Leek to Stoke-on-Trent Restoring your Railway Fund SOBC

18/11/2022

DEMAND FORECASTING TECHNICAL REPORT

SLC Rail

SYSTRA

LEEK TO STOKE-ON-TRENT RESTORING YOUR RAILWAY FUND SOBC

DEMAND FORECASTING TECHNICAL REPORT

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1. INTRODUCTION

1.1.1 This report details the demand forecasting and economic appraisal undertaken as part of the Leek to Stoke-on-Trent Restoring Your Railway Fund SOBC, detailing the data sources and methodologies used and the demand forecasting and appraisal results. This provides more detailed analysis that supports the economic case presented in the SOBC Lite document.

1.1.2 As part of the development of this business case we have considered a wide range of options and issues that might impact on the viability of the scheme including:

- Proposed station locations
- Differing modes
- Differing train service specifications, including the impact of HS2
- Incorporating freight services from Cauldon quarry

1.1.3 The route being examined can be divided into two sections. The first sections runs between Stoke-on-Trent and Leek and the aim on this section is primarily to reinstate a passenger service connecting Leek and Stoke. The second section of route runs from Leekbrook Junction to Cauldon Quarry. This section of route would be used for freight trains serving the quarry at Cauldon, owned by Aggregate Industries. It was these quarries that allowed the route to survive until the early 1990s. Were freight to return it would involve high volume medium and long distance flows of both stone and cement. This makes this proposal relatively unusual in the Restoring Your Railway (RYR) process as both freight and passenger traffic need to be considered, with the scope for complementarities, conflicts and dependencies.

1.1.4 The current formation between Stoke and Leekbrook Junction is disused and though the alignment is still in place and in Network Rail ownership substantial sections of track have been removed. Between Leekbrook Junction and Leek sections of the route are now owned by third parties. Finally between Leekbrook Junction and Cauldon Low the track is still in place and has been used on occasion by the Churnet Valley Railway. All of the above means that there is largely a blank canvas to work with in developing this scheme with no existing services to accommodate in any form on the route, though access to Stoke-on-Trent station is a challenge.

1.1.5 The reminder of this technical note sets out more detail on the options appraised and the methodology used to assess them.

2. SCHEME DEVELOPMENT AND ASSUMPTIONS

2.1.1 The route from Stoke to Leek is currently a disused formation providing an entirely blank canvas for the development of a new service. The principal limitations on service development is the single track alignment (which hampers the operation of higher frequency service options as the formation would have to be widened to accommodate passing loops), and capacity at Stoke-on-Trent station, which is limited by the two through platforms and high density of services. This hampers both the operation of higher frequency services but also complicates the operation of services to locations beyond Stoke-on-Trent such as Manchester or Crewe. A partial mitigation to this issue has been provided by an option that has been developed to provide an independent platform for Leek trains to the south of the station which would allow the Stoke to Leek route to operate as an independent service.

2.2 Stations

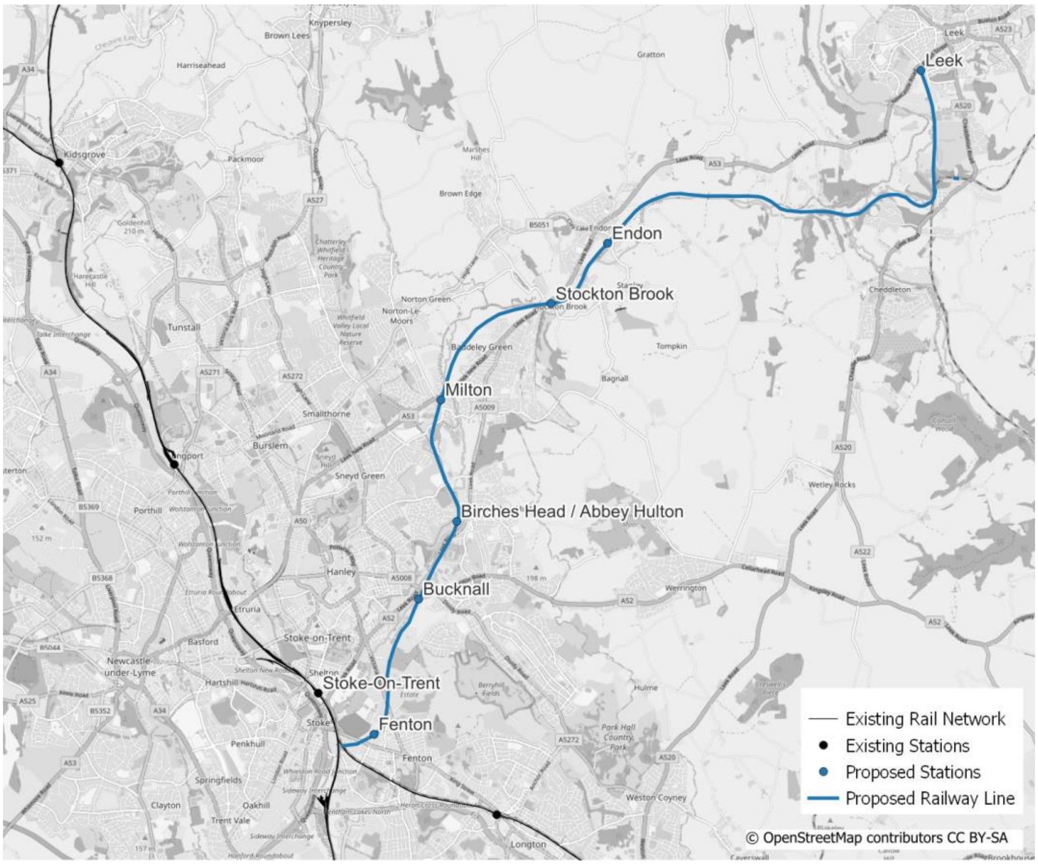
2.2.1 Initial option development for the SOBC incorporated a proposed seven new heavy rail stations along the route:

- Fenton
- Bucknall
- Birches Head / Abbey Hulton
- Milton
- Stockton Brook
- Endon
- Leek

2.2.2 The station sites reflect the historic locations of stations on the route. Whilst these generally still align with the location of population and employment there have been changes to patterns of development since the route was closed to passenger traffic. These station sites should therefore be seen as indicative locations to provide an understanding of the order of magnitude of demand that might be achievable rather than definitive station locations. If the scheme is to be progressed further an early action would be to undertake more detailed analysis of locations both from a demand and engineering perspective to optimise the station sites. This might result in either a rationalisation of sites or especially in high frequency service options an increase in the number of sites.

2.2.3 Within the timetabling work associated with this study it was identified that were a service based around the concept of a minimum viable product to be developed one of the intermediate stations would have to be removed. This was necessary to ensure that a one train per hour service could be operated with a single train, whilst also providing a sufficiently robust timetable. Following an initial demand forecasting exercise (discussed in the following sections) Stockton Brook was removed. This was based on a review of both demand forecasts and catchment areas. Whilst Stockton Brook did not have the lowest level of demand, the location of housing and development in relation to possible station locations led to the conclusion that there was a greater risk that the station would not deliver the projected level of demand in practice.

Figure 1. Proposed Station Locations



2.3 Service Options

2.3.1 As part of defining a short list of options for the SOBC, a series of train service patterns were specified for inclusion within the appraisal. These were:

- 1 train per hour (tph) Leek to Stoke-on-Trent
- 1tph Leek to Crewe
- 1tph Leek to Manchester
- 2tph Leek to Stoke-on-Trent
- 1tph Leek to Stoke-on-Trent & 1tph Leek to Crewe
- 1tph Leek to Stoke-on-Trent & 1tph Leek to Manchester

2.3.2 Through services to Crewe and Manchester were tested as a mechanism for further enhancing connectivity. In the case of Crewe this would provide connectivity to High Speed 2 services, as well as the employment sites that are associated with HS2 when it is complete. Manchester was included as a major centre of leisure and of employment. Additional demand to these locations may be important to the business case as the location of Stoke-on-Trent station in relation the polycentric layout of Stoke-on-Trent acts as a constraint to local rail demand.

