Northumberland Line

Outline Business Case: Economic Appraisal Report

Northumberland County Council

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Quality information

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List of Acronyms

Acronym	Definition
AFC	Anticipated Final Cost
AMCB	Analysis of Monetised Costs and Benefits
ASI	Ashington station
ATOC	Association of Train Operating Companies
BCR	Benefit-Cost Ratio
BED	Bedlington station
BTP	British Transport Police
BYH	Blyth Bebside station
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CRM	Cramlington station
CRN	Calculation of Railway Noise
DfT	Department for Transport
DMU	Diesel Multiple Unit
DOO	Driver-Only-Operation
EAR	Economic Appraisal Report
ECI	Early Contractor Involvement
ECML	East Coast Main Line
ECS	Empty Coach Stock
ESG	Event Steering Group
FBC	Full Business Case
FOC	Freight Operating Companies
FTA	Fixed Track Access Charges
GBRF	GB Railfreight
GDP	Gross Domestic Product
GRIP	Governance of Railway Investment Projects
GTC	Generalised Travel Cost
HBO	Home-Based Other
HBW	Home-Based Work
IVT	In-Vehicle Time
JTW	Journey to Work
LAD	Local Authority District
LAQ	Local Air Quality
LEP	Local Enterprise Partnership
LNER	London North Eastern Railway
LSOA	Layer Super Output Areas
MPT	Morpeth station
MSOA	Middle Layer Super Output Area
NCA	Non-Car Available
NCC	Northumberland County Council
NCL	Newcastle Central station
NOP	Northumberland Park station
NPV	Net Present Value
NRPS	National Rail Passenger Survey
NTEM	National Trip End Model
NWH	Newsham station

Acronym	Definition
OBC	Outline Business Case
ORR	Office of Rail and Road
PDFH	Passenger Demand Forecast Handbook
P&R	Park and Ride
PVB	Present Value of Benefits
PVC	Present Value of Costs
QRA	Quantitative Risk Assessment
RAB	Regulatory Asset Base
RAMs	Route Asset Managers
RNEP	Rail Network Enhancements Pipeline
RPI	Retail Price Index
RSP	Rail Settlement Plan
RUS	Route Utilisation Strategy
SDV	Seaton Delaval station
SEN	South East Northumberland
SFO	Station Facilities Operator
SOBC	Strategic Outline Business Case
TAG	Transport Analysis Guidance
TCF	Treating Customers Fairly
TEE	Transport Economic Efficiency
TfN	Transport for the North
TOC	Train Operating Companies
TPE	TransPennine Express
TUBA	Transport User Benefit Appraisal
TWAO	Transport and Works Act Order
VAT	Value-Added Tax
VOT	Value of Time
WEBs	Wider Economic Benefits

1. Introduction

1.1 Context

1.1.1 Northumberland County Council (NCC) is seeking to improve connectivity and accessibility in the South East Northumberland Corridor (SEN Corridor), in particular improving the links between towns such as Ashington and Blyth with Newcastle, with a view to encouraging more sustainable access to the key regional economic centre.

1.1.2 A scheme to improve connectivity in the corridor was first considered in 1996 when NCC and its partners commissioned a study to investigate travel demand in the SEN Corridor in order to assess the need for major improvements in public transport. Three options were originally considered, these included:

- The re-introduction of passenger rail services on existing rail lines that are currently used solely for freight between Ashington, Blyth and Newcastle;
- The extension of the Tyne & Wear Metro system or the introduction of other light rail systems into South East Northumberland; and
- Improving the existing bus services through priority measures and potential bus guidance.

The study recommended the re-introduction of rail services on the Ashington, Blyth, and Tyne line (known as the 'Northumberland Line') as it was the most justifiable in terms of overall cost and benefit, and also provided good transport integration and connectivity opportunity linking the study corridor with the Regional Centre. Further review over the next decade (including a major scheme bid in July 2002) continued to find this option the most viable.

1.1.3 In 2011 AECOM was commissioned by NCC to develop an overarching evidence base for South East Northumberland[1]; considering economic, social and environmental aspects, including both current and future transport movements. Key challenges were drawn from the evidence base with a view to developing and assessing interventions designed to alleviate the identified challenges. This study showed that reopening the Northumberland rail line to passengers fully met the highest priority study objective of increasing access to job opportunities to South East Northumberland and reducing congestion. As well as this, reopening the line also met the further objectives of increasing public transport provision and reducing environmental impacts.

1.1.4 The background and progress on the scheme to date was discussed with the Department for Transport (DfT) in November 2011. The methodology for taking the scheme forward in terms of identifying a preferred option was founded on the feedback from this meeting and in accordance with the Guidance Note on Passenger Demand Forecasting for Third Party Funded Local Rail Schemes (DfT).

1.1.5 In 2012 AECOM was commissioned by NCC to undertake the initial business case work for the scheme. This focussed on developing a rail demand forecasting model covering the SEN corridor and an appraisal model to determine the economic costs and benefits. These tools were founded on TAG appraisal guidance. A range of heavy rail service options were identified through consultation with the rail industry, mostly focussed around providing one or two trains per hour between Ashington and Newcastle, whilst maintaining the current provision for freight services. Updates to this demand and appraisal analysis were undertaken in 2014 and 2016 to reflect the latest appraisal guidance, to incorporate opportunities to further define the core scheme proposition and to robustly inform the wider rail investment debate including possible funding opportunities.

[1] "South East Northumberland Public Transport Corridor Study", AECOM December 2011

1.1.6 In parallel, NCC commissioned Network Rail to undertake early GRIP[2] work to identify and cost the engineering requirements necessary to re-introduce rail passenger services between Newcastle and Ashington. This reported in 2016 identifying a cost of £191m[3] at GRIP 2 level with some notable exclusions such as land purchase, statutory process and utility diversions. Following a value management exercise with stakeholders, including NCC and Transport for the North, in 2017 Network Rail subsequently identified circa £30m of net savings and reported this in 2018.

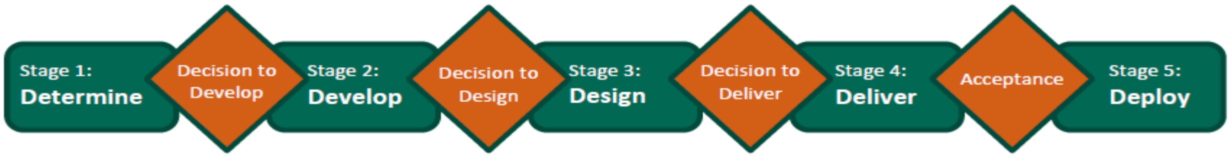
1.1.7 The reopening of the Northumberland Line to passenger services is being promoted by Northumberland County Council, as part of, and with the full support of, the North of Tyne Combined Authority, established as a recent devolution deal with Government. A new governance model for transport has been created operating across the North East as a pragmatic solution to provide the flexibility to meet the area's unique circumstances. This requires arrangements that will enable the North[4] and South[5] of Tyne areas to pursue their own diverse policy objectives while continuing to work together on transport delivery and as part of the North East LEP, so that the whole area will operate more efficiently and effectively in the shared pursuit of greater productivity and economic growth. As the North East moves forward, the seven councils will maintain their shared commitment to creating the conditions for economic growth and working collaboratively across the wider North East geography where it makes sense to do so on areas of common interest.

1.1.8 Effective engagement with the North East LEP and the wider business community is also critical to delivering the ambitions for the area. The seven authorities have agreed to continue to work closely with and through the North East LEP in delivery of the North East Strategic Economic Plan. The Northumberland Line scheme is one of the key transport schemes in the plan which will benefit the North East through enhanced sustainable transport connectivity. Transforming Cities Funding has been made available to the region and the Northumberland Line is viewed as being a key candidate for inclusion in the emerging package of transport interventions to be considered for this funding.

1.1.9 The national context is that in 2018 the government introduced the new approach for rail enhancements - Rail Network Enhancements Pipeline (RNEP), alongside Network Rail's 'Open for Business' initiative. RNEP moves the investment in rail enhancements away from rigid five year cycles and seeks to support enhancements to the capability of the railway by adding capacity as one of its four priority considerations for scheme progression. In addition to making railways safer and more reliable, the guidance supports some of the main objectives of the Northumberland Line, to offer new opportunities for citizens and businesses and to unlock much needed housing and economic growth.

1.1.10 The RNEP framework is a process for progressing rail enhancements that government funds or part-funds. It is made up of five stages, separated by formal decision points as illustrated in Figure 1.1.

Figure 1.1: The RNEP Process



1.1.11 In May 2019 NCC submitted the Strategic Outline Business Case (SOBC) for the scheme, which informed the 'Decision to Develop' in line with RNEP guidance. The DfT's Autumn 2019 Schemes Update confirmed that the Northumberland Line scheme had passed the Decision to Develop.

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[2] Governance for Railway Investment Projects (GRIP) is the management and control process developed by Network Rail for delivering projects on the operational railway
[3] This was a P80 estimate including 40% risk contingency
[4] North of Tyne Combined Authority (Northumberland CC, Newcastle, North Tyneside)
[5] NECA (Gateshead, South Tyneside, Durham CC, Sunderland)

1.1.12 The submission of this Outline Business Case (OBC) is intended to inform the ‘Decision to Design’, in line with RNEP guidance.

1.1.13 The government has identified four priorities for investment and action that contribute to achieving the goals set out in the Strategic Vision for Rail:

- Keeping people and goods moving smoothly and safely;
- Delivering the benefits from committed programmes and projects already underway;
- Offering more: new and better journeys and opportunities for the future;
- Changing the way the rail sector works for the better.

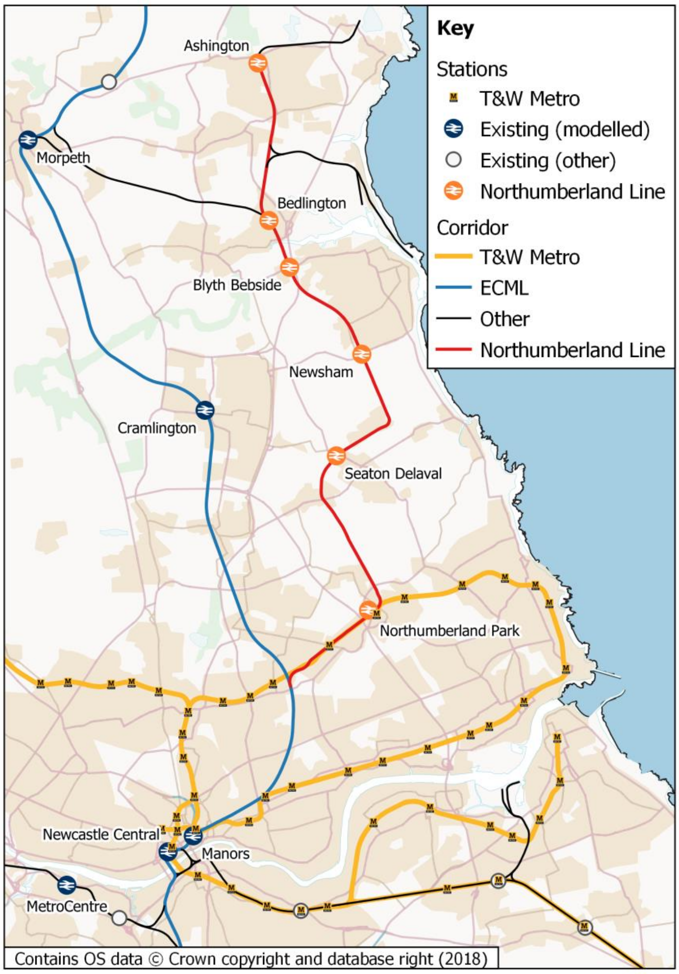
1.1.14 It is considered that the Northumberland Line proposition contributes across all of these key government priorities, and in particular strongly aligns with one of these, namely: “Offering More: New and Better journeys and opportunities for the future”.

1.1.15 Network Rail has recently designated the Northumberland Line scheme as an “Open for Business” scheme. This essentially opens up the scheme for potential third-party delivery as a ‘contestable project’. Contestable projects are funded projects that can be delivered by parties other than Network Rail, where it is safe to do so. Network Rail’s role is therefore more ‘hands-off’ across certain aspects of delivery.

1.2 Scope of Work

1.2.1 The Northumberland Line scheme consists of the re-introduction of rail passenger services over an existing freight-only line in order to link key towns and communities in the SEN corridor with Newcastle. Figure 1.2 presents the line of route, which utilises the East Coast Main Line (ECML) for 6.8 km to Benton North Junction at which point the existing freight-only line diverges to run parallel with the Tyne & Wear Metro line as far as Northumberland Park, where it is envisaged that a new platform will be constructed to facilitate interchange between rail and Metro services. The line of route then turns northwards towards Seaton Delaval, skirting the western edge of Blyth before arriving at Ashington. The distance from Benton North Junction to Ashington is 23.2 km. There are freight-only connections off this line of route towards the Port of Blyth, Morpeth (for connections back onto the East Coast Main Line) and extensions beyond Ashington towards the Lynemouth Power Station.

Figure 1.2: The Northumberland Line



1.2.2 Stations are proposed at Northumberland Park (for connections with Metro services), Seaton Delaval, Newsham, Blyth Bebside, Bedlington and Ashington.

Other station locations have been considered in previous work, but the decision not to progress them further at this time was made on the grounds of site feasibility issues and/or impacts around demand (journey times).

1.2.3 The existing route is single track from Benton North Junction as far as Newsham and then double track through to Ashington.

1.2.4 The scope of work presented in this Economic Appraisal Report (EAR) is founded in the demand and appraisal work undertaken to support the SOBC and OBC that informs the RNEP ‘Decision to Develop’, as well as informing the Transforming Cities Funding application. RNEP, alongside Network Rail’s ‘Open for Business’ initiative and the Transforming Cities Funding opportunity, has fostered a new climate for the development of third party promoted rail investment. In particular, for the Northumberland Line scheme this will allow NCC as scheme promoter to explore alternative delivery mechanisms and employ other organisations other than Network Rail to develop the engineering solution and costs to feed into the scheme’s emerging business case. A key objective of the analysis and work that has been undertaken to develop this OBC is to bring down the capital costs first identified by Network Rail’s GRIP 2 exercise.

1.2.5 In preparation for the SOBC, and now the OBC, submission the opportunity has been taken by NCC, as scheme promoter, to re-map the governance of the scheme in line with RNEP and the new approach to developing the scheme. A consultancy team, led by AECOM and supported by SLC Rail and Mosaic Consultants, has been commissioned by NCC to drive the development of the scheme through the RNEP process and in support of a Transforming Cities Funding application, taking into consideration opportunities that might exist around alternative delivery and funding.

1.2.6 In terms of the EAR, this work has included:

- Refining the service and associated infrastructure options to facilitate the earliest and cheapest possible commencement of operations, based on the outcomes from the analysis that supported the SOBC and in line with potential funding opportunities;
- Re-visiting the demand and appraisal models to ensure they reflect the latest government appraisal guidance (TAG), that they have the necessary functionality to robustly model the emerging options and that the models are using the latest available data; and
- Incorporating the set of capital costs developed by the Consultant Team (that replaces the initial costs developed for the SOBC).

1.2.7 Both the Department of Transport (DfT) and Transport for the North (TfN) have played a key role in the development of the scheme over the years. Previous business case work, including the development of the demand and appraisal models, has been reviewed by the DfT. As part of the preparation for the OBC the DfT are again playing an integral role through their participation on the Project Steering Group. TfN also participate on the Steering Group and separate meetings have been held to discuss scheme development.

1.3 Report Contents

1.3.1 This document is presented in two parts:

- Part 1 (Chapter 2) is the **Appraisal Specification Report** that sets out how the option development, modelling and appraisal has been undertaken; and
- Part 2 (Chapter 3) presents the **Option Appraisal Report** which outlines the demand and appraisal outputs that have informed the OBC’s Economic Case.

2. Appraisal Specification Report

2.1 Timetable Design and Option Development

Overview

2.1.1 The full scheme, as considered by NCC, is to deliver an all-day half-hourly service between Ashington and Newcastle, with competitive journey times. Hourly service patterns have also been considered in the previous work. Anything less than an hourly service pattern was not considered to be an attractive option for the corridor. On the other hand, the infrastructure constraints and requirement for an hourly freight path meant that a frequency of three or more trains per hour would be difficult to timetable and likely result in the need for prohibitive infrastructure interventions.

2.1.2 The development of the appraisal options for the OBC was informed by the approach to developing infrastructure solutions that could deliver a rail service between Newcastle and Ashington. A phased approach to infrastructure enhancement was adopted in order to facilitate the identification of a solution that might be able to be delivered more quickly and at a lower cost than delivering the full scheme as envisaged by NCC. This 'first phase' of scheme development could support initial funding opportunities, such as Transforming Cities Funding, with a view to ultimately delivering the full scheme thereafter.

2.1.3 This approach to developing options differs from the previous studies undertaken, where the options developed were focussed on what would be required to deliver a set of timetable aspirations. For example, Network Rail's GRIP work identified what they considered would be necessary to deliver a half-hourly service all day and was not necessarily focussed on what was the minimum infrastructure requirement to deliver a passenger service.

2.1.4 In the first instance therefore for the SOBC, a set of infrastructure enhancement phases were developed that establish the line speeds and capacity along the route. The delivery strategy was driven by affordability, speed of delivery and planning consent processes and resulted in the identification of four Infrastructure Phases each providing additional service functionality, capacity or resilience. Infrastructure Phase 1 (IP1) enabled a basic service with four stations and was developed in order to deliver a passenger service on the route within the shortest practical timescales; IP2 provided two further stations; IP3 reduced journey times; whilst IP4 enabled a half-hourly passenger service through the day with freight. Each Infrastructure Phase built on previous phases, and the design team developed each phase to minimise any subsequent re-work. Although the delivery strategy envisaged these as being incrementally delivered as funding and consents allow, it was entirely possible that Infrastructure Phases 2-4 could be delivered as a single package if appropriate.

2.1.5 During the Develop stage the number of development phases has been further refined to two phases:

- Phase One: Reflecting a level of service that can be delivered within the timescales dictated by the TCF funding requirements. This is essentially an hourly service, with additional peak hour trains, serving four new stations (Northumberland Park, Newsham, Bedlington and Ashington);
- Phase Two: Reflecting NCC's 'full scheme' with a half-hourly service all day and two further stations added (Blyth Bebside and Seaton Delaval).

This reflects the continued development of the scheme, in the first instance as a key element of the Transforming Cities Fund bid (Phase 1), moving towards achieving NCC's full scheme aspirations (Phase 2) thereafter. For this OBC the two intermediate phases presented in the SOBC have been dropped as the scheme development matures.

In addition, the hourly service pattern all day has been dropped for the OBC on the basis that the hourly service with peak additional services always performed more strongly in appraisal terms.

Operational Considerations

2.1.6 The route between Newcastle and Ashington station is 30 km in length. The first 6.8 km between Newcastle and Benton North Junction are part of the East Coast Main Line which is a 3 AC overhead electrified track railway (Up and Down Main and Slow) for 2.8 km north of Newcastle and then two track railway (Up and Down Main) until Benton North Junction. The lines north of Newcastle are all bi-directional between Newcastle and Benton North Junction. Manors station is served only by the Up and Down Main lines.

2.1.7 From Benton North Junction the route is used by freight only and diverges from the ECML onto the former Ashington, Blyth and Tyne railway. This 23.2 km section has no timetabled passenger services running over it and includes a 11.8 km single line section controlled by Newsham signal box between 1.2 km east of Benton North Junction and Newsham junction. Thereafter the route is double track and signalled as absolute block for the remaining 10.2 km from Newsham to Ashington via Bedlington with traditional lever frame signal boxes at Bedlington South, Bedlington North and Marcheys House.

2.1.8 The route between Benton North Junction and Ashington is cleared for passenger services (modern Diesel Multiple Unit (DMU)) as far as Bedlington North Junction only. The route has 10 timetabled freight services in each direction per weekday operating from the south serving Lynemouth and Port of Blyth and 1 movement per day between Blyth and Fort William running via Morpeth. However, based on recent ‘TRUST’ data there are no more than 8 freight train movements operating over the route on a typical weekday.

2.1.9 Line-speeds on the route north of Benton Junction are maximum 45 mph with a number of 10 mph speed restrictions due to heavy axle-weight restrictions at Bedlington and North Seaton viaducts, curvature at Bedlington north and track contamination at Green Lane level crossing.

2.1.10 The core output requirements for the timetable development and business case implications are as follows:

- A clock-face passenger timetable with a minimum hourly frequency is required in order for it to be viable with an aspiration for half-hourly peak and inter-peak;
- Capacity to be provided for at least one freight service per hour in each direction between Benton North Junction and Lynemouth/Port of Blyth;
- Six stations to be provided at Northumberland Park, Seaton Delaval, Newsham, Blyth Bebside, Bedlington and Ashington;
- Two operating scenarios; a franchised operation with an assumption of Class 170 rolling stock performance and capacity and resourcing by Arriva Northern and; a Concession operation procured by a public body based on alternative rolling stock using the Viva Rail Class 230 25kv battery train performance and capacity as a baseline.

