the infrastructure improvements, outlines the supplier sourcing options and sets out the relevant commercial risks and proposed mitigation actions for both Transport Scotland (TS) and Network Rail (NR).

### P.02 Output-based Specification

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The scope of the scheme is for the double-tracking of the single-line section between East Kilbride and Busby station and the electrification of the railway between East Kilbride and Glasgow Central and between Barrhead and Busby Junction. The scheme directly supports the introduction of new 6-car zero emission services between East Kilbride and Glasgow Central by December 2024 and between Barrhead and Glasgow Central by December 2023. It could also allow BEMUs to operate on Kilmarnock services removing more DMUs in/out of Glasgow Central.

The scheme (***based on the preferred option – Option 2***) includes the following works:

- Double tracking at East Kilbride Station.
- Upgrade of East Kilbride Station, including the provision of an additional platform.
- Relocation of Hairmyres station with accessible footbridge, located to the west of the existing station.
- Station accessibility improvements at stations along the Barrhead and East Kilbride corridors.

- Electrification of the route from Larkfield Junction through to Busby Junction, including tie-ins with the existing electrification on the Clydesdale lines and Muirhouse South Junction.
- Electrification of the route from Busby Junction to East Kilbride Station.
- Electrification of the route from Busby Junction to Barrhead Station.
- All route clearance requirements to allow for electrification.
- Upgrade to all stations between Crossmyloof and East Kilbride to cater for electrification and 8-Car 385 EMUs, including platform extensions if required.
- All gauging works (station and structures) to cater for the identified rolling stock.
- Signalling works associated with the electrification.
- Passive provision for platform extensions along the line from Busby Junction to East Kilbride

The scheme is expected to achieve its objectives in the following ways:

- The East Kilbride Rail Corridor will have increased passenger capacity through new rolling stock and increased platform lengths.
- Working with Local Authorities, including at key locations like Hairmyres Station, the introduction of improved sustainable access, bus interchange facilities and additional park and ride capacity will improve transport integration.
- The environmental impact associated with the region's transport network will be reduced due to the move from diesel to electric services.
- By providing fully accessible or step-free access to key stations on the route, the scheme will improve the accessibility of the rail network to people with physical impairment.

## **P.03 Procurement Strategy**

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### **P.03.01 Construction**

Network Rail has considered the construction options available to the organisation. It was deemed that a Design and Build contract is the most suitable procurement option for the four main contract awards: Civils, Track, OLE and Signalling & Telecoms.



From experience on recent schemes of a similar nature, Design and Build contracts provide a more favourable allocation of risk between Network Rail and the Supplier, whereas a standalone Design contract followed by a subsequent Construction only contract tips the risk share towards Network Rail by opening the project up to continual change as the works progress.

Contracts will utilise Network Rail standard terms and conditions contained within their suite of design and build contracts with agreement of allocation of risk agreed between Network Rail and Suppliers prior to contract execution. This approach has worked well on previous major schemes. The use of Target Cost contracts also enables incentivisation to be hard wired into the relationship from contract execution.

The proposed procurement strategy was selected at a procurement workshop that took place in August 2019 to evaluate and identify a route to market for suppliers capable of delivering. The procurement strategy continues to be reviewed on a regular basis to ensure it remains valid and best choice for the project. The following factors have been evaluated as part of the process to select the most appropriate procurement strategy:

- ECI input into design
- Interface management
- 3rd party engagement
- Staging and access strategy
- Price and programme development
- GRIP 5-8 construction

### **P.03.02 Operation**

The current Abellio ScotRail franchise is due to end in March 2022 and is currently operating under an Emergency Measures Agreement with Transport Scotland. The new rail services will be incorporated into the franchise/concession agreement between Transport Scotland and the operator post-2022, dependent on the approach to rail franchising determined by Government.

## P.04 Sourcing Options

### P.04.01 Overview of sourcing options

Given Network Rail’s role as ‘infrastructure manager’ for the national rail network and their established delivery frameworks, it is anticipated that Network Rail will use its existing framework of contracts to procure and deliver the works.

It is estimated that existing procurement routes will be used for Civils, Track, OLE, GI and Signalling alongside internal Works Delivery packages with Network Rail managing the interface between delivery partners.

The frameworks set out in the table below are expected to be used in this instance.