2.3.3 Service options heading to Crewe would require an additional train path between Stoke and Crewe (incurring additional cost), whilst options routing to Manchester would operate as an extension of existing Manchester to Stoke stopping services. This would also increase operating costs above the minimum viable product as it would require longer trains to operate to Leek than might otherwise be required.

2.3.4 No option has been considered to provide a service to Birmingham as this would be operationally complex with a need for services to reverse at Stoke-on-Trent station and would require a new train path to be found on the capacity constrained route to Birmingham.

2.4 Light Rail

2.4.1 In addition to appraising the proposed introduction of heavy rail services, options were appraised to examine the viability of operating a light rail service along the route. This alternative mode was appraised as it allows the operation of higher frequency services with a potentially lower operating cost (per mile operated) and scope for lower capital costs if the freight option discussed below were not pursued. The light rail option was conceived as a standalone scheme but could be integrated with any wider proposal for a light rail system in Stoke-on-Trent. The latter has been proposed by stakeholders in Stoke-on-Trent in recent years.

2.4.2 The proposed light rail service was appraised based upon the inclusion of calls at all intermediate stops and one of two service patterns, 4 trains per hour or 6 trains per hour.

2.4.3 Whilst a light rail route could be delivered at a lower capital cost than a heavy rail scheme it would preclude the operation of freight traffic as the infrastructure would be unable to accommodate the higher axle loading associated with freight traffic, and issues would have to be addressed around the end loading capabilities of light rail vehicles. A compromise could be achieved by providing heavy rail infrastructure to allow freight traffic to operate and use Tram-Train vehicles which achieve suitable end loading for operation around heavy rail trains but have operating costs more in common with light rail vehicles.

2.5 Freight

2.5.1 As described above, as well as a passenger service the opportunities for using the route for freight traffic have also been explored. Freight trains would both operate from the quarry delivering aggregates and cement, and to the quarry with inputs to the cement process arriving by rail.

2.5.2 Beyond the work required for passenger traffic, freight traffic would as a minimum require upgrades to the line from Leekbrook Junction to Cauldon and the construction of a new terminal. The scale of work associated with freight between Leekbrook Junction and Stoke depends on the approach taken to both passenger and freight operation. The following options are available:

- Option 1: Daytime freight and passenger operation (1tph)
- Option 2: Daytime freight and passenger operations (more than 1tph)
- Option 3: Daytime passenger operation, night time freight operation

2.5.3 Option 1 would require the construction of a passing loop around halfway along the route between Leek and Stoke to allow passenger and freight trains to pass. The only way to avoid this cost would be for the passenger service to not operate in certain hours to allow freight traffic to operate.

2.5.4 In Option 2 a passing loop would be required for passenger services, however the addition of freight traffic would trigger the need either for an additional passing loop and/or additional signalling.

2.5.5 Option 3 presents a proposal that would allow the route to be dedicated to passenger traffic by day and freight by night. This would avoid the need for additional infrastructure for freight traffic but would also limit the flexibility of freight operation, with a more limited number of services able to operate.

2.5.6 Option 3 would however have wider application, for example it would allow light rail vehicles operating at a high frequency to operate by day providing a balance between passenger and freight applications.

2.5.7 Following consultation with Aggregate Industries we have assumed that were either Options 1 or 2 pursued up to four trains per day would leave the quarry, to destinations including London, Banbury, Birmingham and Manchester, whilst in an Option 3 scenario only two services would operate with services focussed on longer distance routes.

2.5.8 Based on engagement with Aggregate Industries to consider the volume of traffic and destinations for flows from the quarry, an estimation of the economic benefits associated with mode shift of cement traffic from road to rail was made. These benefits will be derived from decongestion and a reduction in carbon emissions and improvements in air quality.

2.5.9 Decongestion benefits were derived from the DfT TAG Marginal External Congestion Costs, whilst reductions in carbon emissions were derived from Greenhouse Gas Reporting: Conversion Factors 2022 published by the Department for Business, Energy & Industrial Strategy.

2.6 Opening Year

2.6.1 The scheme appraisal incorporates a proposed opening year of 2027.

2.7 Options Summary

2.7.1 Following the initial option development and demand forecasting, the options identified for appraisal as part of the work were as follows. All heavy rail options include calls at the five intermediate stations and where freight services follow Option 1 as outlined above:

- Option A = Operating a 1tph passenger service between Leek and Stoke-on-Trent, with no freight services included
- Option B = As option A but with freight services included
- Option C = Operation of a 1tph Leek to Crewe passenger service (no freight services included)
- Option D = Operation of a 1tph Leek to Manchester passenger service (no freight services included)
- Option E = Operation of a 2tph Leek to Stoke-on-Trent passenger service (no freight services included)
- Option F = Operation of 1tph Leek to Stoke-on-Trent & 1tph Leek to Crewe passenger services (no freight services included)
- Option G = Operation of 1tph Leek to Stoke-on-Trent & 1tph Leek to Manchester passenger services (no freight services included)
- Option H = Operation of a light rail system calling at all proposed intermediate stops on a 4 trains per hour frequency (no freight services included)
- Option I = As Option H but with a 6tph frequency

3. RAIL DEMAND FORECASTING

3.1.1 Within this section we set out the data sources used and the methodology employed to estimate demand for each proposed station, both in the initial demand estimation to evidence station selection and in the series of potential options outlined above.

3.1.2 The patronage predicted to be generated by each station will be separated into trips generated by the existing population and trips generated by new developments.

3.1.3 It was considered that there would be no abstraction to the proposed new stations from existing heavy rail stations as the geography of the study area means the catchments of the new stations are remote from other existing heavy rail stations. The exception to this and an issue that would need to be examined in more detail if the scheme were progressed is the use of Stoke-on-Trent as a railhead for the Leek route catchment for longer distance trips for example to London, for the purposes of this initial assessment we have assumed that there is no abstraction.

3.1.4 The sections below describe the approach to estimating this demand including key assumptions and data sources.

3.2 Market Segments

3.2.1 SYSTRA has identified two market segments impacted by the new stations, as set out below:

- Local Catchment Demand – demand generated by the population / employment currently within 15km of each station
- New Development Demand – demand generated by proposed development within the local catchment of each station

3.2.2 The methodology for calculating the size of each market segment is set out in the following sections.

3.3 Sources of Data

3.3.1 The three main sources of data for the demand forecasting element of this work are:

- National Rail Travel Survey (NRTS) data
- Census data

National Rail Travel Survey

3.3.2 NRTS data provides a detailed source of information on the trip patterns of rail users. The data was provided for fifty two stations as listed below:

- Adlington (Cheshire)
- Alsager
- Ambergate
- Bamford
- Belper
- Blythe Bridge
- Bramhall
- Buxton
- Chapel-En-Le-Frith
- Cheadle Hulme
- Chesterfield
- Chinley
- Congleton
- Crewe
- Cromford
- Derby

- Dore & Totley
- Dove Holes
- Dronfield
- Duffield
- Edale
- Grindleford
- Hathersage
- Hope (Derbyshire)
- Kidsgrove
- Longport
- Longton
- Macclesfield
- Matlock
- Matlock Bath
- Nantwich
- Peartree
- Penkridge
- Poynton
- Prees
- Prestbury
- Rugeley Town
- Rugeley Trent Valley
- Sheffield
- Shrewsbury
- Stafford
- Stoke-On-Trent
- Stone
- Tutbury & Hatton
- Uttoxeter
- Wem
- Whaley Bridge
- Whatstandwell
- Whitchurch (Salop)
- Willington
- Wrenbury
- Yorton

3.3.3 NRTS data was obtained for a large selection of stations to provide a broad understanding of the trip rates and catchment areas for local rail services across the wider region surrounding the study area.

3.3.4 The following variables were used as part of this study:

- Origin and destination stations of passengers
- Expansion factors to inflate survey to annual trips
- Five digit origin and destination postcodes for trips
- Access and egress mode to and from stations
- Access and egress distance to and from stations

3.3.5 There are however a number of limitations to the data which will need to be considered within the context of the results of this study:

- The data is now very old with surveys having taken place between 2001 and 2005 (depending on location). This means that the distribution of trips cannot account for any changes to rail services or station access mode choice that have taken place since this time
- The data cannot account for any changes in the distribution of passengers since the survey was undertaken, for example it cannot account for a housing site which has been built since the survey which may generate a substantial number of trips

3.3.6 NRTS data was also used in order to determine a distribution of trip rates for the demand forecasting. Further detail of this can be found in section 3.5.2.