2.1.11 The key constraints for the re-instatement of a passenger service are:

- Platforming at Newcastle Central;
- Interface with existing passenger and freight services on the ECML immediately north of Newcastle Central;
- Route Capacity over the long single line section; and
- Slow line-speeds leading to potentially unattractive journey times.

Platforming at Newcastle Central

2.1.12 Sufficient capacity currently exists for the proposed service to reverse at the north end of Newcastle station nominally in platform 1. Proposed changes to both franchised and open access operator services between now and the December 2021 timetable will impact on the existing capacity of the East Coast Main Line between Newcastle Central station and Benton North Junction. Although current timetable modelling indicates that the Northumberland Line timetable is operable based on the December 2019 timetable the project is working closely with the rail industry December 2021 Event Steering Group (ESG) to ensure that the route is capable of accommodating all known future requirements.

2.1.13 Based on the December 2019 working timetable the inter-peak standard hour timetable north of Newcastle has two Kings Cross – Edinburgh services, one Cross Country Plymouth – Edinburgh service, one local Newcastle-Morpeth, one TPE service extended to Edinburgh service and no more than one freight train path per hour in each direction between Newcastle and Benton North Junction. This equates to 6 paths per hour compared to a theoretical capacity of 12-15 slots per hour suggesting that sufficient capacity is available for the additional Northumberland line services and the additional services planned from December 2021. However, these services run at different speeds, have different calling patterns and are unlikely to be spaced in the most efficient way between Newcastle and Benton North Junction. Continuing co-ordination with the ESG is therefore vital to ensure that the allocation of capacity takes all potential users into account.

Route Capacity over long single line section

2.1.14 Based on the current line-speeds and signalling it would not be possible to operate an hourly freight and an hourly passenger service over the single line section because the line would be occupied for 64 mins in every hour (36 mins by freight, 28 mins for passenger). The Phase 1 hourly timetable proposal therefore includes line-speed improvements on the single line section and upgraded signalling to enable trains to be ‘flighted’ to optimise capacity.

Slow Line-Speeds leading to potential unattractive journey times

2.1.15 Notwithstanding the single-line constraint it would take a Class 150 DMU 41 minutes to run from Ashington to Newcastle calling at all 6 stations based on current line-speeds. This produces an average speed of just over 27 mph, which is some way short of TfN’s Long Term Rail Strategy ‘desirable minimum standard’ for local services to achieve average journey speeds of at least 40 mph. A 41-minute journey time also reduces the available turn-round time at each end of the route for the rolling stock, reducing operational flexibility and increasing performance risks. Line-speed improvements are therefore essential for both commercial and operational reasons.

Timetable Development Process

2.1.16 The most recent timetable development work builds on that done by Jacobs/Network Rail in their GRIP 2 study dated June 2016, which assumed Class 150 rolling stock as the basis for their RailSys based analysis of potential sectional running times. The June 2016 study concluded that a journey time of 34.5 minutes was achievable based on an hourly service from Ashington to Newcastle and with six station stops and Class 150 traction as long as the ruling line-speed was increased to 55 mph.

2.1.17 The June 2016 study set out to establish what infrastructure interventions would be required to support an hourly or half-hourly passenger service both in combination with an hourly freight service. A key conclusion was that to achieve a half-hourly passenger service in combination with an hourly freight service a dynamic loop would need to be provided in the middle of the single line section between Holywell level crossing and Seghill with an assumption that passenger and freight services would be timed to cross each other at the dynamic loop.

2.1.18 The more recent work has taken a different approach and as well as critically appraising the previous operational assumptions, has sought to identify the relationship between service options and infrastructure interventions to gain an understanding of the key service driven cost triggers. The key conclusions are as follows:

- An hourly passenger service can be provided at lower cost and in shorter timescales by not initially building the two stations with more complex land/planning constraints (Blyth Bebside and Seaton Delaval). This can also be achieved with fewer signalling interventions and lower line-speeds in those locations where they are more costly to implement.
- The rolling stock resources required to operate an hourly service (two units in service) can be used more efficiently in the peak hours to provide a higher frequency (tidal) service into Newcastle in the morning peak and out of Newcastle in the evening peak, increasing the attractiveness of the service and hence demand and revenue at marginal operating cost.
- End to end journey times between Ashington and Newcastle based on the Phase 2 half hourly service have been calculated using Class 170 traction capability and assume calls at 6 new stations on the Northumberland line plus Manors just outside Newcastle. Assuming an increase in ruling line-speed to 65 mph and taking into account the same number of permanent speed restrictions, which were determined by track curvature for which no economic solution is available, the quickest attainable journey time for a Class 170 unit on the route is 35 minutes in the southbound direction (towards Newcastle) and 34 minutes in the northbound direction (towards Ashington). Increasing the line-speed above 65 mph makes no difference to the quickest attainable journey time for a Class 170 unit because the modelling illustrates that the traction type is unable to exceed 65 mph before having to decelerate for the next station stop or permanent speed restriction.
- In all timetable options it is assumed that services will call at Manors station just north of Newcastle Central. However, patronage is relatively low for this station outside peak hours and capacity constraints on ECML may result in these stops being reduced. The impact on end to end journey times of the Manors stop being removed would be between 2 and 2.5 minutes and the impact on patronage of losing the stop would be more than offset by the increase in patronage resulting from the improved journey time outside of peak periods.
- Table 2.1 below summarises the journey time comparison outputs from the work done by Tracsis plc in the Develop phase based on the proposed infrastructure interventions in Phases 1 and 2 for each of Class 150/156, Class 170 and Class 230 rolling stock. It illustrates that the difference between Class 15X and Class 170 is marginal albeit this slight difference is enough to suggest that Class 15X units would be too slow to reliably operate the Phase 2 timetable. The key differentiator is between Class 170 and Class 230 timings with up to 3 minutes improvement in journey time with concomitant improvements in patronage, revenue and economic benefits. These timings have been used as the basis for economic modelling of the Franchise versus Concession option within the case. However, it is recognised that a Class 230 (or equivalent) option may also be possible under a franchised arrangement.

Table 2.1: Journey Time Comparisons

	Class 15X	Class 170	Class 230
Phase 1 – Ashington - Newcastle Journey Time			
Northbound	31.5	31	29
Southbound	33	32	30.5
Phase 2 – Ashington - Newcastle Journey Time			
Northbound	34.5	34	31
Southbound	35.5	35	32.5

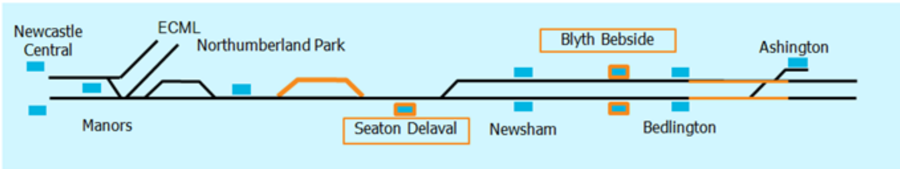
- For the Phase 2 half-hourly service the previous assumption that all services would cross at a new dynamic loop in the middle of the single line section is operationally flawed. Discussions with Network Rail and Arriva Northern have confirmed our view that from an operational point of view it is preferable to time services to cross on the double track section at each end of the single line and use the loop as a regulating point for perturbed operation rather than relying on services to meet in the middle of a single line section.
- In all options Furnace Way sidings, just south of Bedlington, need to be re-instated in order to allow the Port of Blyth - Fort William alumina freight train to reverse, (currently reverses on main line at Newsham). For the Concession option this location also offers the opportunity for out-stabling of rolling stock, a small maintenance depot and a train crew signing-on point. This potentially generates significant vehicle km and train crew operational cost savings compared to the Franchise option.

2.1.19 Two timetable/infrastructure intervention scenarios (or phases) have emerged from the Develop phase work and these are illustrated Figure 2.1 below:

Figure 2.1: Infrastructure Phases

<u>Phase 1: Initial hourly service</u>
4 new stations; Line-speed increases Benton-Newsham: Double track extension south of Newsham; LX upgrades; Turnback facility at Ashington off Main Line; Junction improvements Bedlington North

<u>Phase 2: Half-hourly service</u>
Passing loop between Holywell LX and Seghill LX, new stations at Seaton Delaval and Blyth Bebside, line-speed increases north of Bedlington.



- Phase 1 – Hourly passenger service to four stations with option of higher tidal peak frequency into/out of Newcastle. Requires line-speed improvements between Benton North junction and Newsham, the extension of double track south from Newsham, a new turnback siding at Ashington for train reversal and level crossing and signalling upgrades to enable passenger services to operate (with associated line speed improvements).
- Phase 2 – Half-hourly service to six stations. Requires a new dynamic passing loop between Northumberland Park and Seaton Delaval for performance robustness and also to enable freight and passenger services to cross each other at certain times in the hour. Further line-speed improvements north of Bedlington to offset the journey time impact of the 2 new stations.

2.1.20 Woodhorn station has been proposed in earlier studies as an option for the terminal station on the route. From an operational timetable perspective, it is possible to serve Woodhorn in all options, but in Phase 2 it would trigger a third unit of rolling stock in service, significantly increasing the operational costs for marginal revenue benefit. The station would also require a new crossover, turnback siding and associated signalling. The current assumption, therefore, is that a new station at Woodhorn does not form part of the core scheme proposition but may be considered as a future extension option. The platform and turnback siding at Ashington have been designed such that they would not preclude extension to Woodhorn in a future phase.

2.1.21 The timetables for each of these Infrastructure Phases are presented in Appendix B.

Option Phasing

2.1.22 The two infrastructure phases have emerged from an integrated review of operational and engineering constraints through the Develop Phase on the assumption that the planning and land assembly constraints relating to Seaton Delaval and Blyth Bebside stations would be resolved co-terminously with the acquisition of funding for Phase 2. However, it would be possible to operate the Phase 1 timetable with the additional two stations should the introduction of the Phase 2 half-hourly service be delayed creating a Phase 2a comprising 6 stations and hourly service.

Industry Consultation

2.1.23 The draft hourly and half-hourly timetables have been developed with the assistance of Network Rail and Arriva Northern and in consultation with the two key freight operators. DB Cargo and GB Railfreight. Through the Develop phase two timetable and signalling plan workshops were held involving representatives of Northern Rail, DB Cargo and GBRF plus key members of the project team to establish and incorporate their requirements and suggestions. These discussions have been invaluable in understanding some of the detailed operating characteristics of the route and the current freight flows.

Rolling stock/resourcing assumptions

2.1.24 Previous work undertaken by Jacobs in 2016 and by AECOM and SLC prior to the Develop phase assumed the use of Class 150 or Class 156 rolling stock for the route. This was a prudent view at the time given their relatively poor acceleration capabilities. Furthermore, detailed timetable work undertaken by Tracsis plc has highlighted that Class 170 or rolling stock with a similar capability would be required for the Phase 2 half-hourly service which would use the single section more intensively. Although Class 15X traction is theoretically capable of meeting the timings in the Phase 1 and Phase 2 timetables the performance robustness particularly of the Phase 2 timetable would be affected.

2.1.25 In the Develop phase we have obtained both desktop and real-world test data from the Class 230 battery unit being developed by Viva Rail. Of the new breed of more energy efficient and greener rolling stock being developed in the UK, this train is the one that is closest to full passenger service introduction having been procured by Transport for Wales for operation on the Wrexham-Bidston line in north Wales from 2020. The key benefit of the battery operation is the markedly improved acceleration capabilities of the Class 230 with acceleration rates of up to 1 metre per second/second. On urban routes with a frequent stopping pattern the acceleration capabilities make a significant difference compared to traditional DMU rolling stock as evidenced by Table 2.2 above.

2.1.26 Train crew operating costs assumptions are based on current Arriva Northern salaries, establishment calculator and terms and conditions. In the Develop phase we have made an assessment of what difference a Concession offering may make in terms of traincrew scheduling and costs compared to a Franchise operation. The key conclusions are as follows:

- Franchise operation would require the training of some or all of the current 75 drivers and 54 Conductors at Newcastle train crew depot in addition to the recruitment and training of the new drivers and conductors required to operate the service. By comparison the Concession operation would need to recruit and train only the incremental driver and conductor requirement albeit there may be a higher spare cover requirement due to the smaller depot size.
- Franchise operation would likely need to base the train crew at Newcastle depot whereas under the Concession option the train crew would sign-on at the new rolling stock depot location producing a saving in average shift length. This arises from the fact that ordinarily urban services such as Northumberland line naturally need to start and finish at the ‘country end’ which is therefore the optimal location for the train crew and rolling stock.

- Locating a new rolling stock and train crew in allocation closer to Ashington or Bedlington will generate higher local employment benefits compared to a Newcastle/Heaton depot-based option due to the socio-economic profile of this part of South-East Northumberland.
- A Concession operation provides the opportunity for a 'fresh approach' in respect of new driver and conductor terms and conditions which is not an option readily available to an existing Franchise operation. Market testing has demonstrated that there is an appetite for this kind of approach which potentially also brings with it 'multiplier' benefits in respect of training, apprenticeships etc associated with a new start-up which would be more likely to attract partnership funding in respect of enterprise zones etc.

2.1.27 This economic case has therefore examined both these core options (Franchise and Concession) in detail to determine which delivers the highest value for money and lowest reliable operating cost per passenger km based on an aspiration to move as far as possible towards minimising or achieving a net no subsidy operation if at all possible.

Option Development

2.1.28 The options have been developed in order to distinguish between the infrastructure phases and the different operating scenarios now being assessed. It is important to acknowledge that the Northumberland Line scheme is essentially being developed as a series of phases in line with available funding timescales. Whilst the SOBC appraised a wider set of options around this approach, the OBC has sought to fine tune the phasing, acknowledging the further advancement of the scheme through the 'Develop' Stage. The two operating scenarios presented (Franchise and Concession) both deliver the same outcomes in terms of service levels but will have different sets of costs and benefits associated with them and hence the requirement for them to be appraised as separate entities. These options therefore focus on the delivery of different service frequencies that the infrastructure phases and operating scenarios are able to support and are summarised in Table 2.2.

Table 2.2: Appraisal Options

Infra. Phase ID	Operating Scenario	Appraisal Option ID	Stations Served	Service Headways (peak / off-pk)	Ashington-Newcastle Journey Time	Freight Paths (does option facilitate 1 tph in both directions all day?)
IP1	Franchise	T1	4	40* / 60	32	no (paths restricted in both directions in the peak hour)
	Concession	A1	4	40* / 60	30.5	
IP2	Franchise	T2	6	30 / 30	35	no (paths restricted in both directions in the peak hour)
	Concession	A2	6	30 / 30	32.5	

** three services across a two-hour peak period – essentially a half-hourly service in the peak hour in the peak direction only*

2.2 Demand Model

Introduction

2.2.1 This section sets out how the demand model has been developed in order to inform the OBC. The core structure of the demand model was developed in 2012, with updates in 2014, 2016 and 2018. For the latter update, in preparation for the SOBC, some significant changes and updates were made to the model to ensure it reflected the latest government appraisal guidance (TAG), that it had the necessary functionality to robustly model the emerging options and that it was using the latest available data.

2.2.2 For the OBC, some further refinements have been made to the model in order to improve its representation of times and costs in the study area. In addition, the methodology for processing the base demand data has been refined using more robust factors. The key amendments made to the SOBC version of the demand model include:

- a re-zoning exercise to better reflect station catchments and in particular the size of the station catchment walk-in area;
- updated time and cost data across each mode reflecting the updated zoning and using the latest available data and TAG guidance;
- the splitting of 'Other' journey purpose into separate 'Leisure' and 'Business' journey purposes;
- the use of NRPS[6] data to provide improved time of day demand profiles;
- updated Car Available/Non-Car Available splits for the bus mode;
- adjustment of the long-distance demand uplift factor;
- modelled future years extended by one year (2022 to 2023 / 2038 to 2039).

2.2.3 Information on the model structure and zoning are set out below, followed by a discussion of the generation of the base demand, times and costs that feed into the model. The calibration and validation of the model is presented in line with guidance. The development of the future year models (demand growth, changes to times and costs, do-something option specification) is then presented in a similar manner. Finally, the demand uplifts that capture the market segments not covered by the demand model specifically, which are derived from observed data, are discussed.

Overview of Demand Methodology

2.2.4 The standard rail demand forecasting tools, such as MOIRA and elasticity-based approaches, were unsuitable for this study, given that it is a new passenger service running over an existing freight-only route. The requirements were that the demand forecasting has to be appropriate to support the development of the scheme going forward, including:

- providing robust forecasts of demand and revenue to inform the business case for the scheme in line with RNEP requirements;
- to inform rail industry stakeholders as to the potential viability of the scheme from both a financial (Franchise subsidy) and economic (value for money) perspective;
- providing the necessary information to NCC to support their decision-making process in terms of regionally allocated capital funding (and also to note that there could be an expectation that the scheme would have to be revenue funded locally for the initial years of operation[7]); and
- ensuring that the demand model developed can be easily updated, is transparent and has the technical capability to inform the scheme development through to Full Business Case/Decision.

2.2.5 Therefore, the modelling structure needed to be flexible and disaggregate enough to be able to distinguish between various options that may be developed (options could be specified in terms of differing journey times, different stations, different service patterns, stopping patterns, etc.). This in turn required that an appropriate zoning system was developed and that the journeys by all available modes are assessed, so that modal transfer can be determined. Given the nature of the rail network in the study area, there is limited scope for multi-routing and therefore the need for a network assignment-based approach was deemed to be unnecessary. It was therefore considered that the most appropriate approach was to build a spreadsheet-based mode-choice model, with appropriate imported 'off-the-shelf' parameters, calibrated to ensure a suitable level of validation to the study area. This approach is recommended in the PDFH and ensures good practice is adopted, in that the forecasts are generated 'bottom-up' with built-in sense checks and more formal validation processes at key stages/building blocks. Using a spreadsheet-based platform also ensures model transparency and removes any 'black box' issues.

[6] National Rail Passenger Survey
[7] The actual number of years that NCC might be expected to provide revenue support would be subject to confirmation in discussions with the DfT/TfN

2.2.6 The mode-choice model was built to represent trip decision-making in the South East Northumberland (SEN) corridor only. Longer distance movements would be represented by the application of an appropriate demand uplift factor based on observed levels of rail demand on other rail corridors into Newcastle.

2.2.7 Although there are currently no rail passenger services in the study corridor, to the immediate west there is a parallel rail route (the ECML) that links Newcastle with Cramlington and Morpeth. The current level of service on that line is summarised in Table 2.3.

Table 2.3: ECML Local Services

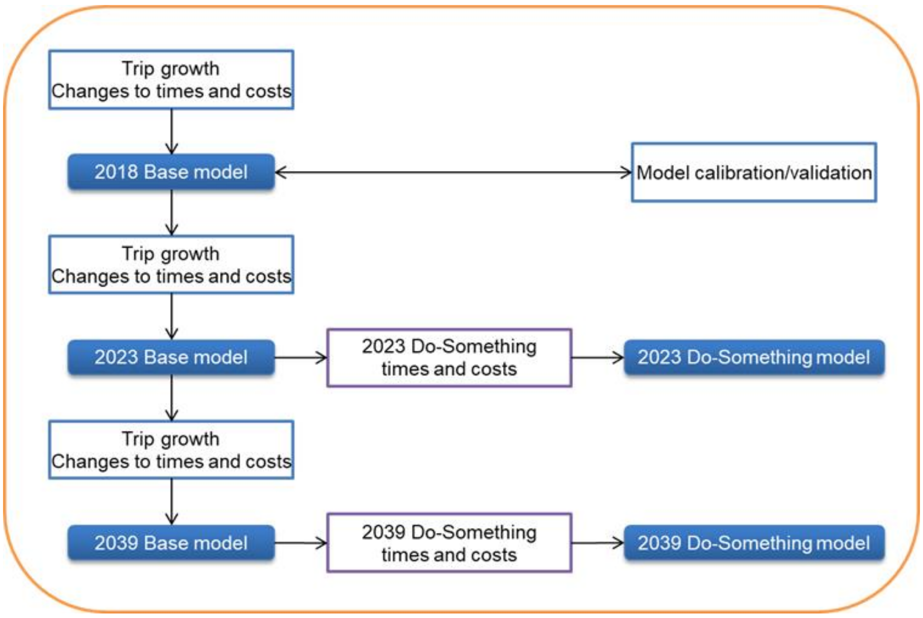
Station	Service Provision into Newcastle			Comments
	Peak	Inter Peak	Journey Time	
Cramlington	hourly	hourly	14-19 mins	Northern local service
Morpeth	4 trains in 2 hours	hourly	14 (fast) to 28 (slow)	LNER and Cross Country insert additional stops in the peaks

2.2.8 Our planning assumptions in relation to the existing rail service provision therefore included:

- Trips from Morpeth or Cramlington are unlikely to consider using the proposed new rail service to access Newcastle. The exception to this was the eastern side of Cramlington, where it was considered that the access times to, and level of service at, a new station at Seaton Delaval could be an attractive proposition as an alternative to using the existing service via Cramlington station;
- There will be trips using the existing rail service by people who live in the SEN study area (these are 'railheaders' – probably driving or catching a bus to Morpeth or Cramlington). Their choice between using the new service in the SEN corridor or the ECML is modelled on the basis of the relative rail generalised cost of travel, allowing them to choose between which rail corridor is used (ECML via Morpeth or Cramlington versus the Northumberland Line).