**Table 39 – Network Rail Frameworks Proposed**

| Framework                                                   | Workstream | Stage 1 Works                                                                                                                                                                                                                                                                                                                                                         | Stage 2 Works                                         |
|-------------------------------------------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| IPSNE CP6 Renewals and Enhancements Framework – BAM Nuttall | Civils     | <p>Delivery of Early Contractor Involvement to ensure constructability is built into the AIP design process throughout.</p> <p>This will inform the access strategy, construction staging, and overall delivery of the project and a price and programme will be developed to support budget preparation and accurate planning of the next stages of the project.</p> | Delivery of GRIP 5-8 works for the Civils workstream. |

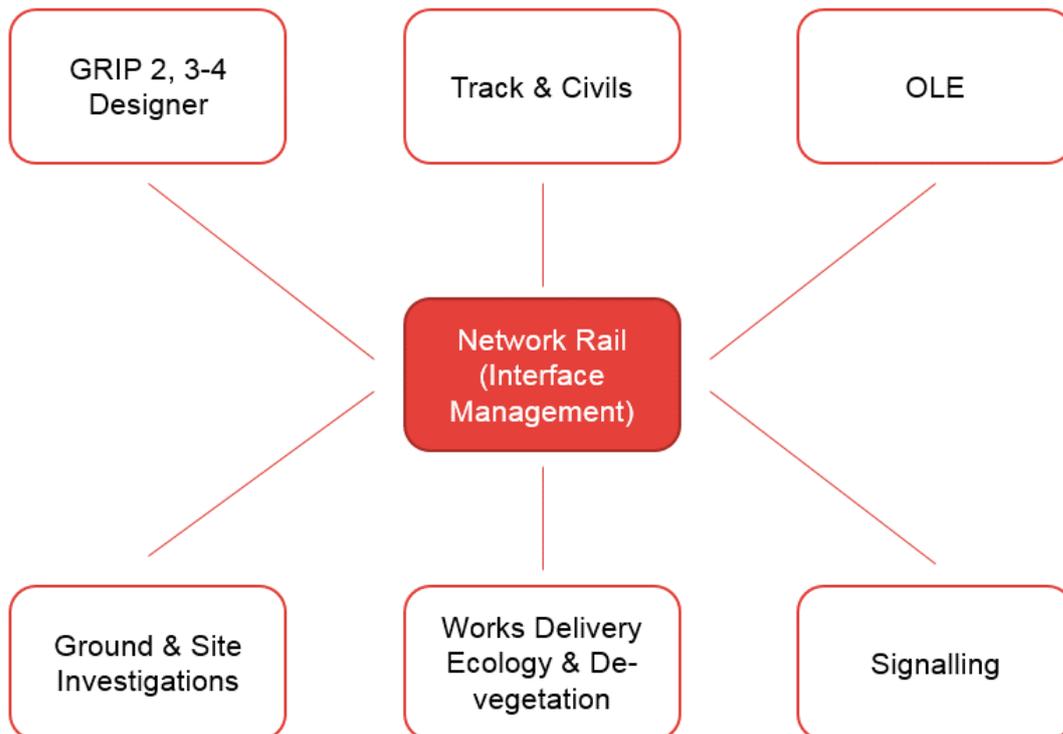
| Framework                                                                    | Workstream      | Stage 1 Works                                                                                                                                                                                                                                                                                                                                                         | Stage 2 Works                                                                                                                                  |
|------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Rail Systems Alliance Scotland                                               | Track           | <p>Delivery of Early Contractor Involvement to ensure constructability is built into the AIP design process throughout.</p> <p>This will inform the access strategy, construction staging, and overall delivery of the project and a price and programme will be developed to support budget preparation and accurate planning of the next stages of the project.</p> | Delivery of GRIP 5-8 works for Track workstream.                                                                                               |
| National Electrification Programme Framework – Scotland Lot – SPL Powerlines | Electrification | <p>Delivery of Early Contractor Involvement to ensure constructability is built into the AIP design process throughout.</p> <p>This will inform the access strategy, construction staging, and overall delivery of the project and a price and programme will be developed to support budget preparation and</p>                                                      | Delivery of GRIP5-8 works for the Electrification workstream including all civils, OLE, distribution, telecoms, protection settings and SCADA. |