Census Data

3.3.7 Census data was used to provide an understanding of demographics within station catchments. This was used to derive a trip rate for existing stations and to provide a basis for calculating the number of trips which may be generated by each proposed station. The following datasets were used:

- *Population estimates - small area: 2020, Output Area (OA) level*
- *WP101EW – Population (workplace population): 2011, OA level*

3.3.8 All data was analysed at OA level as this is the most spatially disaggregate scale available. Workplace population data was only available for 2011, therefore this data was inflated using growth factors for 2011-2020 for workers at MSOA level from TEMPro.

3.4 Trip Distribution

3.4.1 The trip distribution used as part of the demand forecasting is as follows:

- Stoke-on-Trent
- Crewe
- Birmingham
- Manchester
- London
- All Other Destinations (treated as a single station to simplify modelling)

3.4.2 These destinations were chosen as they represented major destinations that are likely to generate significant demand from the Leek line.

3.5 Local Catchment Demand

3.5.1 The local catchment demand includes trips which are predicted to be generated by those currently living or working within the station catchments (up to 15km). This has been calculated using a trip-rate based approach using National Rail Travel Survey (NRTS), ORR Station Usage and Census data. The approach is described below:

1. NRTS data was used to understand the proportion of trips generated by different catchment bands (0-800m, 800m-2km, 2-5km, 5-10km, and 10-15km) at existing stations. These trips were split into 'producer' and 'attractor' trips to understand whether the trip was generated by the resident population or attracted to the station (for example for tourism or employment)
2. The proportion of trips in each catchment band were factored to inflate from 2005/06 (the year NRTS surveys were undertaken) to 2019/20 ORR station usage data to estimate the number of trips being made from each distance band in the year prior to the COVID-19 pandemic
3. TRACC software was used to allocate Census Output Areas (OAs) to their closest station, this allowed forecast Census population / employment figures to be assigned to station catchments
4. The data derived in steps 1-3 was used to calculate producer trip rates (per usual resident) and attractor trip rates (per job) within the distance bands for each of the existing stations

3.5.2 Once the trip rates of existing stations had been calculated, the trip rates for all seven proposed new stations needed to be calculated. The steps below outline how the trip rates to Stoke-on-Trent were first determined:

5. For each station for which NRTS data was requested, the proportion of producer trips to Stoke-on-Trent, Derby, and Stockport were calculated from the NRTS data and applied to the trip rates of each existing station
6. For each donor station the maximum apportioned value, where the trip proportion to the destination was over 35% of total producer trips, was then selected to represent the trip rate to Stoke-On-Trent
7. For donor stations that fed onto other major station (for example Matlock whose main destination is Derby) the same approach as in point 2 was applied, with stations such as Derby acting as a proxy for Stoke. This helped expand the number of stations which could be used in the model.
8. Following this, a manual adjustment was undertaken to remove selected donor stations to ensure those included within the trip rates were stations with similar characteristics to those expected of the new stations, specifically that they will be largely producer stations and they will be served primarily by local services on a single route
9. An average of the remaining donor trip rates was then taken to represent the trip rate to Stoke-on-Trent from each proposed new station

3.5.3 Following the calculation of a trip rate to Stoke-on-Trent, trip rates to the remaining destination categories were calculated as follows:

10. Comparably to Step 5, for each station for which NRTS data was requested the proportion of producer trips to Stoke-on-Trent, Crewe, Manchester BR, Birmingham BR, and London BR were calculated from the NRTS data
11. These proportions were applied to the trip rates of each existing station to distribute the total trip rate for the distance band across those destinations, with the remainder being apportioned to represent trips to 'All Other Destinations'
12. To determine the trip rates for Crewe, Manchester BR, and Birmingham BR, for each destination an average of the Stoke-on-Trent donor trip rates where the donor station does not have an existing direct service to the destination was calculated
13. An average was then calculated of the distributed trip rate (as described in step 11) where the donor station does not have an existing direct service to the destination
14. These two averages were used to calculate a proportional adjustment per destination, which were then applied to the Stoke-on-Trent donor trip rates to determine individual donor trip rates to Crewe, Manchester BR, and Birmingham BR
15. An average was then calculated of the donor trip rates, per destination, to determine an overall trip rate to each destination from the proposed new stations
16. In order to calculate an overall trip rate to represent trips to All Other Destinations, firstly the remaining portion of the overall trip rate for the donor station was isolated following the apportioning of trip rates to Stoke-on-Trent, Crewe, Manchester BR, and Birmingham BR
17. An average of the Stoke-on-Trent donor trip rates was compared to an average of the remaining All Other Destinations donor trip rates where the individual trip

rate per donor station was lower than the average Stoke-on-Trent trip rate (determined in Step 9)

18. The proportional adjustment was applied to the Stoke-on-Trent donor trip rates to estimate an All Other Destinations trip rate per donor station
19. An average of these was then taken to represent an overall trip rate to All Other Destinations
20. In order to calculate a trip rate to London BR, an average of the proportion of trips to London BR from each donor station included within the Stoke-on-Trent trip rate was calculated
21. This proportion was applied to the trip rates calculated for each destination category to apportion a percentage of the trip rate to represent flows to London BR
22. Each proportion was removed from the respective category trip rate and summed to create a trip rate for flows to London BR

3.5.4 In addition to calculating trip rates to represent producer trips from each new station to Stoke-on-Trent, Crewe, Manchester BR, Birmingham BR, and London BR, a series of trip rates were calculated to represent trips attracted to each new station. The steps below outline how these were calculated:

23. Data for 2020 from the Business Register and Employment Survey for the MSOA's covering Leek, Matlock, and Buxton was used to derive the number of people employed within the tourism industry in each area
24. It was then possible to calculate the volume of people employed in the tourism industry in Leek as a proportion of those in Buxton and in Matlock
25. This proportion was then applied to the attractor trip rates (calculated as described in steps 1 to 4) for both Buxton and Matlock stations
26. An average of the resulting trip rates per distance band was then taken to represent the attractor trip rates for the new stations

3.5.5 Once trip rates for the new stations were calculated, the TRACC analysis was repeated with the inclusion of the new stations to identify the output areas, and in turn the population and employment, within the station catchments. Figure 2 displays the catchments of all the proposed stations.

3.5.6 The trip rates were then applied to the population and employment forecasts of each new station to calculate the number of trips which could be generated by each station.

3.5.7 Following the calculation of trip rates and an initial estimation of demand for a 1tph Leek to Stoke-on-Trent heavy rail scenario calling at all seven proposed new stations, Stockton Brook was identified as the station to be removed to reduce the station total to six to ensure that an hourly service could be operated with a single train. The rationale for this was that although Stockton Brook did not have the lowest level of demand the development that formed its catchment area appears relatively disparate relative to the possible locations of the station and thus there is a higher risk than at other stations that the demand would be less than forecast. Furthermore the adjacent station at Endon which would absorb much of the Stockton Brook catchment is well located with good road access.