2.2.9 Figure 2.2 sets out the approach to the development of the demand and revenue model, where the key elements included model structure, zoning, base year demand, base year times and costs, model validation, demand growth, future year times and costs, the do-something specification and other demand uplifts.

Figure 2.2: Modelling Approach



Model Structure

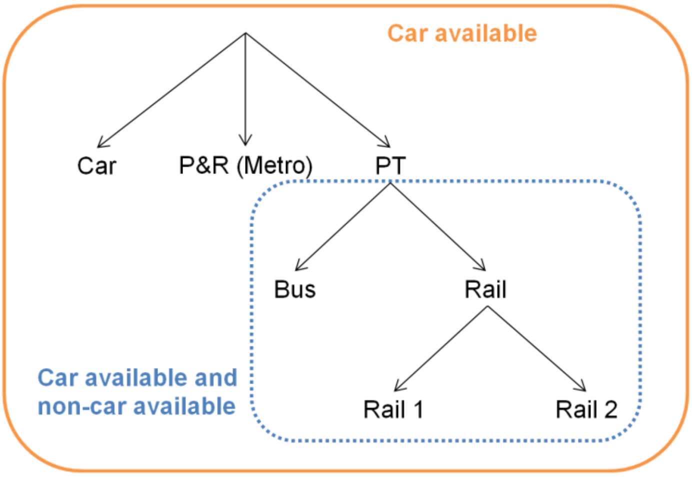
2.2.10 The core structure and model parameters for the mode-choice model were imported from an existing model[8], which formed the basis for developing the model structure appropriate for this study area. The modes represented in the model are car, bus, Tyne & Wear Metro (via Park & Ride (P&R)) and rail. The functionality of the model was expanded to incorporate the choice between the two rail corridors for selected zones in the study area.

2.2.11 The model has four basic segments:

- Peak period, car available;
- Peak period, non-car available;
- Inter-peak period, car available; and
- Inter-peak period, non-car available.

2.2.12 The basic model form is a hierarchical logit model (Figure 2.3), with coefficients representing costs (e.g. fares, fuel costs, parking charges, etc.), in-vehicle time and out-of-vehicle time (e.g. walk time, wait time, etc.). There are also mode constants for the public transport and P&R modes (i.e.: a weighting to represent traveller's preference for one mode compared to another once time and cost impacts have been removed).

Figure 2.3: Model Structure



2.2.13 The way the model works is that the disutility to travel by each mode (in this case car, P&R (Metro), bus or rail) is calculated for each valid movement in the model. Disutility is another name for generalised cost and is made up of the costs of travel, the in-vehicle times and the out-of-vehicle times. A logit formula is then applied using these disutilities in order to determine mode shares by movement.

2.2.14 The rail mode is split into 'Rail 1' and 'Rail 2'. Rail 1 represents the rail offer (i.e. times and costs) associated with travelling via the existing rail service via Morpeth or Cramlington, whilst Rail 2 represents the times and costs associated with using the Northumberland Line rail service.

2.2.15 The model parameters were re-calibrated for this study, which is discussed further in the Model Validation section below.

Zoning

2.2.16 Model zones were defined around each of the potential station catchments in the model. These zones were based on aggregations of Census Lower Super Output Areas, which allowed for easy correspondence of the necessary data into our model structure. Zone centroids were identified for each zone (for developing time and cost data) taking into account the spread of development and attractions within that zone.

[8] Cambridge Huntingdon Multi Modal Study

2.2.17 The zoning in the study corridor was designed to best represent all potential movements that might benefit from the introduction of the proposed rail service (therefore focusing primarily on the Ashington to Newcastle corridor). For example, that means that origins such as Morpeth and (western and central) Cramlington were discarded as they already enjoy their own rail service to Newcastle. Easy interchange between the proposed rail service and the Tyne & Wear Metro at Northumberland Park, or at Newcastle Central, meant that the study area zoning needed to consider all destinations covered by the Metro across Tyne & Wear.

2.2.18 For the OBC, a re-zoning exercise was undertaken. Each station catchment was reviewed with a view to better representing the potential 'walk-in' area. This was due to station locations altering over the previous years of scheme development and thus the assumptions around walk-in catchments altered. The opportunity was also taken to add/split zones to generate more representative times and costs to feed into the mode-choice model. The study area was also extended to include the employment zone around Cobalt in North Tyneside, as well as plugging a gap between Gateshead and the MetroCentre (Dunston).

2.2.19 The number of zones in the model therefore increased from 37 to 56 zones.

2.2.20 Figure 2.4 on the next page illustrates the model zoning.

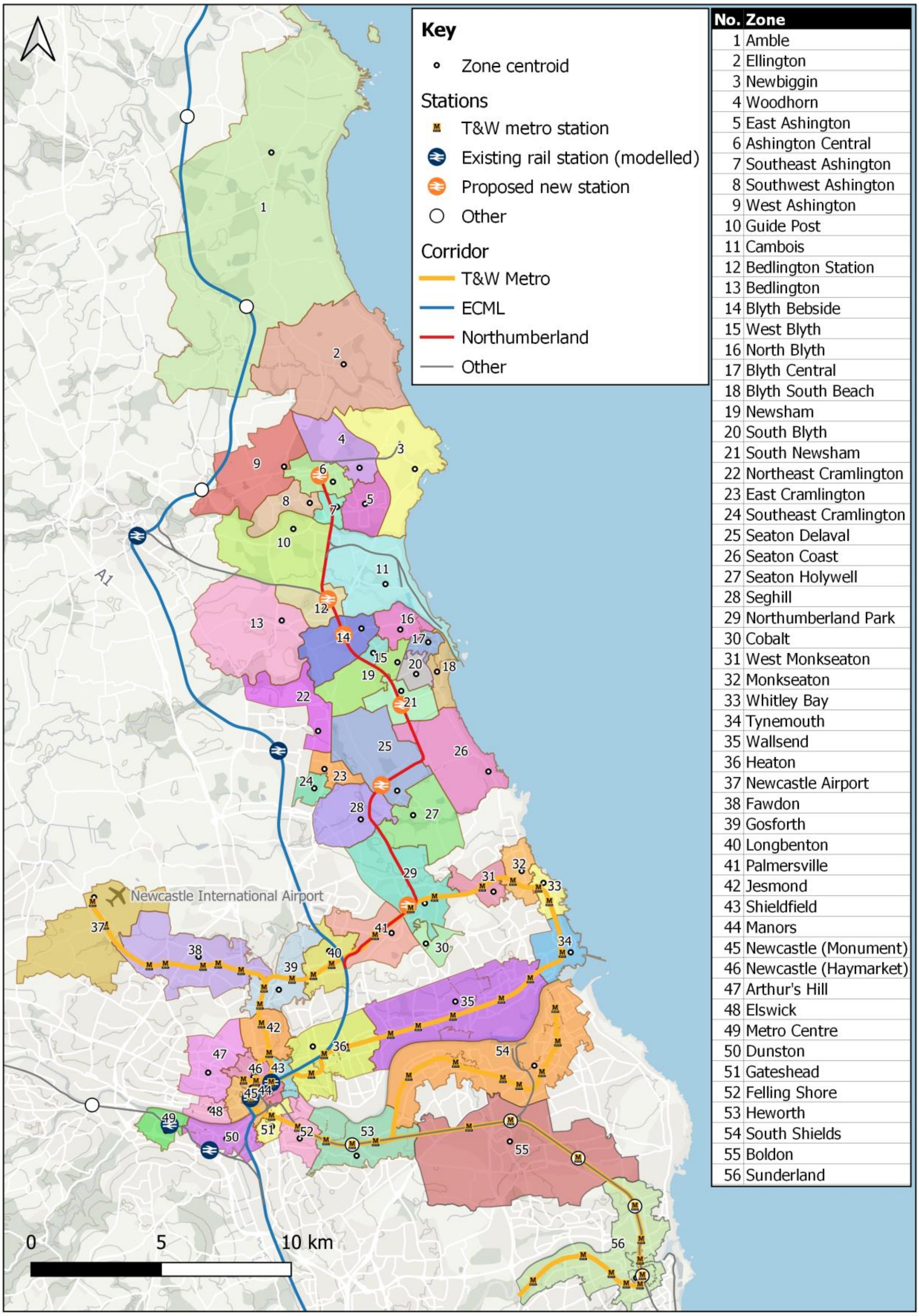
2.2.21 Essentially, the zones can be categorised as follows:

- 'origin' zones in South East Northumberland with a walk-in station catchment – typically covering an area up to 800m around the proposed station sites (zones 6 / 12 / 14 / 21 / 25 / 29);
- 'origin zones' in SE Northumberland further away from the stations (zones 1-5 / 7-11 / 13 / 15-20 /22-24 / 26-28);
- 'destination zones' in Newcastle city centre - and the MetroCentre (zones 43-46 & 49); and
- 'destination zones' in the rest of Tyne & Wear (along Metro corridors, where the final destination can be reached by foot from the nearest metro station) (zones 30-42 / 47-48 / 50-56).

2.2.22 What the figure illustrates is the subset of movements that are represented in the model. Not all these zone-to-zone movements were captured, as the modelling focus was on movements between the subset zones 1-29 and the subset zones 30-56 (i.e.: between South East Northumberland and Tyne & Wear). However, it should be noted that internal movements between zones 1 and 28 (i.e. within South East Northumberland) were also modelled where the presence of the proposed rail service might constitute a viable travel alternative (for example, between zones 6 and 21 (Ashington and Newsham), but not between zones 26 and 25 - Seaton Sluice and Seaton Delaval).

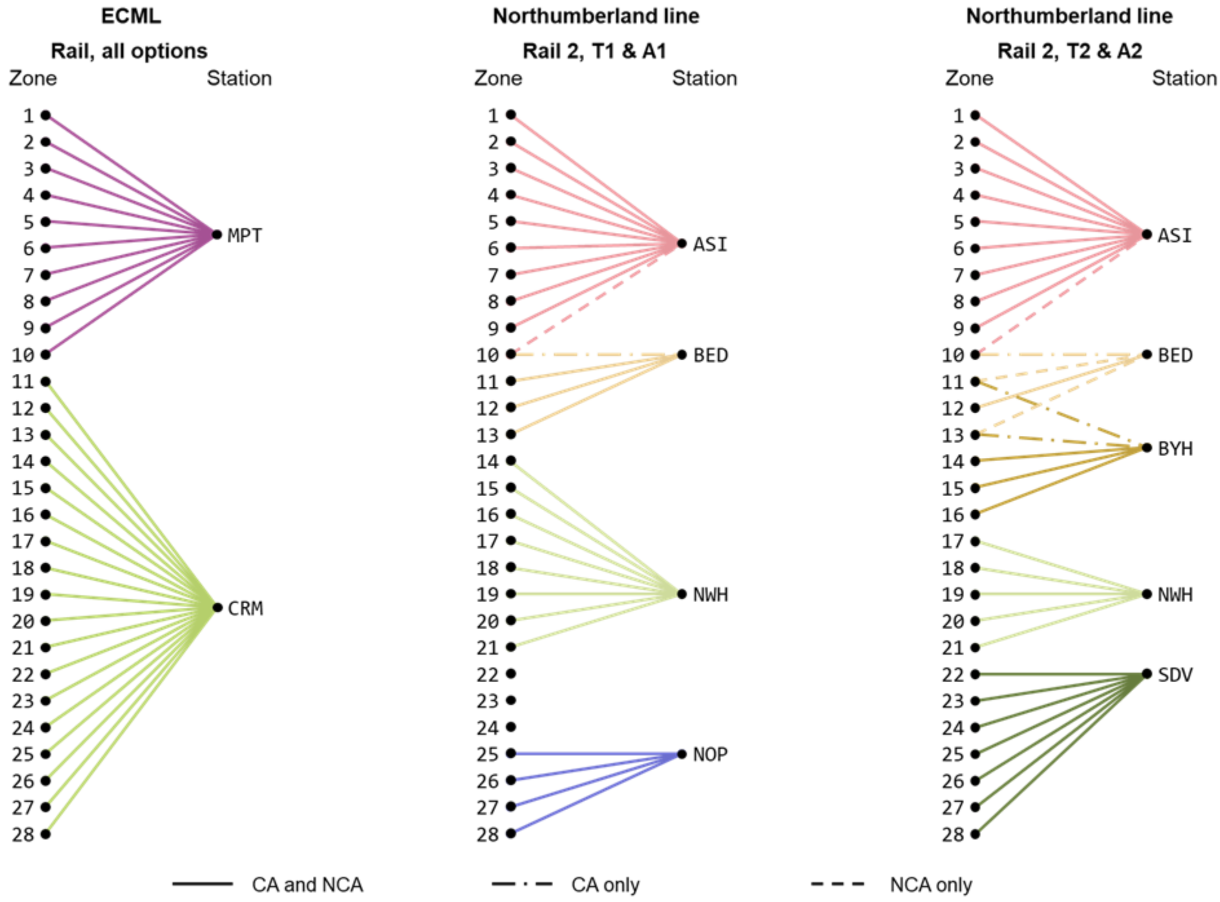
2.2.23 Each model zone has been allocated to a station on the ECML corridor (Rail 1 mode) and to a station on the Northumberland Line (Rail 2 mode in the Do-Something scenarios). That allocation was based on our best judgement and account was taken of access by bus and car (for those zones not within walking distance of a proposed station). For certain zones the allocation to a station varies depending on whether it is the car available or no car available model. For example, in Phase 2, zones 11 and 13 were allocated to Blyth Bebside station in the car available models, but to Bedlington station in the no car available models.

Figure 2.4: Model Zoning Structure



2.2.24 Figure 2.5 illustrates the assumed station allocation by zone, rail mode, infrastructure option and car availability for model zones in Northumberland. In the diagram CA refers to car available passengers and NCA to the non-car available passengers. The station codes used in the diagram are as follows: MPT for Morpeth, CRM for Cramlington, ASI for Ashington, BED for Bedlington, BYH for Blyth Bebside, NWH for Newsham, SDV for Seaton Delaval and NOP for Northumberland Park.

Figure 2.5: Zone to Station Allocation (by rail mode, infrastructure option and car availability)



2.2.25 As the figure above illustrates, for Phase 1 with only four stations the zones allocated to Blyth Bebside were re-directed to either Newsham or Bedlington, whilst the zones allocated to Seaton Delaval were re-directed to Northumberland Park. These reallocations to stations further away from the zones will increase access times and costs for rail trips which will manifest in a lower mode share allocated to rail by the mode choice model. Zones 22, 23 and 24 are not assigned to a Northumberland Line corridor station in Phase 1, as only Seaton Delaval offers a competitive alternative to Cramlington station.

Base Demand

2.2.26 For the OBC, the opportunity has been taken to review and update the base travel demand. Whilst the source of the base demand data remains unchanged - 2011 Census Journey to Work (JTW) data – the expansion of this data to cover all journey purposes and time periods has been updated, using more robust factors. In addition, the base data had to be re-built in line with the re-zoning exercise outlined above.

2.2.27 JTW matrices by mode (all day) have been produced using the total number of trips and modal shares from the 2011 JTW Census dataset. These were processed as outbound journeys only (i.e. they represented one return journey). These were distributed to the study area zoning via a correspondence between MSOAs, LSOAs and the study zones (which are based on LSOAs).

2.2.28 For the OBC, the decision was taken to retain the modelled base year as being 2018. This required an uplift of the JTW matrices from 2011 to 2018 as follows:

- Car growth is based on TEMPro forecasts;
- Tyne and Wear Metro ridership has been used as a proxy of the growth in P&R (Metro) traffic (source: DfT light rail usage statistics);
- Bus demand has been linked to the annual number of passenger journeys on local bus services in Northumberland (Table BUS0109); and
- Rail patronage is assumed to grow in line with the ORR entries and exits figures at Morpeth and Cramlington.

2.2.29 National Rail Passenger Survey (NRPS) time profile data was used to convert the all day JTW matrices by mode into an average AM peak hour commuting matrix and an average Interpeak (IP) hour commuting matrix by mode. The AM peak period was assumed to include any journey starting between 07:00 and 09:00, the IP period between 09:00 and 16:00. The average hour demand was then calculated by dividing the period flows by the number of hours considered for each period. The NRPS data was used to determine the total weekday demand as follows:

- Average AM peak hour * 2 = X
- Average IP hour * 7 = Y
- Where X + Y represented 86.9% of total outbound journeys on a weekday (source: NRPS data)
- (X + Y) * (1 / 0.869) = total weekday outbound trips

2.2.30 These were then expanded to create Leisure and Business matrices for the average AM peak hour and the average IP hour, based on factors from the National Travel Survey, combined with the time profiles from the NRPS data.

2.2.31 Finally, the public transport matrices (bus and rail) were split between Car Available (CA) and No Car Available (NCA) journeys. These splits were based on evidence sourced from a number of transport models across the UK.

2.2.32 Table 2.4 below presents the base year (2018) demand values by period and mode.

Table 2.4: Base Demand (2018, return journeys)

Mode	AM Peak	Inter Peak	Average Weekday	Annual	Mode Shares
Car	7,404	3,286	43,513	13,412,822	86.6%
Bus	933	414	5,483	1,690,055	10.9%
Rail	122	54	714	220,188	1.4%
P&R (Metro)	93	41	547	168,618	1.1%
Total	8,552	3,796	50,257	15,491,683	100%

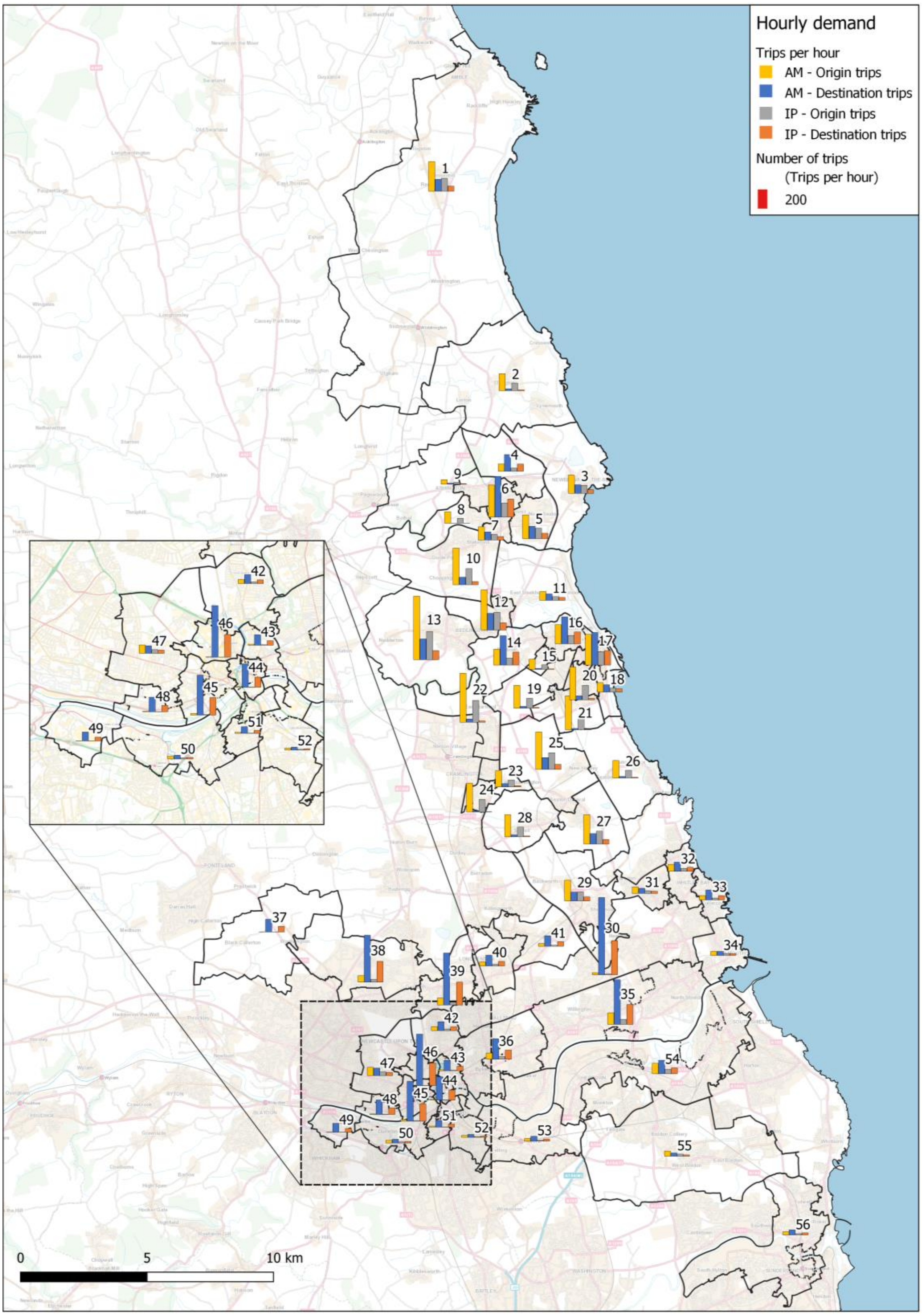
2.2.33 The amendments made to the base demand have increased the total base demand matrix by 7% compared to the SOBC model.