| Framework                                                                | Workstream        | Stage 1 Works                                                                                                                                                                                                                                                                                                                                                         | Stage 2 Works                                                                                                                                |
|--------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                          |                   | <p>accurate planning of the next stages of the project.</p> <p>Also completing safety surveys to identify all issues on the route and where possible remove these risks or plan mitigations and the installation of RRAPs and compounds.</p>                                                                                                                          |                                                                                                                                              |
| <p>CP6 Major Signalling Framework (CP6 MSF) – Scotland Lot – Siemens</p> | <p>Signalling</p> | <p>Delivery of Early Contractor Involvement to ensure constructability is built into the AIP design process throughout.</p> <p>This will inform the access strategy, construction staging, and overall delivery of the project and a price and programme will be developed to support budget preparation and accurate planning of the next stages of the project.</p> | <p>Delivery of GRIP5-8 Signalling for all new or modified signalling and telecoms assets to support double tracking and electrification.</p> |

The delivery arrangements are based on addressing the key challenges around design interfaces between the respective disciplines. Network Rail will act as the programme

interface co-ordinator with the Civils, Track, OHL and Signalling contractors being the key interface suppliers as illustrated in Figure 23. This has been a successful approach on previous schemes, allowing Network Rail to provide the right level of intrusiveness and assurance. Interface management will be facilitated via formal periodic meetings, which will be minuted, with action owners.

**Figure 23 – Proposed Scheme Delivery Arrangement**



**P.04.02 Planned Procurement**

Network Rail is tendering the contract for the overhead line supplier for detailed design and construction activity (GIP5-8) for both East Kilbride and Barrhead corridors electrification.

Network Rail is tendering the civils contract for “critical works” detailed design and construction activity (GRIP5-8) for both the East Kilbride and Barrhead corridors. The contract focuses on detail design and some implementation work for the key interventions in Route Section 1.

***Procurement will be completed and contracts awarded following OBC/FBC approval.***

## **P.05 Risk Allocation and Transfer**

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The general principle of risk allocation is that risks should be allocated to the party best able to manage them, subject to value for money considerations. Risks for the scheme have been identified by specialists in railway and civil engineering, geotechnics, transport planning, quantity surveying and the environmental disciplines, and have been entered into a quantitative risk register. This exercise ensures that, based on its risk appetite and tolerance, Network Rail will be better placed to both take advantage of opportunities and manage threats. The project holds a monthly risk review, along with periodic QCRA (Quantitative Cost Risk Assessment) and QSRA (Quantified Schedule Risk Analysis) sessions.

The proposed commercial approach, described above, builds on existing sourcing frameworks of Network Rail. Recent comparable projects include the Shotts and Stirling Dunblane Alloa (SDA) schemes, both delivered via the 'hub and spoke' model, with Network Rail responsible for the interface management. Both projects delivered key outputs/milestones within the specified timescales. In relation to budget adherence, Shotts delivered all works within the budget envelope, whilst key issues encountered on SDA rendered further investment necessary. Appropriate lessons have been learned from both schemes and incorporated into the delivery model for East Kilbride. The project will complete their own lessons learned sessions in advance of identified stage gate reviews.

# FINANCIAL CASE

## Part Q: Financial Case

### Q.01 Introduction

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This chapter presents the Financial Case for the scheme. It summarises the estimated costs for the delivery and operation of the scheme proposals, along with the spending profile and the parties on which the cost falls. It also highlights the financial risks and uncertainties that could affect the project's affordability and describes the anticipated funding sources for the project.

### Q.02 Estimated Costs

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#### Q.02.01 Capital Costs

The capital costs for the scheme have been estimated by Network Rail. The current Anticipated Final Cost (AFC) for the options are:

- Option 1 (Double tracking) = [REDACTED TEXT]
- Option 2 (Single track) = [REDACTED TEXT]

The costs for the preferred option (Option 2) are based on the following:

- Capital costs for Barrhead = [REDACTED TEXT] (including risk and inflation) developed to FBC specification
- Capital costs for East Kilbride = [REDACTED TEXT] (including risk and inflation) developed to OBC specification
- **TOTAL** = [REDACTED TEXT]

These capital costs include the following against the sections shown in Figure 24:

- Barrhead: electrification of the full route between Glasgow Central and East Kilbride (route sections 1 (Glasgow to Busby Junction) and 5 (Busby Junction to Barrhead) (FBC)

- East Kilbride: electrification of the branch between Busby Junction and East Kilbride and associated station enhancements (route sections 2 (Busby Junction to Busby station), 3 (Busby station to Hairmyres) and 4 (Hairmyres to East Kilbride station), including the relocation of Hairmyres station (OBC)
- Barrhead & East Kilbride: station accessibility enhancements (route sections 1–5 (full route) (OBC)

**Figure 24 – Outline of Route Sections**



Each cost estimate includes a risk allowance. This has been calculated assuming a risk exposure of 80% (P80). This was produced from a quantified cost risk assessment exercise undertaken by Network Rail.

For the risk contingency, it is assumed that all financial risks applicable to the project have been evaluated and included in Network Rail’s risk allowance; as such, no additional contingency is applied.

The capital cost estimate is informed by the following:

- Unit rates which have been benchmarked against historic and current projects, and show the estimate to be robust, with an appropriate efficiency challenge
- ECI engagement with the supply chain which has familiarised all suppliers with the project and afforded them the opportunity to influence design
- Network Rail have received price submissions from their suppliers that are in line with the Network Rail estimate and benchmark rates

### Q.02.02 Operating Costs

The operating costs for the operating options have been supplied by Abellio ScotRail. The incremental impact for 2025 of replacing the existing diesel operations with EMUs or BEMUs has been estimated. As EMUs and BEMUs have lower leasing and running costs than DMUs, on a like-for-like basis they produce a saving, e.g. for Option 2. Where timetable improvements are introduced, the additional mileage operated offsets the lower leasing and running cost savings. The costs include for [REDACTED TEXT]/standard track kilometre/year OLE maintenance cost.

**Table 40 – Annual (2025) incremental operating cost**

| Option | Description                                                                                     | Incremental operating cost (£) |
|--------|-------------------------------------------------------------------------------------------------|--------------------------------|
| 1      | Full Double Tracking to East Kilbride. EMU services to East Kilbride. EMU services to Barrhead. | [REDACTED TEXT]                |
| 2      | No track infrastructure improvements. EMU services to East Kilbride. EMU services to Barrhead.  | [REDACTED TEXT]                |

## Q.03 Funding

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### Q.03.01 Capital Costs

Funding for the construction of the scheme is sought from Transport Scotland as a grant from the authority's Enhancement Fund. This is to cover 100% of the estimated capital cost of the scheme, including the risk allowance.

While there is no third party funding for the scheme, significant local government funding is being provided for the associated works at Hairmyres station. Strathclyde Partnership for Transport (SPT) has committed to up to [REDACTED TEXT], to complement South Lanarkshire Council's contribution of [REDACTED TEXT], plus the value of the sale of its existing land at Hairmyres station. This will fund the park and ride car park, cycle facilities, electric vehicle charging points and active travel infrastructure, all of which will support the success of the scheme.

### Q.03.02 Operating Costs

As described in the Economic Case, revenue estimates have been produced for each of the operating options presented in the OBC/FBC and for a range of growth scenarios. Setting these against the respective operating costs presents the estimated operating position and implications for funding requirements.

**Table 41 – Operating position (2026)**

| Option | Description                                                                        | Incremental operating cost (£) | Revenue (£) (high growth) | Revenue (£) (low growth) |
|--------|------------------------------------------------------------------------------------|--------------------------------|---------------------------|--------------------------|
| 1      | Full Double Tracking to East Kilbride. EMU services to East Kilbride and Barrhead. | [REDACTED TEXT]                | [REDACTED TEXT]           | [REDACTED TEXT]          |
| 2      | No track infrastructure improvements. EMU services to East Kilbride and Barrhead.  | [REDACTED TEXT]                | [REDACTED TEXT]           | [REDACTED TEXT]          |

As described in the Commercial Case, the current ScotRail franchise is due to end in 2022, prior to the delivery of the scheme. It is anticipated that the operating position for the enhanced services will be addressed through the post-2022 franchise/concession arrangements that will be specified by Transport Scotland, with additional funding provided by Transport Scotland as required.

## Q.04 Financial Risks

The key financial risks identified are set out below.