Figure 2. New Station Catchments – All Proposed New Stations

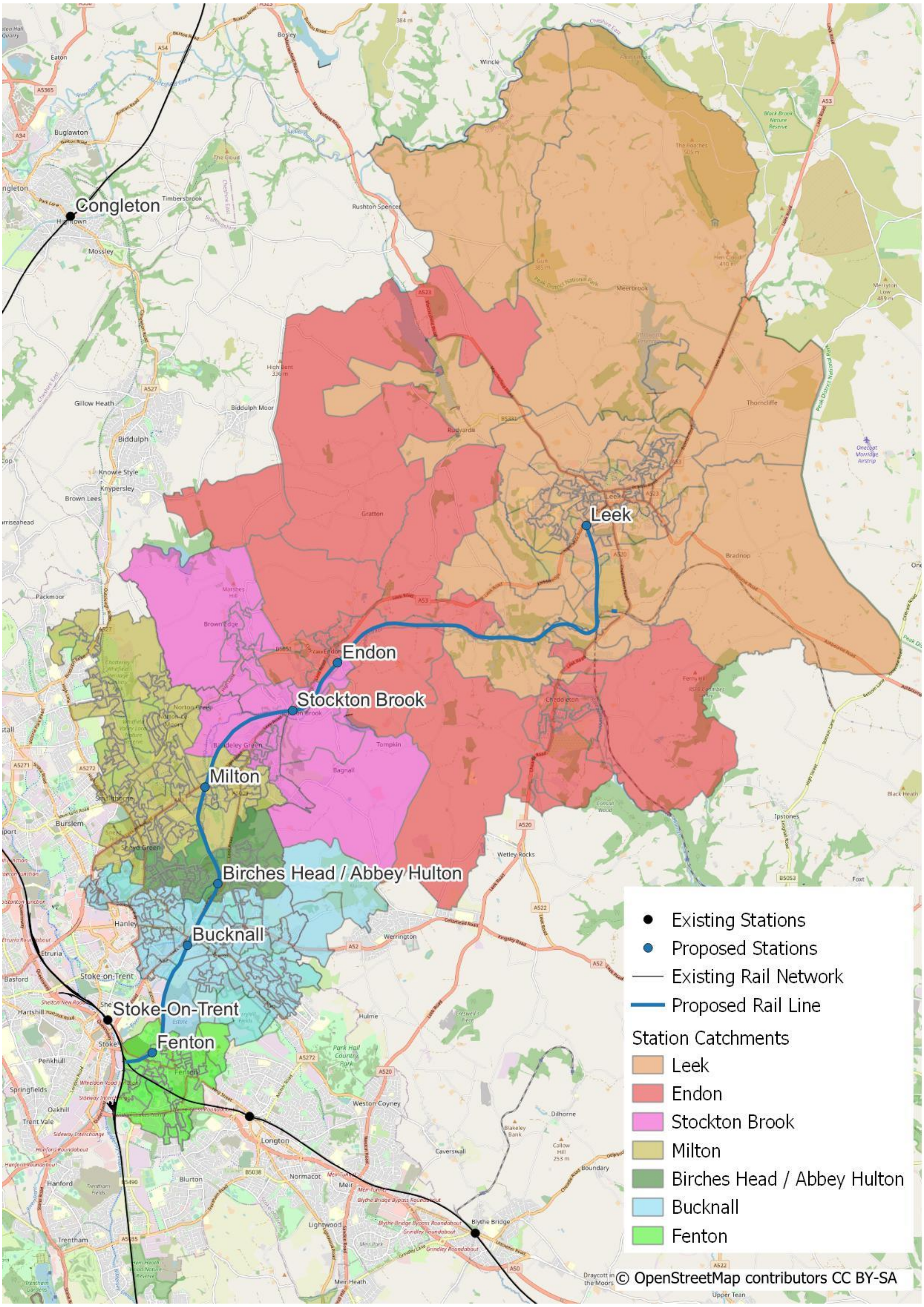
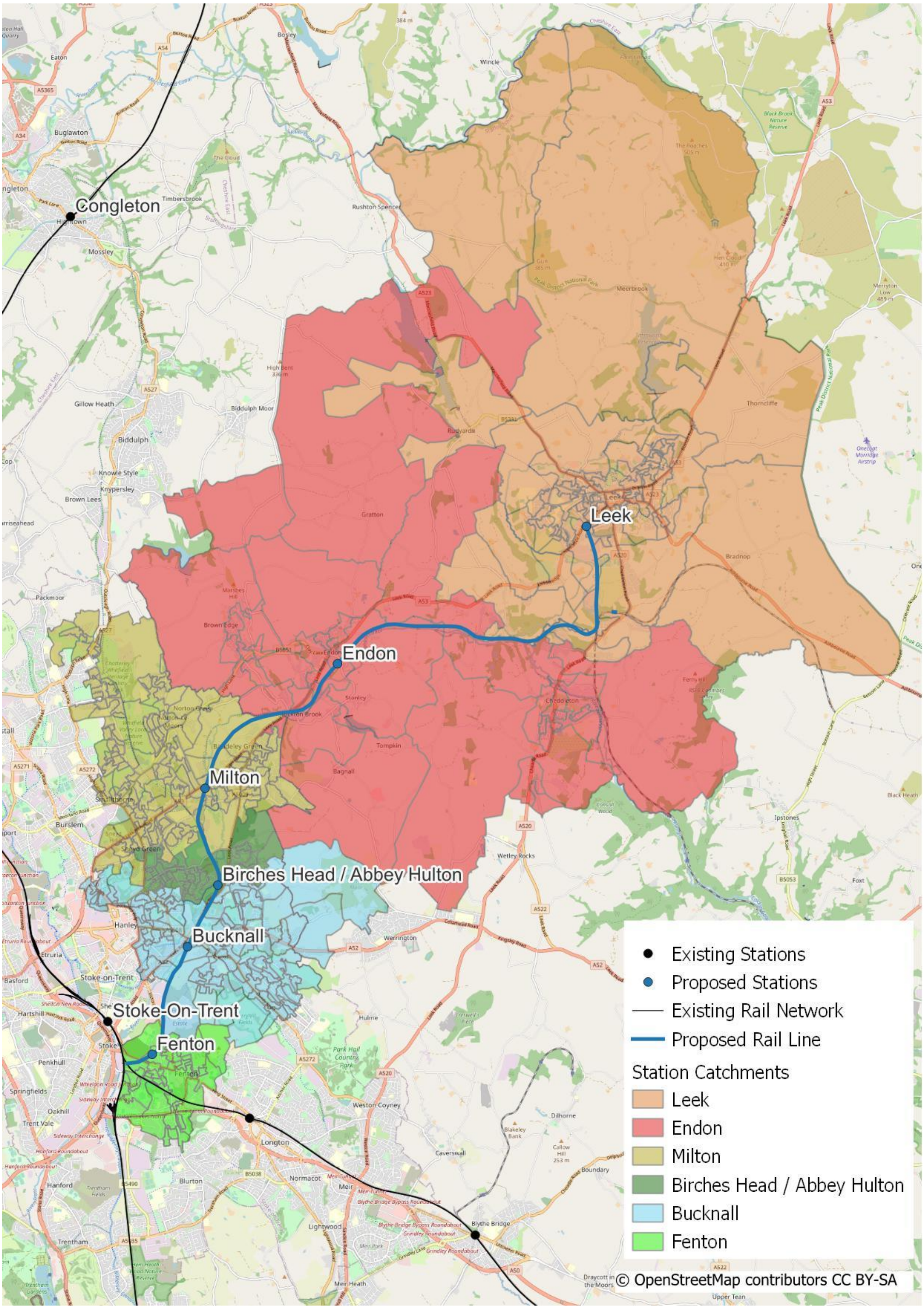


Figure 3. New Station Catchments – Proposed New Stations Without Stockton Brook



3.5.8 The TRACC analysis outlined in section 3.5.5 was then repeated to identify the adjusted station catchments without Stockton Brook (displayed in Figure 3) and the trip rates reapplied to estimate demand generation.

3.5.9 In order to estimate demand in the alternative train service scenarios (see 2.3.1), the trip rates were adjusted to reflect differences in service levels between the 1tph Leek to Stoke-on-Trent scenario and each of the alternative service patterns. The steps below outline how this adjustment was achieved:

1. The Generalised Journey Times (GJT) were calculated to each destination from each new station (Fenton, Bucknall, Birches Head / Abbey Hulton, Milton, Endon) in each train service scenario. A simple RailSys model was developed to calculate indicative journey times along the route between Stoke-on-Trent and Leek
2. For the RailSys model, the track distance between Stoke-on-Trent and Leek was calculated by measuring the previously used track. The station locations were then added to the model along with historical gradient data, applied to replicate the true track characteristics. A range of possible line speeds were initially tested with the chosen line speed for the analysis being 60mph
3. For the GJT's to London, reduced journey times compared to existing services from Stoke-on-Trent that will be achieved as a result of the introduction of HS2 services were incorporated
4. In order to be able to calculate GJT's for the All Other Destinations and the Attractor trips categories, proxy stations were used to represent these destinations
5. To determine a proxy station, NRTS data was used to extract an average mileage of trips both attracted to and produced by to all other destinations from the existing stations within the NRTS data that had a proportion of trips to Stoke-on-Trent
6. An existing station of a comparable distance from Stoke-on-Trent to the mileage data extracted was then, per category, selected to be used as a proxy
7. Following the calculation of GJT's, it was then possible to use elasticities from the RDG Passenger Demand Forecasting Handbook (PDFH) to estimate proportional changes in trip rates to reflect the differing service patterns

3.5.10 An average of the GJT adjusted trip rates was then applied to the population and employment forecasts of each station to calculate the number of trips which could be generated to each destination category per train service scenario.