2.2.34 Figure 2.6 illustrates the origin and destination of trips[9] modelled in the AM and inter-peak periods, only capturing trips relevant to the scheme. Most zones in Northumberland are primarily generative, whilst model zones in the Tyne and Wear area are generally attracting more journeys than what they generate. This is a function of the concentration of jobs and leisure activities in the Newcastle city area.

[9] Return journeys, so this diagram is indicating the origin and destination of the outbound journey

Exception to this are zones 4 (north east Ashington), 6 (central Ashington), 14, 16 and 17 (all northern Blyth) in Northumberland, where the existing concentration of jobs attract a substantial number of trips from neighbouring towns. Key areas of trip generation to note include Bedlington (zone 13), north east Cramlington (zone 22) and south Blyth (zones 20 and 21). Overall demand in the average morning peak hour is circa 2.3 times higher than in the average inter-peak hour. There is a strong commuting flow into Newcastle in the morning peak – particularly to zones 45 (around the station area) and 46 (around the Haymarket/University area). There is also a notable demand to the Cobalt site (zone 30).

Figure 2.6: AM/IP Origin and Destination Trip Ends (All modes, 2018 weekday)



Base Times and Costs

2.2.35 As well as the base demand, a complete review has been undertaken of the base times and costs which feed into the mode choice model, ensuring that they represent times and costs experienced in 2018. Each individual aspect of the journey costs for each mode is described in Table 2.5 below.

Table 2.5: Base Journey Times & Costs

Mode	Variable	Source
Car	Access time	Assume 1 minute
	In-vehicle time	Data extracted from Google Maps for Wed 23/10/2019, using the “typical journey time model” AM departure time at 8:00, IP departure time at 11:00. This is based on actual journey times using GPS data from drivers.
	Fuel costs	Updated TAG guidance to July 2019. TAG Databook A1.3.12, A1.3.13 and A1.3.15.
	Car park charges	The car park charges used in the mode-choice model reflect what is experienced in practice, on average, across all users, therefore taking account of: - a proportion who park for free; - differing parking durations; and - differing parking locations that charge different prices. Sourced from various sites, plus assumptions made around levels of private non-residential parking in central Newcastle. Parking charges assumed in main centres (central Newcastle, Tynemouth, Whitley Bay, Wallsend, Gateshead and Sunderland).
	Egress time	Assume between 2.5 and 5 minutes
Bus	Access time	Based on walk distance between zone centroid and bus route (source: http://jplanner.travelinenortheast.info/nexus).
	Wait time	Initial wait time function of headway of first service boarded (source for service headway: http://jplanner.travelinenortheast.info/nexus, source for wait time function PDFHv6). Interchange wait times from http://jplanner.travelinenortheast.info/nexus
	In-vehicle time	Query for all relevant movements (source: http://jplanner.travelinenortheast.info/nexus). AM times taken for arrival at destination between 8:00 and 9:00. IP arrival at destination between 11:00 and 12:00.
	Fare	Regression model linking journey distance and fare. Three models considered, short distance origin zones, long distance (to from NCL), trips south of the river that require interchange to other operators or Metro. Average fares based on proportional use of single, return, season and concession tickets.
	Interchange penalty	Based on industry evidence (bus to bus)
	Egress time	Based on walk distance between bus route and zone centroid (source: http://jplanner.travelinenortheast.info/nexus).
P&R (Metro)	Access time	Assume 1 minute
	Car in-vehicle time	As per car in-vehicle time
	Car cost	As per car fuel costs. Parking charges at Northumberland Park from Nexus website (assumption regarding share of cars parking on-street (10% park on-street for free)).
	Wait time	Function of Metro headway (headway source: Metro timetables, wait time function from PDFHv6).
	Metro in-vehicle time	Timetables.
	Metro fare	Metro zonal fares from across the range of different ticket products and concessionary travel and assumptions applied around different ticket usage and fares per single journey.

Mode	Variable	Source
	Interchange penalty	Based on industry evidence (car to rail)
	Egress time	Based on walk distance between Metro station and zone centroid. Walking times extracted from *openroute* service (http://maps.openrouteservice.org).
Rail	Access time	Based on walk distance between zone centroid and station, or car time (CA) or bus time (NCA) if zone located more than 15 minutes' walk from station. Sources as above.
	Access cost	Car fuel cost or bus fare (as appropriate) as calculated above. Car park charges assumed at Morpeth and Cramlington (source: National Rail enquires, Northumberland Council).
	Wait time	Function of headway (headways source: timetables, wait function from PDFHv6) + interchange wait time (where appropriate).
	In-vehicle time	Timetables.
	Fare	Based on 2018 LENNON data. Average fare across all ticket types.
	Interchange penalty	Based on industry evidence (rail to rail, car/bus to rail)
	Egress time	If walk-out zone, then based on walk distance between station and zone centroid. Metro time if Metro used. Bus time if bus used. Walk times *openroute* service (http://maps.openrouteservice.org), Bus Nexus journey planner, Metro Nexus
	Egress cost	Metro or bus fare as appropriate.

2.2.36 Table 2.6 illustrates the values used for an AM peak period movement from Ashington to Newcastle City Centre (zone 6 to zone 46). These values represent a single journey, which means that some variables are halved (e.g. car parking charges, return fares, etc.). The use of the model coefficients to these times effectively applies a weighting of 2 to the out-of-vehicle times compared to in-vehicle time. Also, it should be noted that the disutility calculation will also add a mode constant value to the P&R (Metro), bus and rail modes, which will make these modes less attractive relative to car.

Table 2.6: Ashington to Newcastle Times and Costs (2018 AM peak/car available)

Variable	Car	Bus	P&R (Metro)	Rail (via Morpeth)
Access time (mins)*	2	17	52	39
Access cost (pence)	0	0	0	0
Wait time (mins)*	n/a	9	12	23
In-vehicle time (mins)	37	64	18	20
Fuel cost (pence)	185	n/a	131	76
Fare (pence)	n/a	250	166	281
Interchange penalty (mins)	n/a	n/a	9	9
Car park charge (pence)	118	n/a	36	30
Egress time (mins)*	10	8	9	24
Egress cost (pence)	0	0	0	0
TOTAL COST (pence)	**303**	**250**	**333**	**387**
TOTAL TIME (mins)	**49**	**98**	**100**	**115**

** out-of-vehicle times have been doubled to reflect weighting applied in model*

2.2.37 The table demonstrates how poor the current public transport offer is compared to car for this movement. Even though, at 49 minutes, the car time is quite slow for a journey of this distance (reflecting peak congestion), once all the access/egress and wait time associated with using public transport is taken into account, then car remains considerably quicker. Bus and P&R (Metro) times are double the car times, however the bus costs are 18% cheaper than car. Using rail via Morpeth is both the most expensive option and the slowest option, being 28% more expensive than car and 15% slower than the other public transport options.

Model Calibration and Validation

2.2.38 Following construction of the base year model, the final task was to calibrate and validate the model to demonstrate confidence that the model can be used for forecasting purposes. The model parameters were adjusted to ensure they represented the correct values of time as per TAG guidance. In addition, it was ensured that the scaling parameters used in the model were aligned with those recommended in TAG Unit M2 (Table 5.2). The AM peak model uses a scaling factor of 0.53 (TAG Unit M2 recommends a scaling factor value of between 0.50 and 0.83 with a median value of 0.68 for HBW trips). The IP model also uses a scaling factor of 0.48 (TAG Unit M2 recommends a scaling factor value of between 0.27 and 1.00 with a median value of 0.53 for HBO trips).

2.2.39 For model validation, it has to be demonstrated that the 2018 modelled demand is representative of the 2018 observed demand. In addition, there are standard validation tests imposed by the DfT (TAG) relating to the sensitivity of the model (i.e.: that the forecast demand in the model is within acceptable bounds of sensitivity to changes in key variables).

2.2.40 In summary, the validation consists of:

- That the mode shares produced by the Base Model replicate the observed mode shares in the base trips.
- A check of implied elasticities as defined by the DfT in TAG Unit M2. These are 'realism tests' imposed by the DfT that ensure that any model produces demand impacts to changes to costs or times that are within acceptable boundaries (based on observed data).

2.2.41 At the aggregate level, Table 2.7 below illustrates that the mode shares across each mode were satisfactorily replicated.

Table 2.7: 2018 Base Model Mode Share Validation

Mode	AM Mode Shares		IP Mode Shares	
	Observed	Modelled	Observed	Modelled
Car Available Model				
Car	92%	92%	92%	93%
Bus	5%	5%	5%	5%
P&R (Metro)	1%	2%	1%	1%
Rail	1%	2%	1%	1%
Total	100%	100%	100%	100%
Proportion of Total Period Trips	*94%*		*94%*	
No Car Available Model				
Bus	99%	99%	99%	99%
Rail	1%	1%	1%	1%
Total	*100%*	*100%*	*100%*	*100%*
Proportion of Total Period Trips	*6%*		*6%*	

2.2.42 The validation was also checked at the disaggregate level on a zone to zone movement basis. The GEH statistic was used to identify the closeness of fit to the observed mode shares at this level. In all cases across all four models the GEH was below 5, indicating a satisfactory validation.

2.2.43 Whilst there is no guidance for validating specifically public transport mode-choice models, TAG Unit M2 (Variable Demand Modelling) does provide guidance relating to undertaking realism tests on transport models. It should be noted that these realism tests have been defined by the DfT principally to test the performance of full transport models incorporating all four stages of the modelling process (generation, distribution, mode-choice, assignment) and that is why these tests are incorporated into TAG guidance note M2 on Variable Demand Modelling. However, the principles of these tests, in our view, provide a robust mechanism for testing the performance of this model with regard to public transport enhancements and therefore we have undertaken the ‘change in public transport fares’ realism test. In terms of the changes to public transport fares test, the guidance states that the model should be able to demonstrate that a 10% increase in public transport fares results in an elasticity between -0.2 and -0.9 (elasticity to change in public transport trips).

2.2.44 The table below presents the results of this analysis at a number of levels; the aggregate level within the study area, for all journeys to Newcastle as well as for the key flows between Ashington/Blyth and Newcastle city centre. The elasticity values reflect the overall weighted elasticity across all valid movements in the model. These tests were undertaken on the car available models (representing 94% of overall demand).

Table 2.8: Realism Test Results – Public Transport Fare Elasticities

Segment	Model	
	AM	IP
All movements	-0.30	-0.36
All movements to Newcastle	-0.25	-0.34
Ashington to Newcastle	-0.28	-0.39
Blyth to Newcastle	-0.25	-0.36

2.2.45 The elasticity values sit within the required range, with the AM peak elasticities recording a more inelastic elasticity value than the IP elasticities. This reflects what should be expected given that the more price sensitive leisure market is largely represented in the interpeak model. The values are reasonably close though which reflects the fact that the interpeak does contain a small proportion of business and commuting journeys (which tend not to be price sensitive) as well as a proportion of bus demand that is made up of free concessionary travel.

Demand Growth

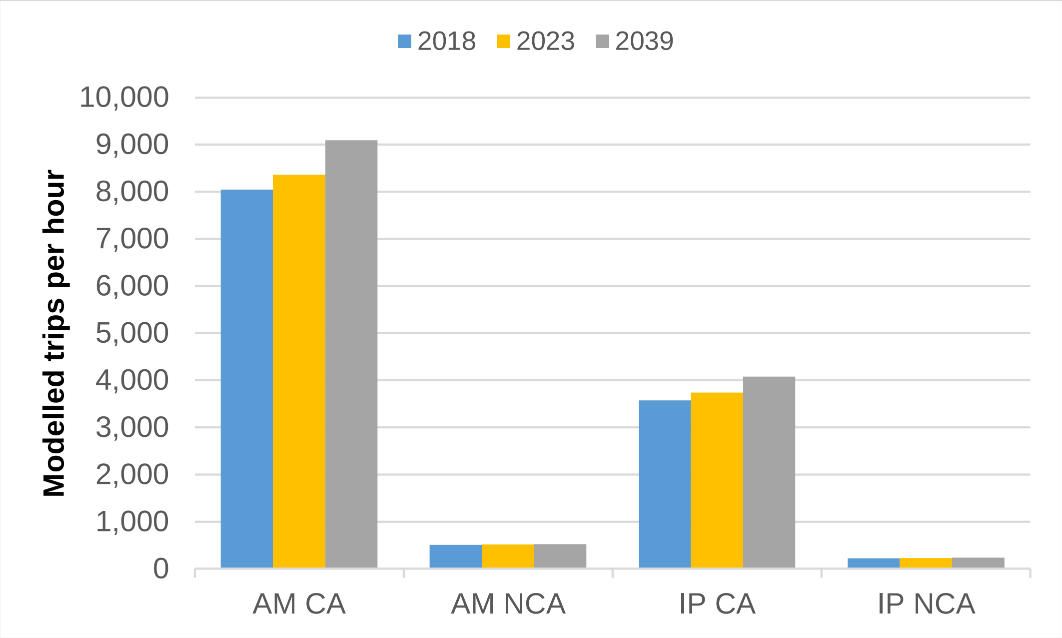
2.2.46 The approach to determining the growth scenario for this analysis is based on utilising standard TEMPro-based growth from 2018 through to the forecast modelled years of 2023 and 2039. These modelled years represent the potential opening year for Phase 1 (2023) and the final year for capped growth in 20 years’ time (2039) in line with TAG guidance.

2.2.47 Increased car availability in the future year scenarios is modelled based on the change in the proportion of households without a car available estimated from TEMPro. The non-car available matrices are then factored down by this proportion, which is then “transferred” to the car-available matrices. Clearly this approach is a simplification, given that car ownership does not necessarily determine car availability, but it is considered a reasonable proxy of how a higher share of public transport passengers are expected to have a car available to complete their journeys.

2.2.48 The core scenario applies standard TEMPro version 7.2 growth rates by model zone, mode and time period to generate future year AM and IP matrices by mode. AM and IP matrices are then combined to generate total AM and IP hourly matrices across all modes. The mode choice model then works out how the relative changes in costs and times by mode into the future impact mode shares for the 2023 and 2039 scenarios.

2.2.49 Figure 2.7 illustrates the modelled change in demand for the car available and non-car available models. The figure illustrates that the car available matrices are expected to grow considerably more than the non-car available matrices into the future. In particular the car available AM and IP matrices are expected to grow by circa 14% between 2019 and 2039, whilst the non-car available matrices are forecast to grow by circa 4% in the AM and IP periods.

Figure 2.7: Modelled Trips (by year and period), average hour TEMPro Scenario



Future Year Times and Costs

2.2.50 The base year (2018) times and costs were re-visited with a view to adjusting them to represent times and costs likely to be experienced in 2023 and 2039.

2.2.51 For car, this focussed on changes to in-vehicle times (reflecting increased congestion into the future) and operating costs that were calculated following standard TAG guidance. Changes to car park charges in real terms were also factored in (based on a continuation of recent trends).

2.2.52 For bus the focus was also on changes to bus in-vehicle times and bus fares. Bus journey times were increased in line with the bus journey time series for rail demand forecasting in TAG. Any real increases in bus fares were also incorporated (based on a continuation of recent trends). It has been assumed that bus routeings and bus frequencies will remain unchanged on the basis that it is impossible to predict any changes into the future.

2.2.53 For rail, the current timetable (December 2018) has been assumed to remain in operation at Cramlington, Manors and the MetroCentre. A new TransPennine Express service to Edinburgh via the East Coast Main Line has been assumed to call at Morpeth and Newcastle from December 2019. Changes in real terms to rail fares have been assumed to follow government policy.

2.2.54 For P&R (Metro) the current timetable was assumed to remain in operation and no real increases in fares were modelled in line with recent trends. Car times and costs were adjusted as per the car mode.

2.2.55 It is important to note that all costs feeding into the model have remained at 2018 prices and therefore any changes in costs to 2023/2039 reflect real increases only.

2.2.56 Table 2.9 sets out the complete list of time and cost data built up for the base 2018 model and indicates where changes were made for 2023 and 2039.

Table 2.9: Future Year Times and Costs for the Model

Mode	Variable	Changed from 2018?	Source for Change
Car	Access time	No	
	In-vehicle time	Yes	TAG table M4.2.3 (journey time increases of 0.4% by 2023 and 3.4% by 2039)
	Fuel costs	Yes	TAG table M4.2.2a (Car cost series for rail demand forecasting)
	Car park charges	Yes	Projection of recent real increases in central Newcastle based on past 10 years trend (+2% per annum)
	Egress time	No	
Bus	Access time	No	
	Wait time	No	
	In-vehicle time	Yes	Table M4.2.3 Bus journey time series for rail demand forecasting (+0.6% by 2023 and +3.8% by 2039)
	Fare	Yes	Projection of recent real increases in UK (source: DfT data): +1.6% per annum
	Interchange penalty	No	
	Egress time	No	
P&R (Metro)	Access time	Yes	As per car IVT factors above
	Access cost	Yes	As per car fuel and parking cost factors above
	Wait time	No	
	In-vehicle time	No	
	Fare	Yes	Projection of recent real increases in Metro fares (source: published data over 10 years): no real terms change
	Interchange penalty	No	
	Egress time	No	
Rail	Access time	Yes	Where access mode is car/bus, as per IVT factors above
	Access cost	Yes	Where access mode is car/bus, as per cost factors above
	Wait time	Yes (MPT-NCL)	Reduction of average wait time for trips between Morpeth and Newcastle as a result of the introduction of the TransPennine Express East Coast service to Edinburgh from 2020
	In-vehicle time	Yes (MPT-NCL)	Reduction of average in-vehicle time between Morpeth and Newcastle as a result of the introduction of the TransPennine Express East Coast service to Edinburgh from 2020
	Fare	Yes	Government RPI+0 rail fares policy to 2020 and RPI+1 from 2021
	Interchange penalty	No	
	Egress time	Yes	Where egress mode is bus, as per bus IVT factors above
	Egress cost	Yes	Where egress mode is bus/Metro, as per fare changes above

2.2.57 Table 2.10 sets out how the total costs and times in 2023 and 2039 (compared to 2018) differ from the base year for a specific core flow in the model (Ashington (zone 6) to Newcastle (zone 46)).

2.2.58 Car and bus journey times only marginally increase into the future. Whilst car fuel costs significantly reduce over time (due more to vehicle efficiency rates in TAG), this is offset to a degree by an increase in parking costs. Bus costs increase proportionally three times as much as rail costs. Rail costs are 44% higher than car costs by 2039 (was +27% in 2018). The slight reduction in rail times reflects the introduction of the TransPennine Express service at Morpeth.

Table 2.10: Ashington to Newcastle Times and Costs (AM car available)

Variable	Car			Bus			P&R (Metro)			Rail		
	2018	2023	2039	2018	2023	2039	2018	2023	2039	2018	2023	2039
Access time (mins) *	2	2	2	17	17	17	52	53	54	39	39	39
Access cost (pence)	0	0	0	0	0	0	0	0	0	0	0	0
Wait time (mins) *	n/a	n/a	n/a	9	9	9	12	12	12	23	18	18
In-vehicle time (mins)	37	37	38	64	64	67	18	18	18	20	18	18
Fuel cost (pence)	185	161	122	n/a	n/a	n/a	131	114	87	76	66	50
Fare (pence)	n/a	n/a	n/a	250	271	347	166	166	166	281	290	340
Interchange penalty (mins)	n/a	n/a	n/a	n/a	n/a	n/a	9	9	9	9	9	9
Car park charge (pence)	118	130	179	n/a	n/a	n/a	36	39	54	30	33	45
Egress time (mins) *	10	10	10	8	8	8	9	9	9	24	24	24
Egress cost (pence)	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL COST (pence)	**303**	**291**	**301**	**250**	**271**	**347**	**333**	**319**	**307**	**387**	**389**	**435**
TOTAL TIME (mins)	**49**	**49**	**50**	**98**	**98**	**101**	**100**	**101**	**102**	**115**	**108**	**108**

** out-of-vehicle times have been doubled to reflect weighting applied in model*

2.2.59 It is worth considering how the car, bus and P&R (Metro) costs and times change relative to the rail costs and times, see Table 2.11.

Table 2.11: Changes in the Relative Cost & Times

Differential	2018	2023	2039
Car cost as a proportion of rail cost	78%	75%	69%
Bus cost as a proportion of rail cost	65%	70%	80%
P&R (Metro) cost as a proportion of rail cost	86%	82%	71%
Car time as a proportion of rail time	43%	45%	46%
Bus time as a proportion of rail time	85%	91%	94%
P&R (Metro) time as a proportion of rail time	87%	94%	94%

2.2.60 Car and P&R (Metro) costs are forecast to fall compared to rail costs into the future, whilst bus costs are expected to increase compared to rail. Rail times improve compared to other modes as a result of the introduction of the additional hourly TransPennine Express service between Morpeth and Newcastle from 2020. From the Northumberland Line's perspective, the proportionate decrease in car costs probably has the largest impact on potential demand, but it is also worth noting the potential impacts from an improved rail service offer at Morpeth.

Do-Something Specification

2.2.61 The infrastructure phases and operating scenarios were presented in paragraph 2.1.19 and Figure 2.1 above. These have been translated into appraisal options by combining the infrastructure phases with the possible operating scenarios and these are summarised in Table 2.2 above.