**Table 42 - Key Project Financial Risks**

| <b>Nature of Risk</b>                                               | <b>Description</b> | <b>Owner and Mitigation</b> |
|---------------------------------------------------------------------|--------------------|-----------------------------|
| Increase in capital cost                                            | [REDACTED TEXT]    | [REDACTED TEXT]             |
| Decrease in farebox revenue                                         | [REDACTED TEXT]    | [REDACTED TEXT]             |
| Insufficient electricity for traction and additional assets         | [REDACTED TEXT]    | [REDACTED TEXT]             |
| Interface with other projects internal and external to Network Rail | [REDACTED TEXT]    | [REDACTED TEXT]             |

# MANAGEMENT CASE

## Part R: Management Case

### R.01 Introduction

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This chapter sets out the governance structure, project plan and assurance and approvals plan. It also outlines the strategies behind risk management and communication and stakeholder management.

### R.02 Project Dependencies and Interfaces

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The East Kilbride and Barrhead Corridors enhancement scheme is not dependent on any prior schemes. However, the full realisation of the benefits from the scheme is dependent on SLC implementing the planned walking and cycling improvements in East Kilbride, as well as walking and cycling links and bus interchange facilities at the relocated Hairmyres station location.

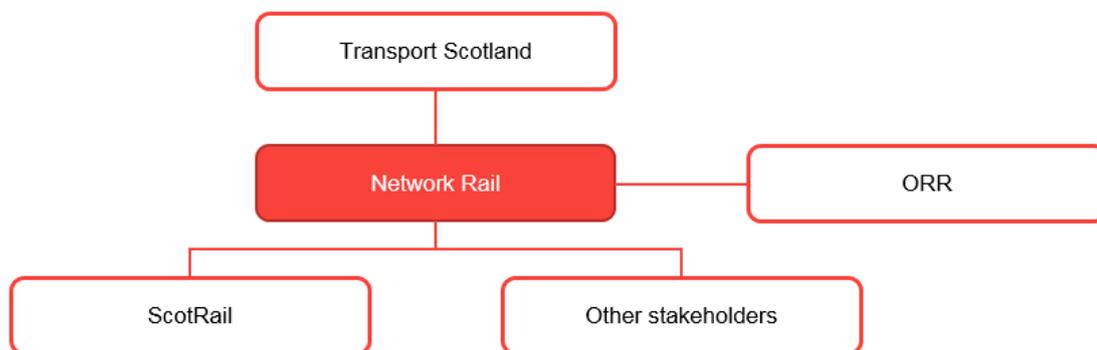
The implementation of Network Rail's Control Period 6 network enhancement plan for Scotland is dependent on the successful delivery of the scheme, as it has multiple interfaces with committed or ongoing Network Rail capital investment projects as described in the Strategic Case, along with Transport Scotland's rolling stock procurement strategy.

### R.03 Governance and Organisational Structure

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The governance structure and delivery team for delivery of the scheme is described below. The scheme will be delivered in line with Transport Scotland's Team Scotland Execution Plan that sets out the governance arrangements and ways of working for the Scottish rail industry.

**Figure 25 - Scheme Governance Structure**



To ensure successful delivery of the scheme, Network Rail has established and will continue to resource the project team with supplier support.

The key roles are:

- **Project Sponsor** – leads the overall strategy and is accountable to define the project scope, acceptance criteria, secure project funding, interfacing with stakeholders and leading project further development.
- **Programme Manager** – leads the delivery teams to implement a programme of projects. Responsible for delivering the defined scope, to achieve key programme milestones, within authorised funding.
- **Project Managers** – lead the delivery teams to implement a sub programme of projects. Responsible for delivering the defined scope, to achieve key programme milestones, within authorised funding.
- **Designated Project Engineer** – The lead engineer, providing leadership to the functional engineers and specifically manages engineering design integration. The DPE is supported by identified discipline specific resource within the engineering team.

The above individuals are supported by the wider project team comprising Network Rail and supplier personnel with expertise and experience in developing and delivering major rail infrastructure projects.

## R.04 Project Plan

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The table below outlines the key project milestones and their target dates for completion. The full programme is included in **separate document - Appendix L**.