3.5.11 The result of the methodology as described above was, for each option, a set of demand forecasts for each of the new stations included per scenario to a series of potential destinations.

3.6 Development Demand

3.6.1 The potential demand generated by new developments within the catchments of the new stations was calculated following a trip rate based approach. For Staffordshire Moorlands details of committed developments were extracted from the local plan. However, for Stoke-on-Trent local plan data was not available as a new local plan is currently being prepared therefore 'Households' and 'Jobs' data from TEMPro was used as a proxy for development for this area.

3.6.2 Data from TEMPro is provided at MSOA level, so for the MSOA's within the catchments of the new stations that are within Stoke-on-Trent this data was extracted and distributed over output areas using data from the 2011 census that outlines the number of households per output area.

3.6.3 For the development data extracted from the Staffordshire Moorlands Local Plan, these sites were mapped in QGIS.

3.6.4 For all of the data, both that extracted from the local plan and that from TEMPro, each development was then allocated to catchment bands (0-800m, 800m-2km, 2-5km, 5-10km and 10-15km) of their closest station based upon the output area each development was within.

3.6.5 Employment sites were converted to jobs figures using the Employment Densities Guide and housing developments were converted to population figures using average household size data for the output area the development is within. Where available, phasing information from the local plan was incorporated to reflect the annual build out of each housing development. Where phasing information was not available, it was assumed the development would be built out across the local plan period duration. A summary of the development quantum used per scenario is given in the table below.

Table 1. Development Summary per Scenario

	ALL NEW STATIONS	WITHOUT STOCKTON BROOK
Additional Population	9,200	9,163
Additional Employees	4,902	4,894

3.7 COVID Impact

3.7.1 The DfT has suggested three scenarios for COVID recovery: a high recovery (best case), a medium recovery, and a low recovery (worst case), these are disaggregated to operator level. In each option, no COVID impact has been assumed, however a sensitivity test upon Option B has been conducted using the medium case forecasts for Northern Trains.

3.8 Growth

3.8.1 Background growth, to forecast future change in demand driven by exogenous factors, was applied using factors from the DfT's EDGE software. The values were provided by DfT at flow and ticket type level meaning that for existing OD pairs an accurate factor could be applied.

3.8.2 Given that the EDGE outputs do not account for new stations, proxy stations were used to determine appropriate growth rates for the new stations. Growth rates were extracted for the following stations:

- Stoke On Trent
- Stone Staffs
- Stafford
- Longton
- Blythe Bridge

- Uttoxeter
- Tutbury & Hatton
- Longport
- Kidsgrove

3.8.3 Each origin-destination pair was then assigned to one of the following destination groups:

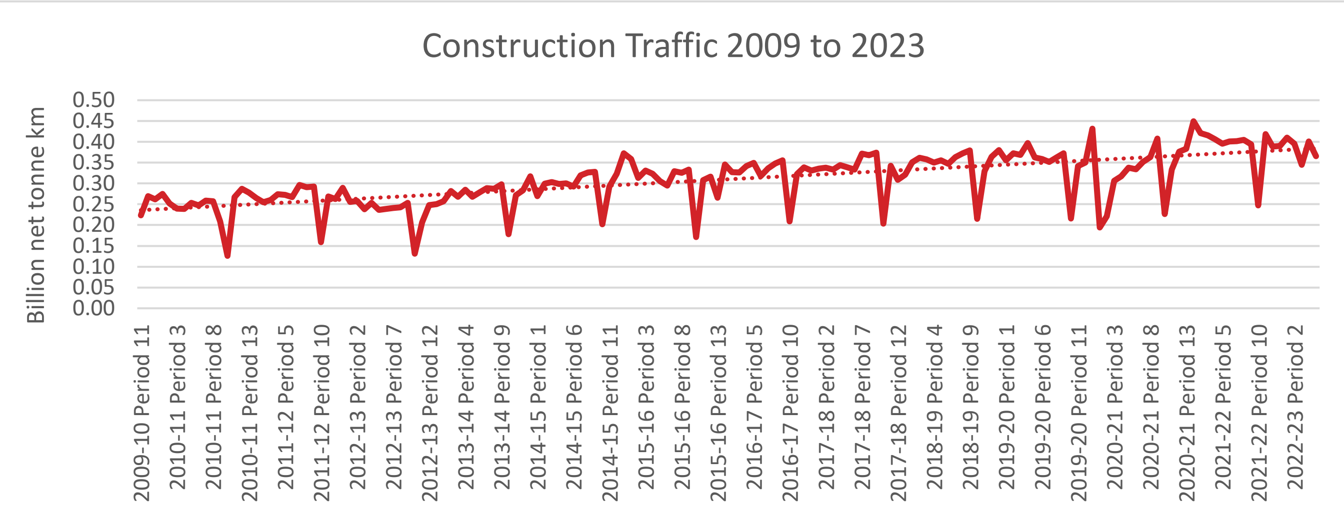
- Stoke-on-Trent
- Crewe
- Birmingham BR
- Manchester BR
- London BR
- All Other Destinations
- Attractor

3.8.4 An average growth rate for each ticket type (Full, Reduced and Season) was calculated for each of the above groups.

3.9 Freight Demand

3.9.1 Aggregates transport by rail is on a gradually upward trend, as can be seen from the graph below.

Figure 4. Long Term Trend on Freight Aggregates Traffic (Source: ORR)



3.9.2 A deeper understanding of the market for freight and its impacts was estimated based on a series of assumptions following discussion with Aggregate Industries, the operator of Cauldon Quarry. Aggregate Industries identified that outbound flows from Cauldon would be both cement and unprocessed aggregates and that typical payloads would be in the order of 1,500 tons per train, which typically would form a train of 22 wagons. There is also scope for inbound movements of bulk fuel associated with cement production. In the longer term the outputs of carbon capture could also be moved by rail. This latter process involved capturing the carbon associated with cement production and moving it away from the site.

3.9.3 Aggregate Industries identified a number of medium and long distance destinations for freight movements. From this we have assumed that typically four trains per day could be operated from the quarry. This level of service is not untypical for larger rail served quarries such as Hindlow and Tunstead in the Peak District or Swinden Quarry in the Yorkshire Dales.

3.9.4 Based on the range of destinations provided by Aggregate Industries we have assumed that with four trains per day in operation, services would operate to the following locations:

- Pendleton (Manchester)
- Small Heath (Birmingham)
- Banbury
- Acton (London)

3.9.5 The ability to move material by rail would have two effects on Cauldon Quarry. For medium distance flows (Birmingham and Manchester) services would be replacing road haulage which brings a reduction in costs for Aggregate Industries and a reduction in the impacts of carbon emissions, other air pollutants and congestion to wider society. For longer distance movements the benefit to the quarry operator would be access to a larger market. The cost of transport is a significant factor in the overall costs of cement and stone and thus the catchment area and output from each quarry is determined by the cost of transport. Rail freight provides an efficient way of moving stone and cement in bulk and therefore provides the basis for expanding the catchment of the quarry, thus allowing an increase in output from the quarry and an increase in income to Aggregate Industries.

3.9.6 As demonstrated in the figure above the number of net tonne km for construction traffic has increased over the last 10 years, at a time when overall production of crushed rock, sand and gravel has been broadly stable. This indicates that the length of haul has been increasing over time. Based on engagement with Aggregate Industries it is understood that this increase in length of haul has been driven by consolidation in the aggregate sector with a focus on fewer larger quarries. In addition there has been a notable reduction (through exhaustion of sites) in the number of quarries in the South East and East of England meaning that quarries elsewhere (in the north of England and south west) are increasingly supplying the market in the south of England, especially London. These longer distance flows from larger quarries are more suitable for rail haulage than road haulage.