2.2.62 The rail service and the stations it serves do not currently exist and therefore a number of assumptions had to be made regarding the times and costs to be used in the mode-choice modelling. The table below summarises the source of the times and costs used to represent the proposed rail service in the model.

Table 2.12: Future Year Scheme Times and Costs for the Model

Mode	Variable	Source
Do-Something Rail	Access time	Either walk time (walk-in zones), bus (no car available models) or car (car available models). Average walk speed 5 km/h, bus and car times determined as per Do-Minimum models
	Access cost	Car fuel costs or bus fares depending on access modes. Car parking assumed to be free at new stations.
	Wait time	Function of headway (Table 2.2)
	In-vehicle time	Determined by timetable exercise
	Fare	For the Franchise-based operating scenario (T1/T2): Fare/distance function determined using average fares between Morpeth-Cramlington-Newcastle (LENNON data). Applied to distances on proposed line. RPI assumption as per Do-Minimum For the Concession-based operating scenario: (A1/A2): Extension of the Metro fare zones. Existing Zone C extended to Blyth Bebside. New Zone D north of this station (source: assumption confirmed with Nexus for purposes of OBC).
	Interchange penalty	Same as Do-Minimum
	Egress time	Either walk or bus. Metro used to access certain zones across Tyne & Wear, either via Northumberland Park or Newcastle Central.
	Egress cost	Bus fare or Metro fare (where applicable)

2.2.63 Table 2.13 compares the Do-Minimum rail times and costs via Morpeth with the Do-Something rail times and costs (Options T1 and T2 and Options A1 and A2) using the proposed scheme for the journey between central Ashington (zone 6) and central Newcastle (zone 46).

Table 2.13: Ashington to Newcastle Rail Times and Costs (AM Peak, car available)

Variable	Rail 1 via Morpeth		Rail 2 via Ashington T1 (A1 in brackets where different)		Rail 2 via Ashington T2 (A2 in brackets where different)	
	2023	2039	2023	2039	2023	2039
Access time (mins)*	39	39	19	19	19	19
Access cost (pence)	0	0	0	0	0	0
Wait time (mins)*	18	18	26	26	23	23
In-vehicle time (mins)	18	18	33 (32)	33 (32)	35 (33)	35 (33)
Fuel cost (pence)	66	50	0	0	0	0
Fare (pence)	290	340	302 (260)	355 (260)	302 (260)	355 (260)
Interchange penalty (mins)	9	9	0	0	0	0
Car park charge (pence)	33	45	0	0	0	0
Egress time (mins)*	24	24	24	24	24	24
Egress cost (pence)	0	0	0	0	0	0
TOTAL COST (pence)	**389**	**435**	**302 (260)**	**355 (260)**	**302 (260)**	**355 (260)**
TOTAL TIME (mins)	**108**	**108**	**102 (101)**	**102 (101)**	**101 (99)**	**101 (99)**

** out-of-vehicle times have been doubled to reflect weighting applied in model*

2.2.64 For this flow between Ashington and central Newcastle, the model is estimating that the proposed new rail service will reduce the time taken by rail by circa 6% (T1/T2) and 8% (A1/A2) to 101/2 and 101/99 minutes respectively. Also, rail costs are estimated to reduce by circa 18% to 22% as a result of the removal of the access costs to get to Morpeth. However, the Concession operating scenario (Options A1/A2) further reduces these rail costs (33% to 40% reduction in total rail costs) through the use of the Tyne & Wear Metro fare zone system. It is worth noting that whilst rail fares increase in real terms through to 2039 (RPI+1), Metro fares are not assumed to increase in real terms and hence they remain constant through to 2039.

Demand Uplifts

2.2.65 The mode-choice model estimates the demand for the new rail passenger service for journeys in the SEN study corridor and identifies where this demand has come from (i.e.: from car, bus, P&R (Metro) or existing rail). There are further sources of possible demand for the new rail service, namely:

- Induced demand; and
- Longer distance journeys (such as Ashington to York or Newsham to London).

In both cases uplift factors have been determined based on the best available evidence.

2.2.66 Induced demand represents journeys not previously made by any mode that are now being made due to the presence of the rail service. These could be people who previously did not make these journeys at all or they could be people making more journeys on an existing movement than they already make. We are fortunate that we have robust evidence from a number of post-implementation studies. These include the Borders Rail Line – which is a new passenger service on a previously abandoned rail corridor[10], the Larkhall extension[11] and past studies[12] . We have taken an average of these different evidence bases for the purposes of this appraisal, which results in an assumption that 25% of demand is 'induced'. On that basis, an induced demand uplift factor to apply to the outputs of the demand model (which determines the demand from modal transfer) has been estimated by averaging the factors from previous studies:

1 + (proportion induced / proportion from mode transfer) = 1.34

2.2.67 Arriva Northern kindly supplied 2017/18 LENNON data for the Tyne Valley line (Hexham-Newcastle). From analysis of the journey data it was possible to determine what proportion of demand on this route was 'longer distance' demand. In this case, longer distance demand constituted any journeys made beyond Newcastle/MetroCentre, thus mirroring those journeys that might start/finish on the proposed SEN corridor line that were not represented by the mode-choice modelling.

2.2.68 On the Tyne Valley corridor (Hexham-Blaydon) the proportion of demand generated by these stations that has a destination or origin beyond Newcastle was 22.7%. On that basis, a long-distance demand uplift factor for the Tyne Valley corridor was calculated as being:

1 + (proportion long distance / proportion internal corridor) = 1 + (0.227 / 0.773) = 1.29

2.2.69 However, we have adopted a demand increase for the Northumberland Line that is 50% of the value calculated above, resulting in an uplift factor of 1.145. This conservative assumption has been adopted to reflect the continued attractiveness of Morpeth for long distance travel and the ability to access the West Coast Main Line from Tyne Valley stations by changing trains at Carlisle (or Hexham and Carlisle). A long-distance journey via Morpeth removes in many cases the need for an interchange and it is therefore likely to continue attracting a number of long-distance passengers from the study area. In addition, average earnings and household incomes in the Tyne Valley corridor are higher than in the study corridor, which suggests a higher propensity for longer distance travel than might be anticipated to be the case to/from the study corridor.

2.2.70 We did consider determining the long-distance demand uplift factor based on the LENNON demand at Morpeth and Cramlington (also supplied by Arriva Northern). However, it was deemed that the analysis was not necessarily representative of the longer distance rail demand likely to be using the proposed rail service in the SEN corridor. For the reason that this corridor is situated on the ECML and therefore is served by longer distance services at certain times of the day and this would be distorting the results accordingly.

2.2.71 The long-distance factor is applied to journeys in the demand model generated by the stations in the corridor Ashington to Seaton Delaval inclusive.

Revenue Calculations

Franchise Operation (T1/T2)

2.2.72 Revenue was determined by applying an average fare/yield to the forecast demand from the modelling process for journeys made within the SEN corridor. The average yield information was based on 2018 LENNON data supplied by Arriva Northern for the Morpeth/Cramlington/Newcastle rail corridor including a detailed breakdown by ticket type which was then weighted by journeys made on each ticket type. By definition, therefore, this weighted average yield accounted for levels of concessionary travel.

[10] The year 1 report (Borders Railway Year 1 Evaluation, Transport Scotland June 2017) identified that 36% of journeys were 'new' whilst the year 2 report (Borders Railway Year 2 Evaluation, Transport Scotland February 2018) identified that 35% of journeys were 'new'
[11] 13% induced journeys
[12] 25% induced journeys, based on a number of rail re-openings across the UK

2.2.73 An average yield/distance function was determined based on this data which could then be applied on a station-to-station basis between the proposed stations in the SEN corridor. Separate yields were determined for application in the peak and interpeak models by estimating the proportion of passengers travelling on each ticket type by time of day using standard rail demand profiles.

2.2.74 Table 2.14 illustrates the peak and inter-peak average single fare calculated between Ashington and Newcastle (£3.02 peak in 2023 in 2018 prices), which can be compared to the Morpeth to Newcastle average peak fare of £2.90 in 2023 (2018 prices).

Table 2.14: Assumed Ashington to Newcastle rail single fare (2018 prices)

Period	Average single fare 2023 (pence)	Average single fare 2039 (pence)
AM	302	355
IP	315	369

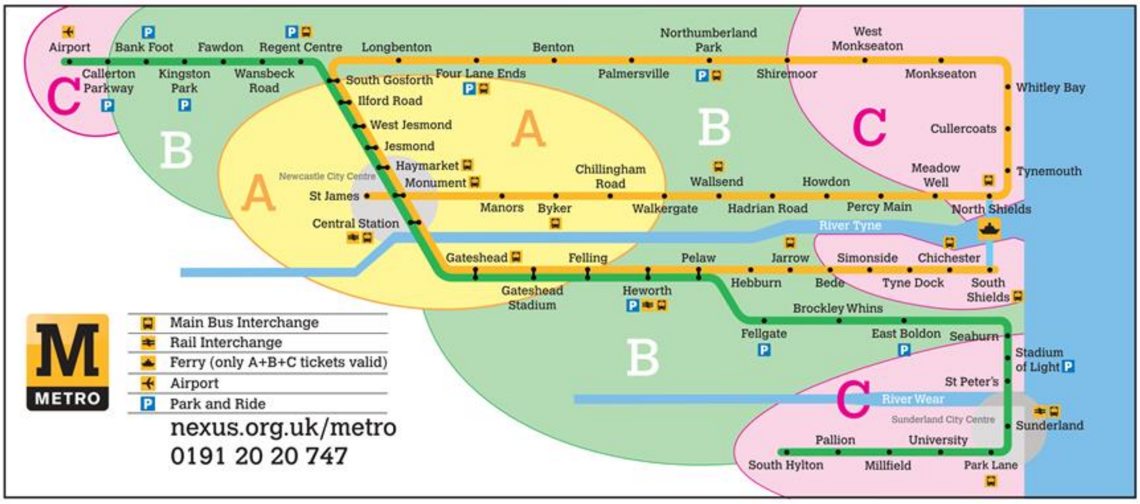
2.2.75 For the longer distance journeys (determined by the application of a demand uplift factor and discussed in the previous section), an average yield per journey of £19.42 (2018) was calculated based on the sample of longer distance journeys identified on the Tyne Valley line.

2.2.76 Government rail fares policy (real increases of RPI+0 through to 2020, RPI+1 thereafter applied to the demand cap year 2038) has been factored into the generation of the future year model yields.

<u>Concession Operation (A1/A2)</u>

2.2.77 For the Concession operation scenario, the assumption is that Metro fares would be used. Following discussion with Nexus, it was confirmed that for the purposes of this analysis at OBC stage and in order to provide an initial illustration, the Northumberland Line would be covered by existing Zone C and an additional new Zone D. Figure 2.8 illustrates the current Metro fare zones, showing that Northumberland Park sits within Zone B and therefore would be a boundary station with Zone C for the Northumberland Line. It is assumed that the boundary station between Zone C and Zone D would be Blyth Bebside[13].

Figure 2.8: Existing Metro Fare Zones (source: Nexus website)



[13] The principle adopted for this exercise is that the Northumberland Line (that is the section from Northumberland Park to Ashington) is covered by two zones; Zone C and a (new) Zone D. Shiremoor is currently a boundary station between Zone B and C, so it makes sense for the southern section of the Northumberland Line to be in Zone C too. However, given the distances up to Ashington, we considered it appropriate to add a new Zone D for the northern section, so identified Blyth Bebside station as the boundary station between Zone C and Zone D. Therefore, for example, someone travelling from Blyth to Newcastle would travel across 3 zones (CBA), in the same way that someone travelling between Whitley Bay and Newcastle would travel across 3 zones (CBA) today. Similarly, someone therefore travelling from Ashington to Newcastle would travel across 4 zones (DCBA).

2.2.78 Metro zonal fares currently exist in the model, taking into account the levels of concessionary travel. For the additional zone (D), a fare uplift was determined by applying the trend in fare uplifts going from one to two, two to three zones (working out at 47p in the AM peak and 37p in the Interpeak).

2.2.79 A key advantage of adopting Metro fares is the integrated ticketing possibilities for journeys that would involve the Northumberland and Metro services, such as Newsham to Whitley Bay.

2.2.80 Table 2.15 illustrates for a sample of journeys how the Franchise and Concession fares vary. It can be seen in the table that the introduction of fares based on a metro zonal system would lead to a substantial reduction in the average fare paid by Northumberland Line users (e.g. 14% reduction in Ashington to Newcastle fare, 19% reduction in Newsham to Manors fare). This reduction is more noticeable for journeys requiring interchange with Metro (e.g. Newsham to Whitley Bay)[14] and short distance trips.

Table 2.15: Comparison of Franchise and Concession Fares (2023 AM peak)

Flow	Franchise based fares	Metro based fares	
		Number of Metro Zones travelled	Fare
Ashington-Newcastle	£3.02	4 (ABCD)	£2.60
Ashington-Bedlington	£2.04	1 (D)	£1.16
Bedlington-Seaton Delaval	£2.21	2 (CD)	£1.66
Newsham-Manors	£2.62	3 (ABC)	£2.12
Newsham-Whitley Bay	£2.28 + £1.66 = £3.94	2 (BC)	£1.66

2018 prices

2.2.81 It is assumed that there would be no change to the long-distance average fare in a Concession operating scenario. These fares would continue to be set and governed by the Rail Settlement Plan with the revenue apportioned between franchises in the same manner as the Franchise operating scenario. It is however assumed that a proportion of the revenue that is generated by this fare would be allocated to 'Metro', reflecting the pro-rata distances travelled on the Northumberland Line.

2.3 Appraisal Model

Overview

2.3.1 This Section sets out how the scheme benefits and costs have been calculated and processed in order to prepare an appraisal in line with DfT guidance (TAG). This involves the creation and population of scheme 'Transport Economic Efficiency' (TEE), 'Public Accounts' (PA) and 'Analysis of Monetised Costs and Benefits' (AMCB) tables, with the main products being the Net Present Value (NPV) and the Benefit/Cost Ratio (BCR).

2.3.2 How the benefits and costs are brought together in the final TEE, PA and AMCB tables to produce the NPV and BCR can vary depending on the transport scheme being appraised. In particular, TAG appraisal guidance suggests that rail scheme costs and benefits have to be treated in a different way to (say) how a major highway or bus-based scheme might be processed. This is because of the specifics of the rail industry and how the private sector and public sector finances operate via franchising.

[14] This is due to the relatively high fixed price element associated with the Franchise-based fares. By essentially removing the need to purchase two separate tickets, the fixed price element of one of the ticketing systems is removed from the fare paid.

2.3.3 The appraisal follows the latest TAG guidance for appraising rail schemes. The basic premise is that after any current rail Franchise expires, all rail operating costs and rail revenues ascribed to the scheme should be transferred to government (to be factored into whatever the government wishes to 'buy' in the next round of franchising). Therefore, the rail private sector provider impacts in the TEE table are neutralised (by adjusting the grant/subsidy value) and the rail costs and revenues transferred to the PA table.

2.3.4 Thus, in this appraisal the benefits are made up of user, non-user, environmental, social and accident benefits minus the reduction in bus revenue and indirect tax revenues. The costs are made up of the investment costs, operating costs (paid via government subsidy (new Franchise)) minus the rail revenues. For the Concession operating scenario, it is assumed that a local/regional body fulfils the role of 'Concessioner', and therefore the same principle applies in terms of transferring the operating costs and revenue to the PA table.

2.3.5 It is important to note that this scheme appraisal for the OBC contains both Level 1 and Level 2 benefits, with the calculation of wider economic impacts (Level 2 benefits) now incorporated into the analysis.

2.3.6 The scheme appraisal has assumed a standard 60-year scheme appraisal period (in this case 2023 to 2082). Note that all benefits and costs described below are subject to standard discounting treatment (as per TAG guidance: discount rate of 3.5% for years 1 to 30 and 3% for years 31 to 60, discounted back to 2010) and all monetary values are presented at 2010 prices. All relevant benefits are adjusted to account for ramp-up in demand over the first three years of the service (53% in year 1, 78% in year 2, 90% in year 3, 100% thereafter (source: PDFH)). TAG guidance also dictates that in the appraisal of a rail scheme demand growth, which determines the level of benefits, has to be capped 20 years from the date of the appraisal (in this case from 2039), although benefits are allowed to grow beyond that date in line with pre-determined population growth.

2.3.7 In order to avoid using two units of account in the same appraisal, all impacts in the factor cost unit of account are converted into the market price unit of account by up-rating by (1+t), where t represents the average indirect taxation rate throughout the economy. At the time of preparation of the previous business case this factor was 1.19.

2.3.8 Two forecast years were modelled, 2023 (assumed opening year) and 2039 (demand cap year), and therefore the benefits have been determined based on data from these two years. Demand levels and thus benefits between 2023 and 2039 have been interpolated, whilst post-2039 demand and benefits have been capped at 2039 levels with an allowance for population growth in line with appraisal guidance.

2.3.9 For options planned to be delivered after 2023 (i.e. Phase 2 – assumed to start in 2025), demand and revenue for the opening year has been interpolated between the model years of 2023 and 2039.

Appraisal Model Parameters

User and Non-User Benefits

2.3.10 As the proposed rail service in the corridor is essentially a 'new mode' in the corridor, it was not possible to calculate rail user time benefits in line with standard TAG guidance. We therefore adopted the 'numerical integration' approach to determining rail user time savings, as set out in TUBA Guidance (reference TAG A1.3 para 2.1.11) for such occurrences. The data inputs remain the same:

- Rail generalised time (pre and post scheme); and
- Rail demand (pre and post scheme).

2.3.11 The calculations have been undertaken at the zone to zone movement level from the mode choice model. Numerical integration is where the Do-Something generalised times are gradually increased to the point where the Do-Something rail trips equal the Do-Minimum rail trips and at each increment the user time savings calculation (as per TAG A1.3) is undertaken. These increments are then summed to determine the overall value.

2.3.12 A final adjustment to account for the user time savings associated with the longer distance journeys was applied.

2.3.13 The calculations produce total rail user time savings in minutes. This total is then monetised by applying the appropriate Value of Time (VOT) by journey purpose (i.e. commuting, business, leisure) for a given future year (as per the TAG Databook). Note that the VOTs continue to increase throughout the duration of the scheme appraisal period and therefore, whilst demand growth is capped from 2039 (apart for an element of growth associated with population growth), rail user time benefits continue to increase post 2039.

2.3.14 Road user benefits are the benefits associated with removing some road traffic from the highways (via modal transfer from car to rail). However, this analysis has been undertaken across all modes, therefore including any increase in road traffic by rail passengers driving to their boarding station.

2.3.15 For demand derived from the mode-choice model, the change in total annual person road distance (i.e.: effectively the net aggregated car person distance removed from the highway network), by journey purpose, was calculated. These were then converted into car km removed from the road network by the application of appropriate average vehicle occupancy values (sourced from TAG).

2.3.16 The 'car km removed from the road network' value is then converted to a monetised 'decongestion' benefit by applying the pence per vehicle km removed figure from the TAG Databook, which increases over time as congestion is assumed to increase.

2.3.17 For the longer distance journeys (determined by the application of a demand uplift factor), the proportion transferring from car was identified (based on the proportions from the mode-choice model) and an average car occupancy (source: TAG) and average distance applied. The average distance was determined based on the Tyne Valley Line LENNON data used to calculate the long-distance fare (Paragraph 2.2.67). The car-km removed could then be calculated and added to the demand from the mode-choice model.

<u>Other Benefits</u>

2.3.18 Other marginal external benefits, such as environmental and accident benefits are all determined as a function of the reduction in car km associated with the scheme (in the same way that the road decongestion benefits have been determined – as outlined above). These include:

- Accident;
- Infrastructure;
- Local air quality; and
- Noise.

2.3.19 Standard unit rates of benefits for each of these, per car km removed from the road network, are given in the TAG Databook.

2.3.20 Greenhouse Gas benefits have been determined in line with TAG guidance (TAG Unit A3), using the TAG Greenhouse Gases Workbook. An estimation has been made of the changes in energy consumption, both in terms of reduced car usage (car km removed from the road network) and also increased train operation (additional vehicle miles). Standard TAG rates for converting fuel consumption into carbon dioxide emissions have been used to determine the incremental change in emissions to feed into the TAG Greenhouse Gases Workbook. The calculations have been undertaken separately for 'traded' (i.e. electricity consumption) and 'non-traded' (i.e. diesel and petrol consumption) elements.

2.3.21 It should be noted that the benefits associated with air quality impacts relate to the savings in emissions from road transport brought about by modal transfer to rail. In line with TAG guidance (Paragraph 3.3.37 Unit A3), any impacts associated with additional train operation have been scoped out.

2.3.22 Noise disbenefits associated with the operation of additional train services have been calculated in line with TAG guidance Unit A3. The first stage in the TAG process is to identify the railway noise emissions with and without the scheme. These have been calculated using the Calculation of Railway Noise (CRN) guidance (Department of Transport, 1995)[15] at distances of between 10 and 300 m from the track. Trains have been assumed to be at line speed. The route has been split into sections based on the railway operations such as whether locomotives are on power. For each track section, distance bands have been identified within which properties are anticipated to be exposed to the noise level bands specified in the TAG methodology. The calculations do not consider site specific geometry, screening effects and all ground is assumed to be acoustically reflective. This process has been undertaken for the baseline scenario (i.e. the freight trains currently using the line) and 'with scheme' (for each option). To enable valuation of the cost of the scheme using the TAG Noise Workbook, it is necessary to provide 'with scheme' noise level data in the opening year and for a forecast year post-opening. The change in railway noise levels in the forecast year are the same as those in the opening year for that option. For all options, the forecast year has been adopted as 2039 for consistency with the rest of the OBC.