**Table 43– Project Plan**

| Key Milestone                                   | Target Date     |
|-------------------------------------------------|-----------------|
| IDM approval & NR authority (Barrhead corridor) | [REDACTED TEXT] |
| Barrhead Corridor – Main Implementation on site | [REDACTED TEXT] |
| East Kilbride FBC IDM (estimated)               | [REDACTED TEXT] |
| Barrhead blockade                               | [REDACTED TEXT] |
| Barrhead Entry into Service                     | [REDACTED TEXT] |
| East Kilbride blockade                          | [REDACTED TEXT] |
| East Kilbride Entry into Service                | [REDACTED TEXT] |

*\* subject to redesign of East Kilbride corridor*

The project programme developed for this OBC/FBC contains all key project tasks, their duration, interdependencies and key milestones and gateways. Certain elements of the programme have built in tolerance / contingency to account for risks identified within the risk register. Should unforeseen or unmitigated risks arise, the scheme's delivery programme could be delayed, resulting in reputational damage, further disruption to the railways, cost increases, and additional financial commitment from the project sponsor.

[REDACTED TEXT]

## R.05 Assurance and Approvals Plan

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### R.05.01 Technical Assurance

The East Kilbride and Barrhead Corridors Enhancement project has progressed in line with the Governance for Railway Projects (GRIP) management and control process.

Network Rail’s GRIP stages were developed to mitigate risk and are based on best practice for major infrastructure projects recommended by the Association of Project Management and the Chartered Institute of Building.

The project is currently at GRIP 4.

**Figure 26 - Key stages of the investment lifecycle - GRIP stages**



Formal gateway reviews are carried out at a minimum of four mandatory stages of the GRIP lifecycle. To successfully progress to the next GRIP stage, a project must deliver an agreed upon set of products that meet specific quality criteria.

Once the project moves into GRIP 5, PACE (a project management framework representing Project, Assets, Change and Environment domains) will be used to replace the GRIP process. PACE is intended to provide a more flexible control framework enabling Sponsors and Project Managers to tailor the controls herein to better meet the requirements of their project.

**Figure 27 – The PACE lifecycle**



Areas of the project which are not performing are addressed and if outputs are not being delivered as projected, the item or discussion area is escalated in line with the governance structure.

**R.05.02 Financial Assurance**

Network Rail will employ its established project governance processes to ensure the necessary approval of budgets and expenditure is adhered to with identified responsibilities for the project manager, project sponsor and project board.

### R.05.03 Value for Money

While value for money must be demonstrated in the scheme's economic appraisal, the scheme will also be evaluated in terms of its contributions to the strategic guidance set out within the following documents:

- Glasgow City Region Economic Action Plan
- South Lanarkshire Economic Strategy 2013-2023
- South Lanarkshire Procurement Strategy 2020-2023
- Renfrewshire Economic Strategy 2020-2030
- East Renfrewshire Corporate Procurement Strategy 2019-2022

## R.06 Communications and Stakeholder Management

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The Stakeholder Management Plan (provided in **separate document - Appendix M**) sets out the objectives of stakeholder engagement for the project. The objectives are as follows:

- Manage stakeholder expectations by providing a realistic view of the change and what will be happening and when.
- Design communications to support the efficient delivery of the works demonstrating Network Rail's inclusive, informed and considerate approach to project delivery.
- Make sure that stakeholders have sufficient information about the impact of work and when and how it will be delivered.
- Build partnerships and local networks to create forums that will help share information to help achieve the required outputs.
- Establish communication channels to ensure efficient and consistent information to stakeholders.
- Demonstrate the benefits the programme can deliver.
- Engage in open and honest communications to encourage meaningful dialogue with all stakeholders.
- Support partners where appropriate for direct customer communications.

These objectives, and the wider stakeholder plan, build on other successful large-scale enhancement projects led by Network Rail.

The Plan provides a high-level guide for stakeholder management, encompassing both internal and external stakeholders and setting out the roles and responsibilities of key members of the project team. It will be revised as the project matures into the detailed design and build stages.

To monitor the level of engagement and measure the success of the stakeholder management plans, key milestones and communication KPIs will be established, along with detailed period reporting. The strategy will also be underpinned by a series of operational communications plans specific to certain elements of the project plan to ensure minimum disruption to stakeholders.