3.9.7 To address this in the economic appraisal we have undertaken two tests:

- In the core scenario we have assumed that the two long distance trains would result in the loss of two existing rail movements to these destinations from competing quarries that incur higher costs, typically by being a longer distance movement. For example, a Cauldon – London flow would replace a Tunstead – London flow which has a greater distance and thus a higher cost. The benefits that can be derived from this are therefore a change in operating costs and a change in carbon emissions. This is a very robust approach that accommodates any future scenario where the scope for transfer from quarries in the south of England is limited
- We have also produced a sensitivity test where it is assumed that the two long distance flows replace shorter distance routes operated by road vehicles from sites

closer to the final destinations in the South East. This will provide a more positive result than that described above

3.9.8 Whilst in practice it is possible that overall demand for aggregates may rise (independent of this scheme), we believe that the approach above provides a robust way of estimating the overall societal impact of the freight component of this scheme.

4. DEMAND FORECASTING RESULTS

4.1.1 This section presents the results of the demand forecasting work for the options appraised.

4.2 Forecast Demand

4.2.1 The table below presents the volume of trips generated per station in Options A and B, both based upon a scenario of a minimum viable product of 1tph Leek to Stoke-on-Trent. The figures are presented for three forecast years, for the first year of full operation, 2030, and 2040. PDFH guidance requires a build-up of demand over four years for rail schemes, so data for 2030 is presented as a year subsequent to the demand lags.

Table 2. Forecast Demand – Options A and B

	2027	2030	2040
Leek	89,157	181,671	194,627
Endon	19,256	38,944	41,557
Milton	93,919	191,272	207,993
Birches Head / Abbey Hulton	34,173	69,625	75,789
Bucknall	88,446	180,324	196,352
Fenton	46,998	95,995	104,868
Total	**371,950**	**757,830**	**821,187**

4.2.2 Table 2 shows that by 2030, demand upon the line in Options A and B is forecast to generate over 750,000 trips per annum with Leek, Milton, and Bucknall each forecast to generate around a quarter of overall demand.

4.2.3 The demand is forecast to be almost entirely new to rail demand, with trips beyond Stoke-on-Trent equalling 55% of total demand in 2030.

4.2.4 0 below presents total demand in the three forecast years per option.

Table 3. Forecast Demand – All Options

OPTION	2027	2030	2040
A and B	371,950	757,830	821,187
C	373,522	760,981	824,516
D	385,237	785,187	851,757
E	446,907	909,885	984,421
F	447,685	911,446	986,070
G	455,086	926,725	1,003,235
H	588,098	1,193,137	1,280,468
I	683,876	1,385,843	1,483,033

4.2.5 The table above suggests that by 2030 demand would vary between 757k and 1.38 million trips per annum dependent on the service option, rising to totals of between 821k and 1.48 million by 2040.

4.2.6 The forecasting has shown that doubling the frequency of services between Leek and Stoke-on-Trent increases demand by 20%. Extending services towards Manchester and Crewe would not significantly increase demand, in part because there are multiple locations beyond Stoke and extending to only one destination cannot serve all markets well.

4.2.7 The light rail options (Option H and Option I) with a much higher frequency generate markedly higher levels of demand, up to twice the demand in Option A.

5. APPRAISAL METHODOLOGY

5.1.1 This section sets out the approach to scheme appraisal for the various demand components. The appraisal methodology follows the most up to date DfT TAG guidance, that published in May 2022.

5.2 General Assumptions / Parameters

5.2.1 In developing this appraisal a number of assumptions were made:

- Opening Year: 2027
- Background Growth Cap: 2042
- Inflation Cap: 2042
- Appraisal Period for Passenger Service: 60 Years
- Demand Lags: Applied to the demand at the new stations for four years after station opening in line with PDFH guidance
- Background Growth Approach: EDGE

5.2.2 Where applicable, the costs and benefits were deflated and discounted to the department's base year (2010) in line with TAG.

5.3 Sources of Benefit and Disbenefit

5.3.1 The following benefits have been assessed as part of the appraisal:

- Revenue
- Marginal External Costs
- Travel Time Savings

5.3.2 The following sections set out the approach to assessing these benefits.

5.4 Revenue Generated

5.4.1 To estimate revenue for trips generated to / from each of the new stations, full, reduced, and season fares for single trips between each station and each destination category were generated based upon journey distance and revenue data from the Office of Road and Rail (ORR).

5.4.2 ORR dataset *"Table 1210: Revenue per passenger kilometres and per passenger journey, Great Britain, April 1986 to March 2022"* was used, specifically the 'revenue per franchised passenger kilometre' value for April 2019 to March 2020 was applied to the kilometre distance between each OD pair to generate a fare for the journey.

5.5 Revenue Abstracted

5.5.1 In addition to the heavy rail revenue generated by the scheme, the revenue lost to bus operators as a result of lost passengers from bus services to Stoke-on-Trent was also calculated.

5.5.2 Bus ticket prices were obtained from the Firstbus website. A single fare was estimated using a 'Pack of 12 Single Trips' ticket for the Potteries area.

5.5.3 A concessionary fares adjustment was then applied to the estimated single trip fares. 31% of journeys were assumed to be made by concessionary fare passengers based on the average 2019/20 England Non-Metropolitan area average (DfT Bus Statistics Table BUS0105). The rate of reimbursement was then applied from the Concessionary Bus Travel Reimbursement Calculator.

5.5.4 Inflation was applied to all revenue figures using values from TAG Table A5.3.1 with the values then rebased to 2010 using GDP deflator values from the TAG databook and then discounted using the discount rates given in TAG Table A1.1.1.

5.6 Marginal External Cost

5.6.1 It is assumed that some of the newly generated demand for the stations will be abstracted from car and therefore the marginal external cost benefits generated by this group were calculated.

5.6.2 Diversion factors from car to rail were first acquired from TAG Table A5.4.5. Each OD pair was assigned one of the categories in the TAG table, for example a trip between Leek and Stoke-on-Trent was categorised as 'Non-London Short Distance <20 miles non-PTE' with a diversion factor of 31%. Rail distances were used as a proxy for car distances to determine the total distance abstracted from car each year.

5.6.3 Marginal external cost values for congestion were then applied from the TAG databook Table A5.4.4. Marginal External Costs by Region and Time of Day. Weighted average values for car from TAG Table A5.4.2 were used for the remainder of the MEC elements.

5.7 Costs

Capital Costs

5.7.1 Capital costs for the scheme were provided by SLC Rail. Capital costs were provided for a series of components including:

- Heavy Rail – The cost associated with the required heavy rail infrastructure, including two turnback platforms at Leek and Stoke-on-Trent
- Five Stations – The cost associated with the five proposed intermediate stations
- Passing Loop – The cost associated with a passing loop, if required for the day operation of freight services in conjunction with passenger services, or the operation of 2tph passenger services
- Light Rail to Stoke-on-Trent – The cost of operating a light rail service along the route, inclusive of the cost for a depot and light rail vehicles
- Freight – The cost associated with upgrading the line between Leekbrook Junction and Cauldon to allow for freight services to operate

5.7.2 Upper and lower cost estimates were produced by SLC Rail. For the purposes of the appraisal a central set of costs were generated by averaging these lower and upper costs. The base cost estimates, in 2022 prices, provided by SLC Rail are shown in the table below:

Table 4. Base Costs (£m, 2022 prices)

Heavy Rail	£188.03
Five Stations	£12.37
Passing Loop	£5.83
Light Rail	£170.86
Light Rail Stops	£9.89
Freight	£92.99

5.7.3 In line with TAG unit A5.3 *Rail Appraisal* the base cost estimates provided were used as the basis for the appraisal. The table below shows how the costs were processed, using the passenger service cost for Option A as the example.