Revenue

2.3.23 There are three revenue impacts that have been determined for appraisal purposes:

- Increase in rail revenues;
- Impacts on bus revenues; and
- Impacts on Metro revenues.

2.3.24 Paragraph 2.2.72 set out how rail revenue was calculated in the mode-choice model. The net rail revenue impacts were identified by ensuring that any Do-Minimum rail users' revenue was netted off the rail revenue generated by the proposed rail service.

2.3.25 Where the mode-choice model predicts a change in bus usage, due to modal transfer to rail, then the subsequent reduction in bus revenue was determined by the application of the change in bus trips to the appropriate bus fares. It should be noted that this was a net impact as bus revenue increases were also experienced where bus was being used as an access and/or egress mode to rail (e.g. Blyth to Blyth Bebside station).

2.3.26 The impacts on Metro revenue in the Franchise scenarios (Options T1 & T2) have been determined in the same manner as that outlined for the changes in bus revenue in the previous paragraph. For the Concession scenarios (Options A1 & A2) there is the additional revenue allocated to Metro associated with all the journeys made on the Northumberland Line[16].

2.3.27 In line with TAG appraisal guidance, all revenues were uplifted to market prices (factor of 1.19).

Indirect Taxation Impacts

2.3.28 The introduction of the scheme generates a number of indirect impacts on the tax revenues collected by the Exchequer.

2.3.29 The reduction in car km (due to modal transfer to rail) results in less fuel consumption and hence less tax paid. The change in indirect tax revenue due to the reduction in car km was determined using the total change in car km (as outlined above), and then applying standard rates per car km removed from the road network sourced from the TAG Databook.

[15] Department of Transport/Welsh Office (1998), Calculation of Road Traffic Noise (CRTN)

[16] Although revenue associated with long-distance rail journeys beyond Newcastle remain allocated to 'rail' rather than 'Metro'.

2.3.30 The change in indirect tax revenue due to the increased use of public transport is broken down into two parts. Firstly, there is the additional revenue received by the government from the fuel duty on the diesel needed to operate the rail vehicles for the additional distance. Secondly, there is the money no longer assumed to be spent on taxable items (VAT) due to the net change in expenditure on public transport fares (which are zero rateable). This net change is calculated by considering the change in revenue from both rail and bus fares and applying the indirect taxation rate of 19% (which is an average of all taxation) to calculate the revenue denied to the government in tax revenues by this additional expenditure on public transport fares.

Treatment of Costs in the Scheme Appraisal

2.3.31 The scheme appraisal model considers the following cost items:

- Capital costs – an Anticipated Final Cost (AFC) has been determined as a product of a separate engineering exercise which is discussed in more detail in the Financial Case;
- Mobilisation costs – these are the one-off costs experienced by the train operator during service mobilisation including items such as driver recruitment and training. Discussed in more detail in the Financial Case;
- Renewals and replacement costs – included to reflect the ongoing costs associated with replacing the additional infrastructure provided by the scheme over the defined appraisal period (60 years). The method for ensuring a cost allowance for this in the scheme appraisal is discussed in the Financial Case;
- Operating costs – for the Franchise scenarios the annual operating costs have been developed from cost rates sourced from Northern Rail and applied to the net change in the number of trains required, the vehicle mileage and the number of traincrew required. For the Concession scenarios the operating costs have been developed from data provided by specific organisations invited to supply costs for operation of the service[17]. The various elements that make up the operating costs are discussed in more detail in the Financial Case.

2.3.32 The scheme opening year is assumed to be 2023 for Phase 1 (Options T1 and A1) and 2025 for Phase 2 (Options T2 and A2). On that basis, a capital costs spend profile has been developed with the engineers as illustrated in Table 2.16.

Table 2.16: Capital Cost Spend Profile

Year	Spend Profile to 2023 (Options T1 & A1)	Spend Profile to 2025 (Options T2 & A2)
2020	21%	5%
2021	37%	7%
2022	39%	17%
2023	3%	19%
2024		47%
2025		5%

2.3.33 Capital costs have been developed in 2019 prices and include for a risk contingency that has been determined via a Quantitative Risk Assessment exercise. In addition, capital expenditure to date (i.e. between 2015 and 2019) has also been included in the scheme appraisal. The scheme appraisal then applies:

- Optimism bias of +18% in line with TAG guidance for a scheme that sits at GRIP3 equivalent project stage;

[17] These organisations (Vivarail Ltd and Vintage Trains Ltd) were asked to supply quotes for operation of the service to a specification aligned with Options A1 and A2. These are not in any way binding and have been provided in order to inform the OBC and ongoing development of the Northumberland Line scheme. Their use is intended to provide an indication of the likely level of costs associated with a Concession operation.

- An allowance for construction cost inflation at +1% per annum above the standard inflation rate;
- Market price uplift, discounted to 2010 and converted to 2010 prices in line with TAG guidance.

2.3.34 The mobilisation costs estimated for the scheme are assumed to be incurred in the year prior to the start of operation. Within the scheme appraisal they have been subject to the same treatment as the capital costs outlined above[18].

2.3.35 Renewal and replacement costs are assumed to be incurred across the 60-year appraisal period. An allowance for construction cost inflation at +1% per annum above the standard inflation rate is applied through to 2039. Costs are subject to the market price uplift, discounted to 2010 and converted to 2010 prices in line with TAG guidance.

2.3.36 The various elements that constitute the operating costs are required to be treated in different ways in the scheme appraisal in line with TAG guidance. Operating costs were initially developed for 2018 and then projected forward across each of the appraisal years based on the following:

- Vehicle leasing costs: In line with TAG guidance the application of rolling stock depreciation in real terms has been assumed through to 2039 and then capped. For the Franchise scenario the use of class 170 rolling stock is assumed until 2030 when they are 30 years old (in line with guidance). They are assumed to be replaced by cascaded diesel rolling stock. For the Concession scenario electric/battery rolling stock is assumed. This is assumed to have a 35-year lifespan in line with guidance, which will take the replacement year beyond the capped year.
- Fuel costs: TAG guidance applied (Table A1.3.7 / A1.3.10a) to reflect how fuel prices and vehicle efficiency changes over time. No cap is applied in 2039.
- Other non-staff costs: No changes in costs in real terms.
- Staff costs: Increase in real terms in line with real earnings index as per TAG guidance (Table A5.3.1). Staff costs are not capped in 2039.

Level 2 - Wider Economic Benefits

2.3.37 Level 2 Wider Economic Benefits (WEBs) have been considered in the assessment of the wider economic impacts of the scheme. These only consider connectivity impacts and therefore the estimation of WEBs does not require the quantification of land use changes, i.e. connectivity impacts only depend on the impact of the transport scheme.

2.3.38 The Economic Narrative that supports the OBC, setting out the context for developing the wider economic benefits, is included as an appendix to the Economic Case.

2.3.39 Level 2 WEBs are normally expected to constitute the following benefits:

- Agglomeration – static clustering;
- Labour supply impacts;
- Output change in imperfectly completive markets.

The Economic Narrative states that the Northumberland Line does not justify the estimation of output changes in imperfectly competitive markets. Thus, only agglomeration and labour supply impacts have been estimated for each of the core scenarios.

2.3.40 Both agglomeration and labour supply impacts have been calculated for each of the four standard industrial sector groups considered within the TAG WEBs process: manufacturing, construction, consumer services and producer services. These are the sectors assumed to be most affected by changes in transport costs.

[18] It is acknowledged that mobilisation costs would not in practice be subject to any construction cost inflation, given that they are mostly staff-related costs. However, for the purposes of this appraisal it was considered a prudent assumption at this stage to ensure some form of real cost inflation associated with mobilisation costs was built in.

2.3.41 TAG guidance (Wider Impacts Dataset) has been applied to reflect the local GDP per worker, by Local Authority District (LAD), sectoral employment numbers and average earnings for each of the industrial sector groups. To account for the areas of Northumberland not affected by the rail scheme the LAD employment numbers have been adjusted downwards to the model zones by an adjustment factor derived from the NTEM number of jobs by MSOA.

2.3.42 Since the only district authority for which the transport model provides full travel costs for all movements is Northumberland, only WEB Benefits for this LAD have been included in the results. Clearly this represents a conservative estimate of the overall benefits of the scheme, but avoids an overestimation of benefits due to lack of data from journeys not modelled.

Agglomeration impacts

2.3.43 A new transport scheme can lead to a higher density of economic activity, ultimately increasing social welfare. This effect derives from improved transport links and thus closer perceived proximity between individuals and businesses resulting from changes (decreases) in the Generalised Travel Cost (GTC) between each Origin-Destination pair.

2.3.44 Agglomeration is not directly observable and thus a measure of ‘Effective Density’ is used as a proxy to estimate the resulting productivity impacts.

2.3.45 The Do-Minimum and Do-Something GTC for car and public transport modes were estimated following TAG guidance (TAG Unit A2.4, equation 2.1) and aggregated by LAD, weighted by OD trips, journey purpose and mode. All journey times and cost inputs were derived from the mode-choice model. Variations in the average GTC lead to changes in the effective density of the region (i.e. increased proximity), thus generating productivity impacts. The change in the productivity impacts has been estimated by comparing Effective Densities before and after the introduction of the scheme.

2.3.46 The welfare impact of agglomeration has been converted into monetary terms through the calculation of the overall productivity impact, in pounds, in line with TAG guidance (equations 2.3 and 2.3a from TAG Unit A2.4).

2.3.47 Figure 2.9 summarises the estimation of agglomeration impacts.

Figure 2.9: Measurement of Agglomeration

2.3.48 Changes in productivity between the Do-Minimum and Do-Something scenarios have been interpolated between both modelling years and the ramp-up factors were applied. After the final modelled year, productivity impacts are assumed to continue to grow in line with the annual forecast growth rate of real GDP per capita, following TAG guidance.

Labour supply impacts

2.3.49 Labour supply impacts relate to the employment effects derived from supplying improved accessibility on a region poorly connected to employment centres. Changes in the number of potential employees result in GDP impacts due to productivity increases.

2.3.50 Do-Minimum and Do-Something average round-trip GTC were estimated for commuting trips, following TAG guidance (TAG Unit A2.3, equation 1) and aggregated at LAD level, weighted by OD trips and mode. Journey times and costs were derived from the mode-choice model.

2.3.51 The estimation of employment impacts followed TAG guidance (TAG Unit A2.3, equation 2). The valuation of the labour supply impacts was calculated in terms of GDP impacts (TAG Unit A2.3, equation 3). Tax revenue impact has been estimated as 40% of the estimated GDP impact (TAG Unit A2.3, equation 4).

2.3.52 Figure 2.10 summarises the estimation of labour supply impacts.

Figure 2.10: Measurement of Labour Supply Impacts

2.3.53 Changes in productivity between the Do-Minimum and Do-Something scenarios have been interpolated between both modelling years and ramp-up was applied. After the final modelled year, welfare impacts have been estimated to grow at the same rate of the non-work value of time, following TAG guidance.

2.4 Risk Register & Sensitivity Tests

2.4.1 A risk register has been developed that covers the demand and appraisal elements of the study – a copy is presented in Appendix A. It presents the core risks associated with the development of the demand forecasting model and the scheme appraisal model and sets out the mitigation measures identified against each risk item.

2.4.2 A range of sensitivity tests has been defined to assess how changes to model parameters and assumptions might impact on the scheme's value for money. These tests acknowledge that demand and revenue forecasts and the appraisal model are subject to a degree of uncertainty associated with the stage of the scheme's development and the uncertain nature of demand and revenue forecasting.

2.4.3 Parameters and assumptions defined in Section 2 above constitute the core scenario, around which sensitivity testing has been undertaken. The set of sensitivity tests defined comprise changes to inputs of the model choice model (demand, times and costs), appraisal assumptions and the scheme costs (capital and operating costs).

2.4.4 Whenever the test involves modifying a model parameter (such as fuel costs), "Low" and "High" scenarios have been defined. In all cases the Low and High terms refer to the effect of the parameter in the value for money of the scheme. So in the case of fuel prices the Low test assesses the impact of a reduction in fuel costs, whilst the High test involves rising fuel costs.

2.4.5 Table 2.17 summarises the set of sensitivity tests modelled. Further detail and justification of why the tests have been performed is provided below:

Table 2.17: Summary of Sensitivity Tests

Sensitivity test	Variant	Description
S1	Low	Demand -20%
S1	High	Demand +20%
S2	Low	CAPEX +20%
S2	High	CAPEX -20%
S3	Low	Fuel prices +20%
S3	High	Fuel prices -20%
S4	-	Use of 3-car Class 170s in Franchise scenarios
S5	-	Use of 2-car Class 230s in Concession scenarios
S6	-	Inclusion of Network Rail renewals costs avoided
S7	-	Switch to electric rolling stock in 2040 in Franchise scenarios
S8	-	20% reduction in the Concession-based operating costs

S1 - Changes to model demand (+20% / -20%)

2.4.6 As explained in Section 2.2, the demand matrices used in the mode choice model have their basis in the Census Journey to Work data from 2011. There remains an inherent relationship between commuting and other trips as a result, plus this data is now 8 years old and the conversion from 2011 to 2018 is based on TEMPro growth rates adding further uncertainty to the process. A further consideration is that both induced and long-distance demand is measured through the application of uplift factors. These are based on the best available evidence, but it is nevertheless acknowledged that there is scope for variation around these factors.

2.4.7 For this reason, Sensitivity Test 1 assesses how the business case will change if the overall demand fell or increased by 20%. Arguably 20% is a high figure for this sensitivity test, as commuting demand is subject to less uncertainty given that it was sourced from the 2011 census. It was felt nonetheless that this a useful exercise to understand how the scheme's Value for Money varies as a result of changes to the demand matrices.

S2 - Changes to infrastructure costs (+20% / -20%)

2.4.8 This test explores how sensitive the business case is to changes in construction costs by modelling 20% higher and lower costs than the central estimates produced for the business case. In this sense, it must be noted that the optimism bias applied in the appraisal already acknowledges that capital costs are subject to considerably uncertainty at this stage of scheme development. To some extent this sensitivity test takes the uncertainty around construction costs one step further than what has been assumed for the core scenario.

S3 - Changes to fuel prices (+20% / -20%)

2.4.9 Car is the dominant mode in the corridor; accounting for over 85% of trips in the study area (see Table 2.4). It is therefore important to understand how sensitive the results are to changes to the generalised cost of driving (which could be assessed either through car costs or times). This has been done in this case by appraising how a 20% increase and reduction in car fuel costs affects the scheme outputs.

2.4.10 It must be noted that the 20% factor has been applied to the change in fuel prices between 2018 and the model year, rather than the overall car fuel cost. Fuel costs have been sourced from the November 2018 TAG data book and therefore the 2018 figures are not subject to uncertainty.

S4 – Use of 3-car Class 170s in Franchise Scenarios

2.4.11 The core operating assumption in the scheme appraisal for the Franchise scenario options (T1 and T2) is that the service would commence operation using a small fleet of 2-car Class 170 equivalent units. It is anticipated that these would provide sufficient capacity during most hours of operation. For the peak hour trains in the peak flow direction (i.e. towards Newcastle in the AM peak hour and out of Newcastle in the PM peak hour), these trains are assumed to be strengthened to a 4-car train by coupling two units together. Initial high-level analysis of the demand levels from the SOBC indicated that this level of capacity provision would suffice.

2.4.12 There are however a couple of reasons why it might also be worth considering an alternative rolling stock strategy of the operation of 3-car Class 170 equivalent trains to understand what this does to the scheme appraisal:

- Northern currently only operate 3-car Class 170 trains; and
- It would provide more capacity over the whole day and across the peak period as a whole. Whilst the peak hour train would now be a 3-car (instead of 4-car), the other peak trains either side of the peak hour train would also be 3-car (instead of 2-car).

2.4.13 The adoption of this strategy would increase annual operating costs, due to the additional vehicle miles involved.

S5 – Use of 2-car Class 230s in Concession Scenarios

2.4.14 The Concession scenarios have been assembled based on a specification developed with private sector organisations that have assumed the use of battery-operated Class 230s. These trains are 3-car trains, necessary to carry the batteries and transformer, plus they provide the necessary peak period capacity likely to be required for this scheme.

2.4.15 However, this particular operating scenario is only intended to provide an indication of how a Concession-based operation might be procured and operated. Therefore, it may well be that a different Concession-based operation might consider operating 2-car trains, with peak strengthening to 4-car – similar to the operating scenario assumed for the Franchise based scenarios.

2.4.16 On that basis, this sensitivity test assumes that the rolling stock in the Concession scenario options (A1 and A2) is 2-car, with 4-car peak hour trains. It is assumed they would remain battery operated.

S6 – Inclusion of Network Rail renewals costs avoided

2.4.17 The scheme's investment costs are a mix of additional assets introduced (e.g. stations and additional track) alongside items that will replace existing Network Rail assets, such as updated point-work and signalling. The renewals and replacement costs included in this OBC scheme appraisal are a function of this investment and the core appraisal has not considered the extent to which some elements of the existing Network Rail renewals programme on this line might be avoided in the future or have been replaced by the renewals costs included for the scheme.

2.4.18 The extent to which there are existing Network Rail renewals costs that are avoided or now included within the scheme requires detailed analysis and is therefore intended to be the subject of the next stage of scheme development – namely through the 'Design' stage. This will therefore be presented as part of the Full Business Case (FBC).

2.4.19 For the OBC a sensitivity test will be undertaken to illustrate what impact a reduction (-10% / -30% / -50%) in the scheme's renewals costs will have the scheme appraisal.

S7 – Switch to electric rolling stock in 2040 in Franchise scenarios

2.4.20 For the purposes of determining the scheme's Greenhouse Gases impacts, the core assumption in this scheme appraisal for Options T1 and T2 is that the service will be operated by diesel-powered rolling stock throughout the 60-year scheme life. However, existing government policy is to eradicate diesel-only operated trains by 2040 in the UK. For the purposes of scheme appraisal, and in the absence of knowing what type of rolling stock will be operating the service in 2040 under the Franchise-based scenario, it has been assumed that an 'equivalent' diesel train continues to be used. This sensitivity test, however, assumes that the service converts to electric operation in 2040, and determines how that alters the Greenhouse Gases benefits accordingly.

2.4.21 It should be noted that this sensitivity test does not alter the operating costs for Options T1 or T2. The assumption is that the operating costs from 2040 onwards in the scheme appraisal essentially serve as a proxy for the operating costs that would be incurred whatever rolling stock is operated.

S8 – 20% Reduction in Concession-based operating costs

2.4.22 Initial market testing has determined some operating costs for the Concession-based options (A1 and A2). Whilst these give an early indication of the scale of operating costs, it is acknowledged that they are based on a certain set of service specifications and assumptions around what rolling stock is used. As the scheme is further developed through the Design Stage and the Concession-based approach is refined, it is anticipated that the operating costs could change accordingly. On that basis, a sensitivity test has been included that presents the impact on the scheme appraisal should the Concession-based operating costs reduce by 20%.

2.4.23 An example of where it might be possible to reduce operating costs within a Concession-based operation is the potential move towards Driver-Only-Operation (DOO). For a Concession based operation only the train crew required to operate the service would need to be recruited and trained. A new Concession start-up would potentially provide the opportunity for a fresh start on train crew terms and conditions including the potential for driver control only or driver only operation.

3. Option Appraisal Report

3.1 Forecast Demand and Revenue

3.1.1 This section presents the demand and revenue outputs that feed into the scheme appraisal, for the following options:

- Option T1: Franchise-based operation / 1 train per hour with additional peak hour services;
- Option A1: Concession-based operation / 1 train per hour with additional peak hour services;
- Option T2: Franchise-based operation / 2 trains per hour;
- Option A2: Concession-based operation / 2 trains per hour.

3.1.2 Demand matrices from the mode choice model are processed and uplifted as described in the previous section to calculate the number of passengers expected to travel on the Northumberland line, as well as the overall rail revenue generated by the scheme. In addition, the demand and revenue impacts associated with competing (modal transfer)/complimentary (rail access/egress) modes – bus and Metro – are discussed.

3.1.3 It must be noted that demand and revenue figures in this section are for passengers travelling on the studied corridor at least part of their journey. Therefore, it includes abstracted demand and revenue from the ECML and long-distance journeys, where the bulk of the journey will not be on the Northumberland Line (e.g. Ashington to Birmingham). Hence outputs presented in this section are not valid for a financial appraisal (which is separately presented in Section 3.4).

3.1.4 Table 3.1 presents demand and revenue forecasts by option. The scheme is predicted to generate between 750,000 and 1,500,000 return journeys by 2039, with annual scheme revenue[19] ranging from £7.8m to £12.6m in 2018 prices. The full scheme with a half-hourly service frequency (Phase 2) is expected to generate circa 55% more demand than Phase 1 with only four stations and an hourly service all day (with peak extras). The Concession-based options (A1/A2) generate 20% to 25% more demand than the Franchise-based options (T1/T2), reflecting the cheaper fares in the study corridor, plus the slightly faster journey times.