Given the nature of the scheme, it will impact a number of stakeholders over several years; the nature of these impacts will change as the project moves from design to development and construction. Stakeholders interfacing with the works are identified in the Network Rail's communications plan, which will be revised periodically to reflect the changing project development stage and assumptions around the relative importance of key stakeholders and the means to engage with them.

The stakeholder list currently includes:

- Transport Scotland
- Office of Road and Rail
- Train Operating Companies/Freight Operating Companies
- Elected Members
- Local Authorities of South Lanarkshire, East Renfrewshire, City of Glasgow
- Local residents and community groups
- Strathclyde Partnership for Transport
- Public utility providers and key landowners
- Internal Network Rail stakeholders, e.g. Network Rail Property, Maintenance

It is proposed that Network Rail will act as the primary point of contact for the scheme, overseeing the development and delivery of the project communication plan. As such, Network Rail's CRM system will be used to record all incoming correspondence; management reporting will be available on a periodic basis.

## R.07 Risk Management Strategy

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Risk management is a continuous process comprising the identification and assessment of risks and the implementation of actions to mitigate the likelihood of them occurring and their impact if they did. The approach to risk management for the project is proportionate to the decision being made or the impact of the risk.

Network Rail has a well-defined risk management process. It provides detailed guidance on how risk management should be undertaken and covers all management levels, including delivery partners in accordance with GRIP and other Network Rail documentation. A Risk and Value Management Plan has been created as part of GRIP 4 (provided in **separate document - Appendix N**).

A quantified cost risk assessment exercise and risk workshops have been undertaken through the development of the project and will continue where necessary.

- IDC/IDR process has allowed disciplines to minimise design risk.
- The risk register is maintained.
- 8 weekly meetings are in place with the Risk and Value manager.

To date, several key risks have been identified, including those arising from the uncertainty associated with the current maturity of the design and the applied quantity surveying methods, engineering solutions, and overall project management. **separate document - Appendix O** provides the full details of the quantitative project risks, actions and exposure. These, and the associated financial risks have been presented in the Financial Case.

Other risk factors material to the successful delivery of the scheme, are presented in Table 45 below. The actions to be taken to reduce their likelihood of occurrence or impact are scored based on the assumption analysis key shown in Table 44.

**Table 44 - Risk Assumption Analysis Key**

| Confidence           | Impact                |
|----------------------|-----------------------|
| A B C D              | A B C D               |
| A – Very Confident   | A – Minor Impact      |
| B – Fairly Confident | B – Manageable Impact |

| <b>Confidence</b>                           | <b>Impact</b>                                                                      |
|---------------------------------------------|------------------------------------------------------------------------------------|
| C – Uncomfortable                           | C – Significant Impact                                                             |
| D – Very Uncomfortable                      | D – Critical Impact                                                                |
| Will the assumption turn out to be correct? | What impact would the assumption have on the project if it proved to be incorrect? |

**Table 45 - Risk Assumptions**

[REDACTED TABLE]

The approach to mitigation and control measures to reduce the degree of risk considers one of the four options available:

- Terminate: Remove the risk completely by terminating the activity
- Tolerate: Accept and manage the risk
- Transfer: Transfer the risk, for example, through an insurance claim or a third party best placed to manage the risk
- Mitigate: Implement management actions and controls to reduce the risk, including ownership of the risk

Reviews of the scheme’s risk register are an integral part of progress meetings and at the Project Board throughout the life of the scheme. All key risks will be formally reviewed at key decision points in the scheme lifecycle.

## **R.08 Benefits Realisation Plan**

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A key element of the STAG process is the requirement for the impact of interventions to be evaluated. It is important that this is considered at the outset of the project so that the appropriate data is collected.

The Strategic Case sets out the anticipated outputs (what has been delivered and how it is being used), outcomes (intermediate effects) and impacts (longer-term effects) of the scheme, each of which is quantifiable and can be monitored.

The Monitoring and Evaluation and Benefits Realisation Plan is under **separate document - Appendix P**.

## R.09 Monitoring and Evaluation

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It is anticipated that standard monitoring measures, which cover the outputs, outcomes and impacts, as well as the inputs (what is being invested), will include:

- Scheme build
- Delivered scheme
- Costs
- Scheme objectives
- Travel demand
- Travel times and reliability
- Impact on the economy
- Carbon

The Monitoring and Evaluation and Benefits Realisation Plan is under **separate document - Appendix P**.