Table 5. Capital Cost Appraisal (£m)

Cost Estimate (2022)	£200.40
Optimism Bias (70%)	£312.63
Market Price Conversion (1.19)	£372.03
Inflation	£410.47
GDP Deflator to 2010 Prices	£299.12
Discounted to 2010	£175.51

Passenger Operating Costs

5.7.4 SYSTRA has estimated the operating costs for the scheme per option based on the SYSTRA Rail Operating Cost Model benchmarked against the Better Value Rail Toolkit. The estimated total annual operating cost for Option A in 2022 prices is £1,55. Optimism bias of 41% was applied and then values were inflated, deflated and discounted for each year in the appraisal period in line with TAG guidance. Costs included rolling stock leasing costs, variable track access charge (VTAC), track maintenance (beyond that covered by VTAC, fuel costs, train (driver and conductor) and station operating costs.

5.7.5 A key assumption in the passenger operating costs was that that an hourly service could be operated with only a single train, which is consistent with the work undertaken to reduce the number of stations to ensure a return trip could operate within one hour.

5.7.6 For costing purposes it was assumed that a Class 158 DMU operated services (with the exception of the Manchester option). In the long term it is acknowledged that such train will have to be replaced either by a diesel battery hybrid or a Battery Electric Multiple Unit, and a sensitivity test has been undertaken on more modern trains.

5.7.7 For the Manchester option it is assumed that a four car Class 331 would operate the service. This is an electric train, but were the service to be operated to Leek a battery variant of the train would be required.

5.7.8 For the light rail options the purchase costs of the trains are incorporated into the capital costs. Only energy, train crew, track maintenance and station operating costs were calculated as part of the operating costs. For light rail it was assumed that only a driver would be required to operate the service.

5.7.9 The table below presents single year operating costs at 2022 prices.

Table 6. Operating Costs

OPTION	2022 PRICES
A and B	£1.55m
C	£3.26m
D	£2.07m
E	£2.67m
F	£4.56m
G	£3.36m
H	£4.06m
I	£6.01m

5.7.10 The highest heavy rail operating costs are associated with the Manchester options reflecting the use of longer trains (4 car) compared to the 2 car DMUs used in other options.

5.7.11 The light rail operating costs are also high but the service operated is between four and six times greater than the lowest cost option and the unit costs are lower, this does however exclude the purchase costs of light rail vehicles.

Freight Operating Costs

5.7.12 SYSTRA has estimated the operating costs for the scheme, using information from Network Rail, MotorTransport and guidance from TAG to estimate both road haulage and rail freight costs and externalities. Costs included rolling stock lease, variable track access charge (VTAC), fuel costs, and train crew (driver). To process the costs for economic appraisal, optimism bias of 41% was applied and then values were inflated, deflated and discounted for each year in the appraisal period in line with TAG guidance.

5.7.13 The model quantified the greenhouse gas savings that could be delivered through rail vs road haulage. Information on greenhouse gas emissions was included from "Greenhouse Gas reporting: Conversion Factors 2022" (Department for Business, Energy and Industrial Strategy), in order to calculate potential carbon emissions associated with the various options. This was used in conjunction with TAG guidance to convert the changes in CO_2e emissions to monetised benefits.

5.7.14 For road haulage the Marginal External Costs of Congestion were calculated using national average rates reflecting the diverse geography of the flows.

5.7.15 A key assumption in the freight operating costs was that each flow would be operated by a dedicated train, working round trips to and from the quarry, with a return trip achievable within 24 hours. This provides a robust assessment as with multiple destinations of carrying trip length it may be possible to improve locomotive and wagon utilisation by linking workings together.

5.7.16 For costing purposes it was assumed that a Class 66 operated services. In the long term it should be noted that this may be replaced by a bi/tri-mode locomotive, such as the GB Railfreight Class 99, which would result in decreased CO_2e emissions, and as such provide further benefits.

5.7.17 For rail costs a final five mile road haulage component was included which factored in the final deliveries from the rail terminal to the consumer and it was assumed that road based haulage would be direct to the customer, without use of a local facility at the destination.

5.7.18 It was assumed that a road based vehicle would spend less time on site undertaking loading and unloading activities due to the decreased volumes transported using individual vehicles. Rail haulage turnaround times were calculated based on analysis of timetable information for similar flows already in operation and additionally cover for the run-around of the locomotive at the terminal.

5.7.19 In all tests it was assumed that 100% load would be achieved on both road and rail based haulage, through engagement with Aggregate Industries it was identified that approximately 1500 tonnes could be made available for each rail based service reliably. Each rail based journey has been calculated on the assumption of the transfer of 1452 tonnes of product – this was based on the maximum length available at Cockshute sidings where any southbound services were to reverse without provision of a new southbound junction at Stoke-on-Trent. For road based haulage it was assumed that 20 tonnes could be carried based on analysis of existing aggregate vehicles in use.

6. APPRAISAL RESULTS

6.1.1 Using the demand forecasting results it was possible to conduct an appraisal following the principles set out in TAG guidance. The appraisal was conducted over a 60 year period with an assumed opening year of 2027.

6.2 Revenue Impacts by Station

6.2.1 The tables below summarise the revenue impacts of the demand forecasting work for the series of options. Table 7 presents the revenue impact for Options A and B broken down by demand element in three forecast years. Table 8 presents the total revenue impact per option.

Table 7. Total Revenue Impact (2019 Prices, £m) – Option A and Option B

	2027		2030		2040	
	Local Catchment	Development	Local Catchment	Development	Local Catchment	Development
Leek	£0.64	£0.07	£1.29	£0.15	£1.39	£0.16
Endon	£0.13	£0.00	£0.27	£0.01	£0.29	£0.01
Milton	£0.60	£0.02	£1.22	£0.05	£1.31	£0.08
Birches Head / Abbey Hulton	£0.21	£0.01	£0.43	£0.02	£0.46	£0.03
Bucknall	£0.55	£0.02	£1.12	£0.04	£1.21	£0.07
Fenton	£0.28	£0.01	£0.58	£0.03	£0.62	£0.04
Total	**£2.41**	**£0.13**	**£4.90**	**£0.30**	**£5.29**	**£0.39**

6.2.2 The table above shows that by 2030 the line is forecast to generate over five million pounds of revenue in Options A and B, with new to rail demand forecast to generate the majority of the revenue.

6.2.3 Table 8 presents the forecast increase in revenue that could be generated from an increase in service specification compared to 1tph Stoke-on-Trent to Leek, with a doubling of service frequency forecast to increase revenue by almost £350,000 in 2030.

6.2.4 Whilst Table 3 shows that the operation of a light rail service results in passenger numbers almost doubling when compared to Option A and B, the table below shows that the revenue increase is not equivalent, with the revenue generated by Option I (Light Rail 6tph) only 20% higher than the revenue generated by Options A and B in 2030.

Table 8. Total Revenue Impact (2020 Prices, £m) – All Options

OPTION	2027	2030	2040
A and B	£2.54	£5.20	£5.69
C	£2.55	£5.22	£5.70
D	£2.69	£5.50	£6.01
E	£2.71	£5.54	£6.06
F	£2.72	£5.55	£6.07
G	£2.80	£5.72	£6.26
H	£2.95	£6.01	£6.55
I	£3.04	£6.20	£6.75

6.3 Other Benefits

6.3.1 The table below presents a breakdown of benefits discounted over a 60 year period for revenue and marginal external cost savings for Option A and Option B.

Table 9. Benefits Breakdown – Discounted Values Over 60 Years (£m) – Option A and Option B

BENEFIT TYPE		OPTION A	OPTION B
Passenger Services	Rail Revenue	£97.80	£97.80
	MEC	£66.23	£66.23
	Bus Operator Revenue Loss	-£1.35	-£1.35
Freight Services	CO_2 Savings	-	£27.24
	MEC	-	£35.64
	Operating Cost Savings	-	£76.93
	Present Value of Benefits (PVB)	**£162.69**	**£302.50**

6.4 Costs

6.4.1 The table below summarises the present value of costs for Option A and Option B.

Table 10. Costs Breakdown – Discounted Values Over 60 Years (£m)

	OPTION A	OPTION B
Capital Cost	£175.51	£262.06
Operating Costs	£34.38	£34.38
Present Value of Costs (PVC)	**£209.89**	**£296.44**

6.5 Appraisal Results

6.5.1 The tables below present a summary of the scheme appraisal for the range of options, with Table 11 presenting the results for the heavy rail options and Table 12 presenting the results for the light rail options .