Table 3.1: Demand and Revenue by Option

Option	2023				2039			
	Average weekday demand	Annual demand	Rail Revenue (£m)	Metro Revenue (£m)	Average weekday demand	Annual demand	Rail Revenue (£m)	Metro Revenue (£m)
T1	2,213	682,000	£6.0m	£0.3m	2,440	752,000	£7.8m	£0.4m
A1	2,703	833,000	£3.3m	£3.1m	3,006	927,000	£4.3m	£3.5m
T2	3,408	1,051,000	£9.3m	£0.5m	3,762	1,160,000	£12.0m	£0.6m
A2	4,247	1,309,000	£5.3m	£4.6m	4,713	1,453,000	£6.9m	£5.2m

Demand is number of return journeys made
2023 figures exclude demand ramp-up
Revenue at 2018 prices

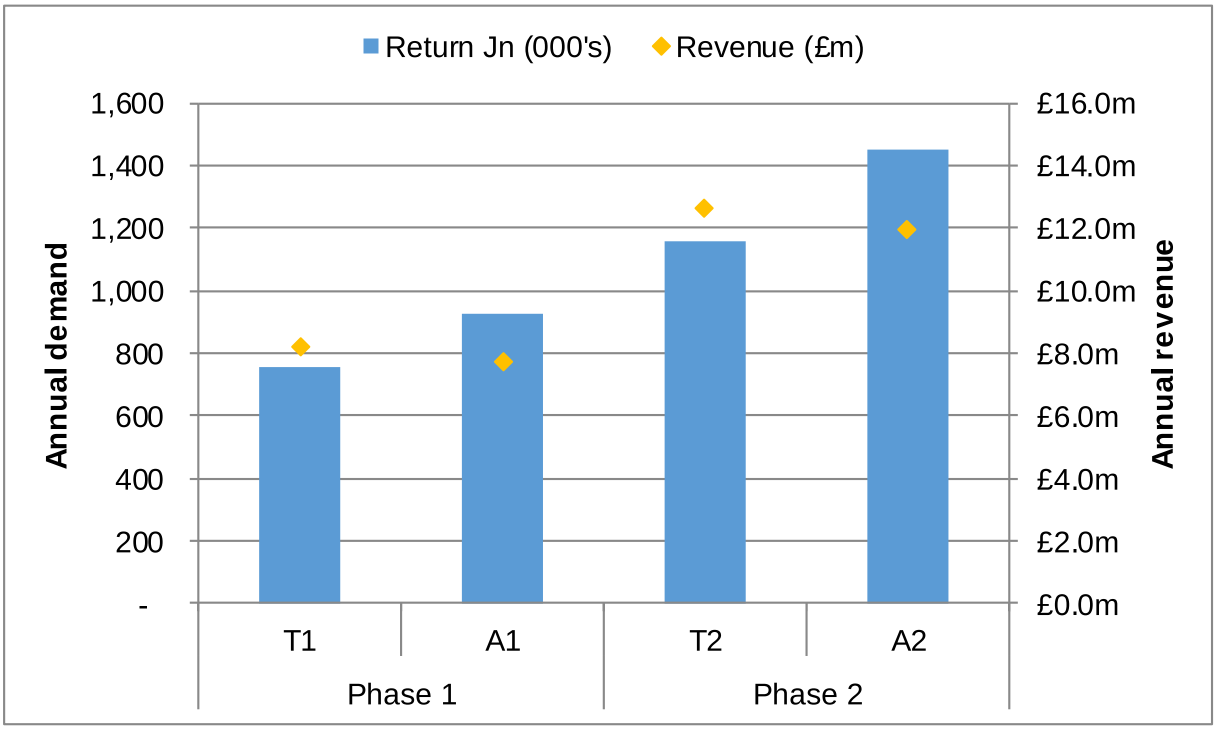
[19] The combined net impact of rail and Metro revenue

3.1.5 The Metro revenue in Options T1/T2 reflect the additional demand interchanging onto Metro off the SEN corridor at Northumberland Park or Newcastle station (e.g. an Ashington to South Shields journey). In the Concession-based scenarios (A1/A2) the Metro revenue also includes the revenue generated across all journeys made in the corridor. In these scenarios there remains a considerable rail revenue value that reflects the long-distance demand (circa 50% of the rail revenue in T1/T2 is associated with the long-distance demand). In overall net revenue terms, whilst the use of cheaper Metro zone-based fares increases overall demand it does not increase the net revenue compared to the Franchise-based options.

3.1.6 The core growth assumption for the scheme is based on TEMPro growth rates, coupled with use of the mode-choice function developed for this scheme appraisal to measure the relative differences in times and costs by mode, developed in line with appraisal guidance and outlined in paragraph 2.2.46. The demand forecasts presented in Table 3.1 imply a rail demand growth on the Northumberland Line of 10% to 11% between 2023 and 2039 (with demand ramp-up impacts removed). This translates into a CAGR[20] of 0.6% to 0.7%. Equivalent CAGR rates (2023 to 2039) produced by the DfT and by Network Rail[21] for rail demand into Newcastle in the peak period are 1.5% and 1.7% respectively. Transport for the North (TfN)[22] has developed an Interpeak growth rate CAGR of 1.1%. It is evident therefore that, whilst the rail demand growth rates produced through this methodology reflect TAG guidance, they remain somewhat lower than the rail industry forecasts produced by the DfT, Network Rail and TfN. To some degree this will reflect specific characteristics associated with the study corridor as modelled, but the prudent growth assumptions compared to the industry forecast growth should be noted.

3.1.7 Figure 3.1 illustrates the annual demand and revenue (combined rail & Metro) by option for 2039, showing the progressive increase in patronage associated with the number of stations built and the higher service frequencies due to infrastructure interventions. What this also visualises is the impact of introducing lower fares on demand and revenue (T1 to A1 / T2 to A2), showing the increase in demand but slight fall in net revenue.

Figure 3.1: Annual Demand and Revenue by Option (2039)



[20] Compound Annual Growth Rate
[21] Growth scenarios developed by DfT and Network Rail System Operator for 'Transforming Connectivity in the North' September 2019
[22] Growth scenario developed for TfN Strategic Development Corridor analysis (January 2018, Atkins)

3.1.8 The demand and revenue outputs are presented below in Table 3.2 for the scheme opening year and the future forecast year of 2039, but this time taking into account demand ramp-up (as applied in the modelling and appraisal in line with TAG guidance). It is assumed that Options T1/A1 would start operation in 2023, whilst the remaining options would commence operation in 2025.

3.1.9 Taking into account demand ramp-up over the first three years of operation, demand and revenue is expected to essentially double between the scheme opening year and 2039.

3.1.10 It is important to acknowledge the impacts of demand ramp-up in the initial years of operation, especially in the context of the scheme promoter possibly taking on the revenue risk for the scheme during these initial years of operation. The financial appraisal section provides further more detailed analysis on the relationships between revenue and operating costs.

Table 3.2: Demand and Revenue by Option, including demand ramp-up

Option	2023			2025			2039		
	Annual demand	Rail Revenue (£m)	Metro Revenue (£m)	Annual demand	Rail Revenue (£m)	Metro Revenue (£m)	Annual demand	Rail Revenue (£m)	Metro Revenue (£m)
T1	362,000	£3.2m	£0.2m				752,000	£7.8m	£0.4m
A1	442,000	£1.7m	£1.6m				927,000	£4.3m	£3.5m
T2				564,000	£5.1m	£0.3m	1,160,000	£12.0m	£0.6m
A2				704,000	£2.9m	£2.5m	1,453,000	£6.9m	£5.2m

Demand is number of return journeys made
Revenue at 2018 prices

3.1.11 Table 3.3 summarises the sources of patronage by option for the 2039 scenario. The table shows that car is the primary source of demand for the scheme in all cases, accounting for circa 45% of rail demand. Approximately 1 in 6 journeys using the new rail service have transferred from bus. It should be noted that the long distance ‘other’ modes will include transfer from car, coach and rail too.

Table 3.3: Sources of Patronage by Option (2039)

Option	From Rail/Metro	From Car	From Bus	**Induced** (internal model area)	**Long distance** (other modes)	**Long distance** (induced)
T1	2.9%	45.1%	18.4%	21.9%	8.7%	2.9%
A1	2.9%	44.9%	18.7%	21.9%	8.7%	2.9%
T2	2.9%	45.7%	17.5%	21.9%	8.9%	3.0%
A2	2.9%	45.5%	17.8%	21.9%	9.0%	3.0%

3.1.12 The impacts of the scheme on the other modes in the study area in 2039 are presented in Table 3.6. In terms of demand, there are two key impacts; modal transfer to rail resulting in less usage of car, bus or P&R (Metro) and increased usage of these other modes as a means of access and/or egress to/from the rail stations. Both these impacts are presented in the same table, alongside the resultant net impact on revenues for the bus and Metro modes.

3.1.13 The impact on bus usage demonstrates a slight net increase in bus journeys across the study corridor, as the new journeys by bus to access the rail stations outweighs the loss of bus trips due to the modal transfer from bus to rail. However, the reality is that these new journeys are significantly shorter (e.g. outer Ashington into central Ashington) than the bus journeys lost to rail (e.g. Ashington to Newcastle) and therefore the net impact on bus revenue is negative at circa £1m lost bus revenue.

3.1.14 The impact on Metro is different to bus as there is very little modal transfer to rail from Metro, but Metro benefits from the excellent connections provided between rail and Metro at Northumberland Park (and to a lesser extent at Manors and Newcastle). This is reflected in the net revenue impacts for Metro in Options T1 and T2 which are positive values (£0.3m and £0.5m respectively). In Options A1 and A2 the Metro revenue presented also includes the Metro revenue associated with the Northumberland Line, hence why it is a much larger value. Nevertheless, it is clear that in these options more demand is interchanging between rail and Metro.

3.1.15 The impact on car journeys is very similar to that being experienced for bus journeys described above. The overall net impact is negligible in terms of car journeys, but longer distance car journeys are being replaced by much shorter distance car journeys and therefore there will be a significant reduction in car km.

Table 3.4: Impacts on Other Modes by Option (2039)

Mode	Option	Usage Impact		Net Revenue Impact (£m)
		Reduction in Journeys due to Modal Shift to Rail ('000s)	Additional Journeys as Access/Egress Mode to/from Rail Station ('000s)	
Bus	T1	-139	158	-0.5
	A1	-173	202	-0.6
	T2	-203	227	-0.8
	A2	-258	297	-1.3
P&R (Metro)	T1	-8	136	0.4
	A1	-9	193	3.5
	T2	-13	227	0.6
	A2	-16	327	5.1
Car	T1	-340	355	not applicable
	A1	-416	435	not applicable
	T2	-531	533	not applicable
	A2	-661	666	not applicable

3.1.16 Table 3.7 presents the mode shares in the corridor before and after the introduction of the scheme for an average weekday in 2039. The mode shares by mode are presented for all movements in the study corridor, all movements to Central Newcastle and all movements between Ashington to Central Newcastle, thereby illustrating how the scheme impacts on different journey types.

3.1.17 The table demonstrates how the rail scheme has the greatest impact on core flows into the Regional Centre (i.e. Central Newcastle). Rail modal share in the corridor as a whole (i.e. across all movements) is circa 5%, but car remains the dominant mode. Into Newcastle, rail becomes the dominant public transport mode, taking 15% to 20% modal share. For key flows specifically well-served by the scheme, such as Ashington to Newcastle, the rail modal share increases to between 20% and 25%. It was also observed that the peak rail mode shares are slightly higher than the interpeak rail mode shares – a reflection of the relatively poorer car journey times in the peak period and the greater levels of concessionary travel on bus at off-peak times.

Table 3.5: Sources of Patronage by Option (Average Weekday 2039)

		Average weekday			
		Car	P&R	Bus	Rail
From 1-28 to All (1-56)	DM	87%	2%	10%	2%
	T1	85%	2%	9%	4%
	A1	84%	2%	9%	5%
	T2	84%	2%	9%	6%
	A2	83%	1%	9%	7%
From 1-28 to Newcastle (44-46)	DM	68%	4%	21%	7%
	T1	63%	4%	18%	15%
	A1	63%	4%	17%	17%
	T2	62%	4%	16%	18%
	A2	60%	4%	15%	21%
From Ashington (4-9) to Newcastle (44-46)	DM	66%	3%	24%	6%
	T1	62%	3%	16%	19%
	A1	61%	3%	14%	22%
	T2	61%	3%	15%	20%
	A2	60%	3%	13%	23%

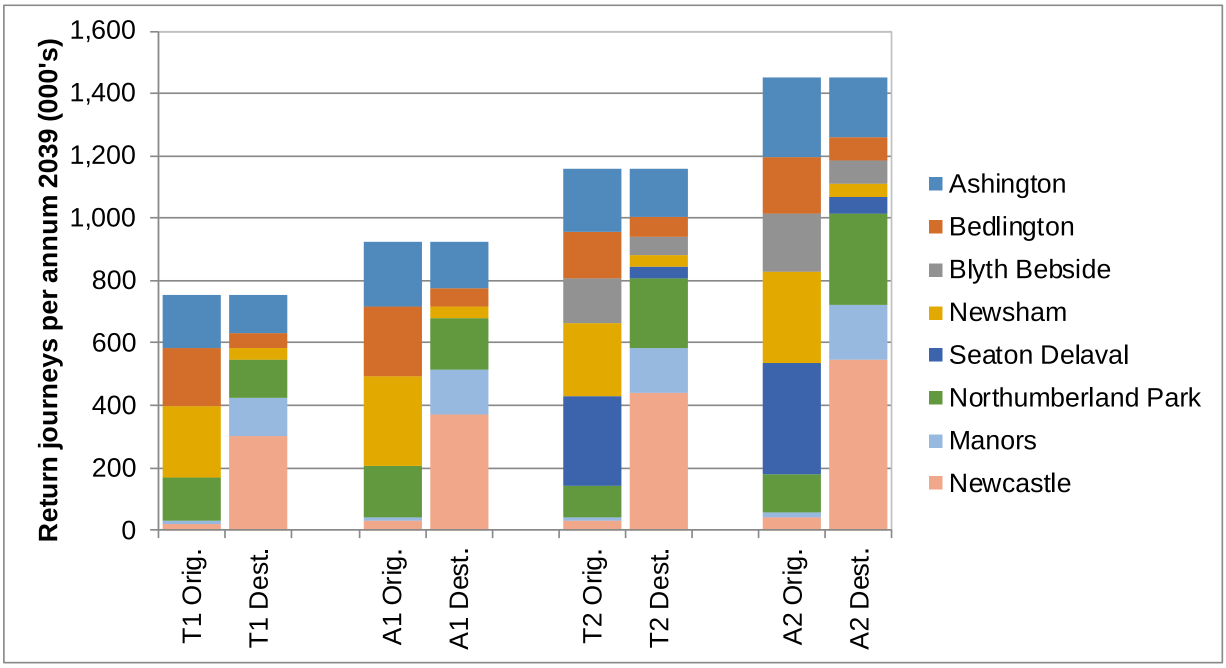
3.1.18 Figure 3.2 shows the split of demand by origin and destination station of the outbound journeys. The figure illustrates that the majority of trips on the corridor originate in Northumberland (circa 80% in all options), whilst Newcastle is the primary destination of outbound trips accounting for circa 40% of outbound alightings. Northumberland Park is also a key destination station for outbound trips, serving circa 19% of passengers. This reflects the interchange opportunities available at the station to change to a Tyne and Wear Metro service (over 60% of alighters from rail at Northumberland Park are interchanging with Metro), plus the large number of jobs concentrated in the Cobalt Park site to the south of the station.

3.1.19 The addition of Blyth Bebside and Seaton Delaval in Phase 2 leads to an overall increase in patronage but a reduction in demand from adjacent stations, as passengers are reallocated to a different station. Newsham accounts for the highest number of generated journeys in Phase 1, but once Blyth Bebside station is introduced in Phase 2 then some of this demand re-distributes to this station instead. In Phase 2 Seaton Delaval generates the most rail journeys.

3.1.20 It is important to acknowledge that due to the structure of the demand model, the station to zone assignment for the corridor is undertaken on an all-or-nothing basis[23]. Therefore, where the catchment of stations overlap, or where a particular station may have a wider P&R function, the station choice is not modelled in detail. This limitation implies that in practice, for example, the trips generated at Blyth Bebside station could be higher than what is shown in the figure as the station could also account for a proportion of trips shown generated at Ashington, Bedlington and Newsham.

[23] Although separate allocations can be undertaken for the car available and the non-car available markets – refer to Figure 2.5.

Figure 3.2: Trip Origins and Destinations by Station (2039)



3.1.21 The next table presents the estimated Entries & Exits of the proposed new stations by 2039. Unlike the previous tables and figures, Table 3.6 captures passengers boarding and alighting Northumberland Line services at each station. Therefore, a return trip between Bedlington and Ashington will be recorded as two passengers at both stations.

Table 3.6: Station Entries and Exits (2039)

Station	T1	A1	T2	A2
Ashington	580,000	720,000	710,000	900,000
Bedlington	470,000	570,000	430,000	520,000
Blyth Bebside	-	-	410,000	510,000
Newsham	530,000	650,000	540,000	670,000
Seaton Delaval	-	-	660,000	820,000
Northumberland Park[24]	520,000	660,000	640,000	840,000
Newcastle[25]	910,000	1,110,000	1,260,000	1,550,000

3.1.22 The table above indicates that all new stations are expected to serve at least 410,000 passenger movements by 2039. Ashington is predicted to be the busiest new station on the corridor due to its combination of large population catchment it serves, and the relatively significant number of trips attracted to the station. It is also worth noting that the number of users at Northumberland Park significantly increases in the Concession-based options (A1/A2) as the use of the same fares with Metro increases the amount of interchanging between rail and Metro.

3.1.23 It is important to note that there is no car parking capacity constraint in the demand model at any station. In addition to that, parking has been assumed to be free of charge at Ashington, Bedlington, Blyth Bebside, Newsham and Seaton Delaval. Clearly if either of these assumptions is not met the demand forecasts at each station is expected to be lower than the figures presented.

[24] The values for Northumberland Park include demand interchanging to/from Metro services.
[25] The values for Newcastle also include Manors and are the forecast incremental impacts associated with the new service that also includes demand interchanging to other services.

3.1.24 Table 3.7 and Table 3.8 show a schematic representation of the internal Northumberland Line corridor demand in 2039 for the Phase 1 options (T1/A1) and Phase 2 options (T2/A2) respectively. The tables show single journeys, with each return trip assigned to the station where it was generated. Therefore, a return journey between Ashington and Newcastle is recorded as two trips between Ashington and Newcastle. By presenting origin-destination movements in this form it is possible to identify the main trip generator and attractor.

Table 3.7: Schematic Representation of the Phase 1 Options Rail Demand Trip Matrix (2039)

T1 ● A1-T1 ○	Ashington	Bedlington	Newsham	Northumberland Park	Manors	Newcastle
Ashington		●●○	●	●●●	●●●	●●●●●●○○
Bedlington	●●●●●○		●	●●○	●●○	●●●●●●○
Newsham	●●●○	●○		●●●●●○	●●●○	●●●●●●●●○
Northumberland Park	●●	●	●		●●●	●●●●●●●○
Manors						
Newcastle	●			●○		

Each circle represents 20,000 trips
Figures rounded to nearest 20,000

3.1.25 Newcastle is the main attractor on the corridor for all new stations in Phase 1, with at least 120,000 per year from each of the four new stations. There are two other movements in Phase 1 that reach the 100,000 trips per annum threshold; Bedlington to Ashington (where rail is very competitive compared to bus for local movements) and Newsham to Northumberland Park (where trips will be accessing the Tyne & Wear Metro). Both of these movements reflect local trip-making in the corridor at both ends of the line.

3.1.26 The Phase 2 options generate considerably more rail demand than the Phase 1 options, reflecting the higher service frequencies and greater number of stations (i.e. catchment population) served. In broad terms the trip distribution is similar to that for the Phase 1 options, but it is worth noting:

- The greater volumes of rail demand towards Tyne & Wear the closer you get to Tyne & Wear (i.e. from Newsham and Seaton Delaval). In particular the demand from these stations that alight at Northumberland Park;
- The relative lack of trips to the Blyth area. This reflects the poor locations of the stations (Newsham and Blyth Bebside) serving Blyth. The model routes journeys to Blyth town centre via Newsham, reflecting the dominant 'direction of travel' towards Newcastle and the level of bus services between that station and the town centre;
- Blyth Bebside and Ashington attract some demand reflecting the presence of trip attractors close to these stations.