Table 11. Appraisal Results (£m) – Heavy Rail Options

	OPTION						
	A	B	C	D	E	F	G
PVB	£162.69	£302.50	£163.18	£172.07	£172.95	£173.20	£178.74
PVC	£209.89	£296.44	£246.85	£221.06	£239.27	£279.88	£254.09
Net Present Value (NPV)	-£47.21	£6.06	-£83.67	-£48.99	-£66.31	-£106.68	-£75.35
Benefit Cost Ratio (BCR)	**0.78**	**1.02**	**0.66**	**0.78**	**0.72**	**0.62**	**0.70**
Value for Money Category	Poor	Low	Poor	Poor	Poor	Poor	Poor

Table 12. Appraisal Results (£m) – Light Rail Options

	OPTION H	OPTION I
PVB	£183.59	£188.04
PVC	£241.07	£278.50
Net Present Value (NPV)	-£57.48	-£90.46
Benefit Cost Ratio (BCR)	**0.76**	**0.68**
Value for Money Category	Poor	Poor

6.5.2 It can be seen that with the exception of one option, all of the appraised options produce a BCR below one, representing poor value for money.

6.5.3 Option B which combines an hourly passenger service between Stoke-on-Trent and Leek with freight traffic generates a BCR of 1.02. This demonstrates the scale of benefits achieved by freight traffic from Cauldon, as the benefits associated with freight are able to support both the costs associated with upgrading the route form Leekbrook Junction to Cauldon and offset the negative Net Present Value achieved by the Option A passenger service.

7. SENSITIVITY TESTS

7.1.1 This section presents the results of the sensitivity tests conducted on the appraisal, upon Option B. The following sensitivity tests have been conducted:

- Impact of COVID-19 upon demand
- Impact of a 20% increase in operating costs
- Impact of a lower capital cost
- Impact upon tourism
- Impact of the use of Class 195 rolling stock
- Impact of alternative freight assumption

7.2 COVID-19

7.2.1 As discussed previously, the options have been based upon no COVID impact incorporated into the appraisal. Therefore a sensitivity test has been conducted that incorporates the DfT's medium recovery forecasts for Northern Trains. Table 13 below summarises the results of this.

Table 13. Appraisal Results (£m) – COVID Medium

	OPTION B	MEDIUM COVID
PVB	£302.50	£288.08
PVC	£296.44	£296.44
Net Present Value (NPV)	£6.06	-£8.36
Benefit Cost Ratio (BCR)	**1.02**	**0.97**
Value for Money Category	Low	Poor

7.3 Increased Operating Costs

7.3.1 A sensitivity test has been conducted that incorporates a higher level of operating costs. A 20% uplift in operating costs (additional to the 41% optimism bias already applied) represents the sensitivity to unmodelled real cost increases. Table 14 below summarises the results of this test.

Table 14. Appraisal Results (£m) – Higher Operating Costs

	OPTION B	+20% INCREASE IN OPEX
PVB	£302.50	£302.50
PVC	£296.44	£303.32
Net Present Value (NPV)	£6.06	-£0.82
Benefit Cost Ratio (BCR)	**1.02**	**1.00**
Value for Money Category	Low	Poor

7.4 Lower Capital Cost

7.4.1 A sensitivity test has been conducted that incorporates a lower estimate of capital costs into the appraisal of Option B. As outlined in section 5.7, lower and upper cost estimates were provided by SLC Rail, with a central set of costs generated for use in the appraisal. For this sensitivity test, the lower estimates of both the passenger and freight costs were used to appraise the impact upon the scheme of lower capital costs. Table 15 below summarises the results of this test.

Table 15. Appraisal Results (£m) – Lower Capital Costs

	OPTION B	LOWER CAPITAL COSTS
PVB	£302.50	£302.50
PVC	£296.44	£207.93
Net Present Value (NPV)	£6.06	£94.57
Benefit Cost Ratio (BCR)	**1.02**	**1.45**
Value for Money Category	Low	Low

7.4.2 A reduction in capital costs for Option B makes a large difference to the BCR moving it from 1.02 to 1.45, just short of the threshold for medium value for money.

7.5 Impact Upon Tourism

7.5.1 A sensitivity test has been conducted to assess the tourism value of the route as part of understanding the wider benefits of the scheme.

7.5.2 Using data from 'STEAM Draft Trend Report For 2013-2020" covering Leek, an economic impact per visitor in 2020 prices was calculated and applied to the demand attracted to Leek.

7.5.3 The table below summarises the results of this test.

Table 16. Appraisal Results (£m) – Impact Upon Tourism

	OPTION B	ECONOMIC IMPACT OF TOURISM INCLUDED
PVB	£302.50	£327.82
PVC	£296.44	£296.44
Net Present Value (NPV)	£6.06	£31.38
Benefit Cost Ratio (BCR)	**1.02**	**1.11**
Value for Money Category	Low	Low

7.6 Use of Class 195 Rolling Stock

7.6.1 A sensitivity test has been conducted that incorporates the use of Class 195 rolling stock within the heavy rail operating costs, rather than the costs associated with a Class 158. Table 17 below summarises the results of this test.

Table 17. Appraisal Results (£m) – Class 195 Operating Costs

	OPTION B	CLASS 195 OPERATING COSTS
PVB	£302.50	£302.50
PVC	£296.44	£299.92
Net Present Value (NPV)	£6.06	£2.58
Benefit Cost Ratio (BCR)	**1.02**	**1.01**
Value for Money Category	Low	Low

7.6.2 The tables above show that a medium COVID demand recovery scenario, a 20% increase in operating costs, and the use of costs associated with a Class 195 within the heavy rail operating costs make little impact upon the BCR, whereas incorporating the impact of tourism benefits to Leek makes a more noticeable difference with the BCR increasing from 1.02 to 1.11.

7.7 Alternative Freight Assumption

7.7.1 As described above out base assumptions about freight are relatively conservative. This option considers a scenario where freight flows to Banbury and London replace shorter distance road haulage movements from quarries nearer to those destinations. This increases the level of mode shift achievable.

Table 18. Appraisal Results (£m) – Alternative Freight Assumption

	OPTION B	ALTERNATIVE FREIGHT
PVB	£302.50	£362.16
PVC	£296.44	£296.44
Net Present Value (NPV)	£6.06	£65.72
Benefit Cost Ratio (BCR)	**1.02**	**1.22**
Value for Money Category	Low	Low

7.7.2 It can be seen that a more optimistic view on freight has a considerable impact on the BCR rising it to 1.22. This further underlines the value of freight to this scheme.

8. APPRAISAL SUMMARY

8.1.1 This report has demonstrated that the proposed reopening of the Leek to Stoke-on-Trent line represents poor value for money in almost all scenarios, only generating a BCR over 1.00 when freight services are incorporated with a passenger service.

8.1.2 With the addition of freight services the scheme is forecast to represent low value for money, with the freight benefits sufficient to support the infrastructure investment required between Leekbrook Junction and Cauldon as well as supporting a proportion of the capital costs between Leek and Stoke. The appraisal is very sensitive to capital cost assumptions. When the lower range of capital costs are applied the Benefit Cost Ratio for a combined passenger/freight scheme increases from 1.02 to 1.45 close to the medium value for money threshold.

8.1.3 Furthermore, the appraisal has shown that the extension of services beyond Stoke-on-Trent makes little difference to the overall value for money of the scheme and the light rail options also appear to perform poorly.

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France:
Bordeaux, Lille, Lyon, Marseille, Paris

Northern Europe:
Astana, Copenhagen, Kiev, London, Moscow, Riga, Wroclaw

Southern Europe & Mediterranean: Algiers, Baku, Bucharest,
Madrid, Rabat, Rome, Sofia, Tunis

Middle East:
Cairo, Dubai, Riyadh

Asia Pacific:
Bangkok, Beijing, Brisbane, Delhi, Hanoi, Hong Kong, Manila, Seoul, Shanghai, Singapore, Shenzhen, Taipei

Africa:
Abidjan, Douala, Johannesburg, Kinshasa, Libreville, Nairobi

Latin America:
Lima, Mexico, Rio de Janeiro, Santiago, São Paulo

North America:
Little Falls, Los Angeles, Montreal, New-York, Philadelphia, Washington