Table 3.8: Schematic Representation of the IP4b Rail Demand Trip Matrix (2039)

T2 ● A2-T2 ○	Ashington	Bedlington	Blyth Bebside	Newsham	Seaton Delaval	Northumberland Park	Manors	Newcastle
Ashington		●●●	●○	●	●	●●●○	●●●	●●●●●●●○○
Bedlington	●●●○		●○	●		●●	●○	●●●●○
Blyth Bebside	●●●○	●		○	●	●●○	●○	●●●●○
Newsham	●●●○	●	●		●	●●●●○○	●●●	●●●●●●●○○
Seaton Delaval	●●	●	●	○		●●●●●●●○○	●●●○	●●●●●●●●●●●○○○
Northumberland Park	●●	○	○		●		●●	●●●●○
Manors								
Newcastle	●					●○		

Each circle represents 20,000 trips / Figures rounded to nearest 20,000

3.2 Demand Benchmarking

3.2.1 The demand forecasts presented in the previous section have been benchmarked against the Tyne Valley corridor by comparing trips rates at stations on both corridors. This exercise provides a useful indication of how the mode choice model outputs (including induced demand and long-distance trips) compares to another corridor with regular rail services into Newcastle. It is however important to keep in mind that both corridors, and the towns served therein, demonstrate significant local differences in terms of their socio-demographic structures.

3.2.2 Trip rates at the Tyne Valley stations in Northumberland have been calculated by dividing the number of entries and exits at each station by the population living within their respective 3-kilometre catchment areas.

3.2.3 Demand figures for this exercise have been sourced from the 2016/17 and 2017/18 Estimates of Station Usage published by the ORR. Entries and exit figures from these two years have been combined to create a 2017 value and have then been uplifted to 2023 based on the average growth rate across all four scenarios included in Network Rail’s RUS study for trips into Newcastle.

3.2.4 Postcode population has been used to work out the number of residents within 3 kilometres of each station. When the 3-kilometre catchment of two stations overlap, population has been allocated to the nearest station regardless of direction of travel. TEMPro growth rates have been used to work out the 2023 population figures.

3.2.5 Table 3.9 presents the rail service provision at each Tyne Valley station and trip rate analysis undertaken. The corridor is served by a half-hourly service, alternating a stopper path with a semi-fast service calling on the corridor only at Hexham and Prudhoe. There are additional peak hour services.

Table 3.9: Tyne Valley Trip Rates (2023)

	Hexham	Corbridge	Riding Mill	Stocksfield	Prudhoe	Wylam
tph to Newcastle AM peak (fast/slow)	1/2	0/2	0/2	0/2	0/3	0/3
tph to Newcastle IP peak (fast/slow)	2/1	0/1	0/1	0/1	2/1	0/1
Journey time to Newcastle (fast/slow)	36/43	-/38	-/34	-/30	22/24	-/21
3km catchment population	14,564	4,140	1,248	3,809	13,306	12,138
Station Entries and Exits	381,468	59,771	28,902	63,448	164,840	116,206
Trip rate	26.2	14.4	23.2	16.7	12.4	9.6

3.2.6 Trip rates on the Tyne Valley corridor range from 26 trips per person per annum at Hexham to under 10 trips per person per annum at Wylam. The former is likely to be linked to the service frequency experienced at Hexham attracting passengers from beyond the 3-kilometre catchment. In contrast the low trip rate of Wylam can be to some extent explained because the station’s catchment includes Crawcrock and parts of Greenside and Ryton which in practice are unlikely to travel to Newcastle by rail from the station.

3.2.7 A similar exercise has been undertaken for the South East Northumberland corridor stations based on postcode population estimates (uplifted to 2023 using TEMPro growth rates), and demand (calculated as per entries and exits for 2023[26]) from the mode choice model with ramp-up removed. Table 3.10 presents the 2023 population catchments for the Phase 1 and Phase 2 scenarios. It should be noted that the Seaton Delaval catchment area includes the eastern area of Cramlington where residents do have the choice of using Cramlington station instead.

Table 3.10: Northumberland Line Population Catchments (2023)

Scenario	Ashington	Bedlington	Blyth Bebside	Newsham	Seaton Delaval
Phase 1 (T1/A1)	36,236	26,024	-	33,423	-
Phase 2 (T2/A2)	36,236	19,860	14,215	25,024	23,876

3.2.8 The table demonstrates that the Northumberland Line serves a much larger population than the Tyne Valley corridor, with an average of almost 24,000 residents per station compared to an average of just over 8,000 people living in the catchments of Tyne Valley stations.

3.2.9 Trip rates for the Northumberland line have been calculated by combining the mode choice model demand estimates with the population catchment of each station. Table 3.11 presents the resulting trip rates by station and scenario for the 2023 scenario. As indicated above, demand ramp-up has been removed from the 2023 forecasts to produce comparable estimates to the Tyne Valley corridor. It should be noted that for benchmarking purposes only the Franchise-based options have been used, reflecting the fact that they use similar fares based on the RSP fares structure.

Table 3.11: Northumberland Line Trip Rates (2023)

Option	Ashington	Bedlington	Blyth Bebside	Newsham	Seaton Delaval
T1	14.4	16.5	-	14.3	-
T2	17.8	19.7	25.8	19.6	24.9

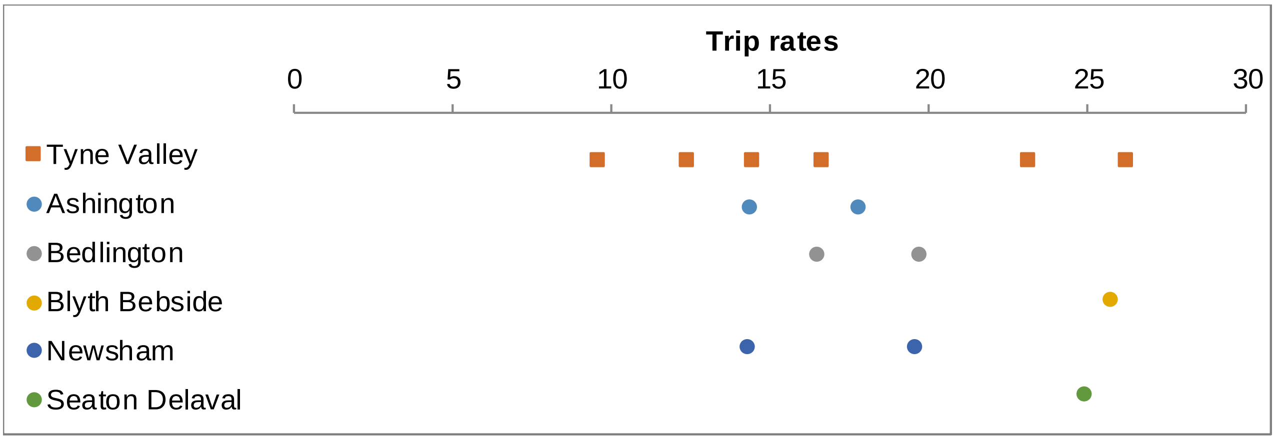
3.2.10 There is a noticeable increase in trip rates moving from Option T1 to Option T2. This is because of the larger population catchment overlap in the scenarios with six new stations. In Option T2 the trip rates range from circa 19 trips per person per annum at Ashington, Bedlington and Newsham to circa 25 trips per person per annum at Blyth Bebside and Seaton Delaval. Larger trip rates at Blyth Bebside can be explained by the considerable overlap with the Bedlington catchment and the substantial number of jobs in the station catchment. In the case of Seaton Delaval, the attractive service frequency compared to the ECML at Cramlington attracts passengers from the eastern side of the Cramlington station catchment.

3.2.11 Figure 3.3 compares the trip rates on the Tyne Valley corridor with the Northumberland Line stations. All stations fall in the range of trip rates calculated for the Tyne Valley stations. This suggests that the Northumberland Line demand forecasts benchmark well against the Tyne Valley stations. Ashington, Bedlington and Newsham fall in the 10 to 20 trip rate range, whilst Blyth Bebside and Seaton Delaval align with the 20 to 30 trip rate range.

3.2.12 In this sense it is important to note that there is a considerable share of forecast demand for trips entirely within Northumberland (i.e. internal between Seaton Delaval, Newsham, Blyth Bebside, Bedlington and Ashington). This fact suggests that in addition to better links to the regional centre the scheme provides local connectivity along the corridor. Local connectivity is however much less dominant on the Tyne Valley line due to the lower size of the towns served (1 in 14 journeys are internal journeys between Wylam and Hexham).

[26] Table 3.6 presents the Entries and Exits in 2038

Figure 3.3: Comparison of Trip Rates, Tyne Valley v Northumberland Line (2023)



3.3 Operating Costs

3.3.1 Two different sets of operating costs have been determined for the OBC, representing either the Franchise-based operation (T1/T2) or the Concession-based operation (A1/A2). The development of the Franchise-based operating costs for the scheme has been undertaken 'bottom-up' through the application of core operating cost rates sourced either from Northern Rail or from data available on the Network Rail website. The Concession-based operating costs have been determined via some initial market testing with the rail industry, where a service specification has been agreed in line with the defined options and a costed proposal has been received[27]. For certain operating cost items, such as those relating to stations, it has been assumed that the costs would be the same across all operating scenarios.

3.3.2 For reasons of commercial confidence, it is not possible to replicate the detailed cost breakdowns provided by Northern or the organisations consulted via the market testing. The information provided in this section is therefore presented at an aggregate level.

3.3.3 Operating costs are made up of:

- Rolling stock running costs: A function of the net additional vehicle or train miles and includes fuel, maintenance and cleaning, variable track access and the capacity charge;
- Rolling stock leasing costs: A function of the number of trains (units) required to operate the service, including an allowance for spare cover. Made up of the capital lease and the non-capital lease costs. Non-capital lease costs often represent the heavy maintenance costs;
- Traincrew costs: A function of the driver and conductor establishment determined to operate the new service;
- Station operating costs: All stations are assumed to be unstaffed. Operating costs have been split between the station building/platforms and the station car parks. The planning assumption at this stage is that the station car parks would be operated by Northumberland County Council;
- Other operating costs: These are other operating cost items not captured by the above (such as admin, ATOC fees, BTP fees, industry system costs, etc). These tend to be a function of overall train miles and get added pro rata.

3.3.4 The operating costs have been developed separately for each option at 2018 prices. In broad terms it is the option timetable that defines the level of operating costs (actual train requirement, train miles, etc) and these are presented in Appendix A, but there are some standard assumptions applied across all options, including:

[27] These organisations (Vivarail Ltd and Vintage Trains Ltd) were asked to supply quotes for operation of the service to a specification aligned with Options A1 and A2. These are not in any way binding and have been provided in order to inform the OBC and ongoing development of the Northumberland Line scheme. Their use is intended to provide an indication of the likely level of costs associated with a Concession operation.

- All trains are assumed to operate between Newcastle and Ashington;
- All services in the Franchise-based options are operated by 2-car trains – assumed to be a class 170 (equivalent). An additional train has been assumed to provide additional peak hour train capacity (i.e. a 4-car train). For the Concession-based options all services are assumed to be operated by 3-car trains – assumed to be a battery-operated class 230[28];
- For the Franchise-based options, an allowance has been made for spare cover (for maintenance etc) based on Northern Rail's standard operating assumption of 1 spare train for every 6 trains in operation. The Concession-based options assume 1 spare train;
- The vehicle and train miles calculated includes for anticipated Empty Coach Stock (ECS) movements to/from depot;
- There are some slight variations in journey times by train as individual trains have been flexed in order to get the timetable to work;
- Weekday timetable starts with an 05:39 departure from Ashington and finishes with an 21:59 departure from Newcastle;
- Saturday timetable is the same as the weekday timetable – except in Phase 1 there are no additional peak hour services. Also, no peak train strengthening on Saturdays;
- Sunday timetable is hourly between 0800 to 2200 hours across all options;
- Sunday service on bank holidays (except no service on Christmas Day).

3.3.5 Table 3.12 sets out the operating specification across each of the options. The use all day of 3-car trains in the Concession-based options increases overall vehicle mileage by 25% to 35%. Two trains are required to operate the Phase 1 timetable, whilst three trains are required to operate the Phase 2 timetable. The requirement for a peak strengthening train in the Franchise-based options increases the number of trains required compared to the Concession-based options. The traincrew numbers are the same across both operating scenarios.

Table 3.12: Operating Specification by Option

Option	T1	A1	T2	A2
Annual Vehicle Mileage	613,775	760,059	954,255	1,267,731
Number of Trains Required	3.5	3.0	4.7	4.0
Driver Establishment	11	11	16	16
Conductor Establishment	10	10	13	13
Number of Stations - 1 platform	2	2	3	3
Number of Stations - 2 platforms	2	2	3	3

3.3.6 The specifications outlined above have been discussed with, and reviewed by, Northern Rail. They were also used as the basis for initial market testing with potential Concession operators.

3.3.7 For the Franchise-based options Northern Rail supplied cost rates relating to rolling stock running costs, leasing costs and staff costs. Equivalent cost data was supplied by the invited organisations via the market testing to inform the operating costs associated with the Concession-based options. User charges, EC4T[29] and electrification asset user charges were sourced from the Network Rail website. Other operating costs have been determined as a percentage cost uplift based on our consultant's database.

[28] This is based on the outcomes of the initial market testing undertaken to date to inform the OBC. A Concession operation would have the ability to procure rolling stock from the market that might be considerably different to that presented in this OBC for illustrative purposes.
[29] Network Rail's charge for electricity

3.3.8 Typical average station operating costs have been used, with separate costs identified for one or two platform stations and whether they will have lifts or not. In all cases it has been assumed that the stations would be un-staffed. It should be noted that the station operating costs do not include the Long-Term Charge administered by Network Rail on the assumption that this charge reflects the cost for renewals and replacement which is costed as a separate item in this scheme appraisal. Equally, no costs have been included for the additional costs that would be incurred by the operator at Newcastle Central (these are costs levied by the SFO[30] on all other operators at the station pro-rata to the number of trains calling at that station – referred to as Qualifying Expenditure). As these are essentially redistributing these costs amongst operators based on the proportion of trains operated, it is considered unlikely that there would be any net material change in operating costs at a 'UK Rail plc' level.

3.3.9 Table 3.13 presents the annual operating costs in 2018 at 2018 prices. The Phase 1 related operating costs come out at £4m to £4.5m per annum, whilst the Phase 2 related operating costs, reflecting the higher service frequency, are circa 45% higher at between £6.1m and £6.7m per annum. As it stands, the Concession-based operating costs are circa 8% to 10% higher than the Franchise-based operating costs. At this stage, however, it would be premature to assume that this would remain the case as the scheme is further developed and the Concession-based approach is refined via more detailed and thorough market testing. A sensitivity test that presents the impact on the scheme appraisal of a 20% reduction in the Concession-based operating costs has been undertaken and is reported in Section 3.8.

Table 3.13: 2018 Annual Operating Costs

	Franchise	Concession
Phase 1	£4.24m	£4.56m
Phase 2	£6.06m	£6.67m

3.3.10 It should be noted that these operating costs account for changes in user charges, which are mileage-based, but not any fixed track access charges (FTA), which are a fixed annual block payment made by train operating companies to Network Rail that reflect the size of their operation and their use of Network Rail's infrastructure (referred to as their Regulatory Asset Base (RAB)). In this case, the proposed service is a new passenger service over a currently freight-only line. Therefore, by definition, the train operating company might be expected to see a rise in their annual FTA accordingly (i.e. taking their share of the use of the existing RAB associated with the line, plus any additional RAB (i.e. new infrastructure) required to provide the service).

3.3.11 Preliminary discussions with the ORR (Office of Rail Regulation), Network Rail and the DfT have, however, forged the view that there is little precedent for how this might work in practice (in terms of how FTA charges might be reallocated). Also, the FTA charges are fixed across each Control Period and therefore won't now change until 2024 at the earliest. It should also be noted that there might be the potential for double counting of costs within the scheme appraisal, which is undertaken at a 'UK plc' level, on the basis that renewals and replacement costs have been included in the scheme appraisal (discussed below) and it may be the case that the FTA charge levied on the train operating company is actually aimed at paying for these costs (amongst other costs). Hence, for the purposes of this economic appraisal, FTA charges have not been included.

3.4 Financial Appraisal

3.4.1 This section presents the scheme's financial appraisal and focuses on the estimated impacts at three different levels:

[30] Station Facilities Operator – in the case of Newcastle Central this is LNER at the time of writing

- at the ‘UK plc’ level, by comparing total incremental rail revenue to total incremental operating costs;
- at the Northern Franchise level, by comparing the estimated incremental revenue to the Northern Franchise, noting that this will include impacts such as transfer of demand away from Morpeth/Cramlington as well as additional demand elsewhere on Northern network (e.g. a new Ashington to Harrogate journey), with the estimated scheme operating costs (which are assumed to fall to the Franchise); and
- at the Concession level, by comparing the estimated incremental revenue to the Concession with the estimated scheme operating costs (which are assumed to fall to the Concession).

3.4.2 This analysis therefore determines whether introducing the service might lead to an operating surplus (reducing the overall Franchise subsidy requirement), or alternatively if the Franchise subsidy requirement will increase to balance the difference between the operating costs and the change in Franchised revenue.

3.4.3 Scheme operating costs comprise rolling stock running costs, rolling stock lease costs, staff costs, station costs and other costs. The latter category including fees paid by Northern to Network Rail, ATOC plus other admin costs. The calculation of the operating costs by option has been discussed earlier. The treatment of these costs into the future has been assumed as per the economic appraisal and in line with TAG guidance, including:

- Real wage rate inflation;
- Depreciation of rolling stock leasing costs over time;
- Replacement of class 170s by class 170 (equivalent) rolling stock in 2030;
- Changes in fuel consumption efficiency and cost rates.

3.4.4 It is also important to note that for the purposes of the financial appraisal a number of different assumptions have been applied (compared to what was assumed for the economic case analysis):

- No optimism bias, market price uplift or discounting has been applied;
- An estimated value for the Long-Term Charges that will be incurred by the Franchise or Concession at each new station has been added, based on industry evidence for comparable station specifications;
- An estimated value for the change in Qualifying Expenditure that will be incurred by the Franchise or Concession at Newcastle Central station has been added, based on the existing levels of Qualifying Expenditure at the station.

3.4.5 Subsidy requirement is based on the overall impact to the Franchised operator, therefore discounting revenue transfer from other Northern services and including any Northern revenue generated outside the study area. Table 3.14 summarises the sources of revenue considered for the financial appraisal and how these have been determined for the purposes of the financial appraisal. The factors in the table are based on LENNON data for the Tyne Valley corridor and a high-level estimate of the ECML revenue split based on service frequencies and journey times.

Table 3.14: Sources of Revenue for Financial Appraisal

Revenue source	Internal/ External	Treatment in financial appraisal
Transfer from other modes	Internal	New Northern revenue
Induced	Internal	New Northern revenue
Transfer from ECML (Morpeth trips)	Internal	Revenue for all passengers who now use Northumberland Line who previously used any ECML service, minus ECML revenue on Northern services from those who have transferred
Transfer from ECML (Cramlington trips)	Internal	Revenue for all passengers who now use Northumberland Line minus revenue for these same passengers who previously used Northern ECML service
Long distance (from other modes & induced)	External	New Northern revenue on Northumberland line, plus share of revenue on other Northern services outside the corridor (10% of long-distance revenue)
Transfer from ECML (Morpeth trips)	External	Northumberland line revenue as above, minus share of Northern revenue lost on the ECML
Transfer from ECML (Cramlington trips)	External	Northumberland line revenue as above, minus share of Northern revenue lost on the ECML

3.4.6 The outputs from this analysis are presented below, indicating what the estimated level of subsidy requirement or surplus in a given year might be. An indication of the proportion of operating costs that are covered by the revenue is also presented. This has specifically focussed on the first three years of operation, year 5 and then year 10. It should be noted that for years 1 to 3 the impacts of revenue 'ramp-up' have been assumed.

3.4.7 Table 3.23 sets out the financial appraisal at the 'UK plc' level. This demonstrates that after year 1 the scheme as a whole generates a revenue surplus. This reflects both the local (study corridor) impacts and the additional long-distance demand generated by the scheme. In this sense, it is important to note that incremental revenue to other operators/franchises is excluded from the Franchise and Concession tables below. Long distance operators such as LNER, TransPennine Express or Cross Country are expected to experience an increase in revenue as a result of the additional rail passengers generated and attracted by the rail service that is only captured in the 'UK plc' table below.

Table 3.15: Financial Appraisal at 'UK plc' Level

Year	T1		T2		A1		A2	
	Subsidy Requirement*	% costs covered	Subsidy Requirement*	% costs covered	Subsidy Requirement*	% costs covered	Subsidy Requirement*	% costs covered
1	-1.1m	75%	-1.2m	80%	-1.4m	70%	-1.7m	75%
2	0.5m	112%	1.3m	121%	0.2m	105%	0.8m	112%
3	1.4m	132%	2.6m	142%	1.1m	123%	2.1m	131%
5	2.2m	151%	3.9m	164%	1.9m	140%	3.4m	151%
10	2.4m	152%	4.4m	165%	2.3m	149%	4.1m	160%

2018 prices

** (-) indicates that the additional revenue accrued does not fully cover operating costs*

3.4.8 Table 3.16 summarises the financial appraisal undertaken for the Franchise options T1 and T2. As discussed above the subsidy requirement is calculated as the difference between the operator's estimated net incremental revenue and the scheme/operator's operating costs. The table indicates that the introduction of the Northumberland Line service is likely to trigger the requirement for additional subsidy for the Northern Franchise. For the first three years of operation there will be significant demand ramp-up, which results in an initial subsidy requirement of between £2.5m and £3.5m in the first year of operation. As the demand ramps up to 100% the subsidy requirement reduces considerably to circa £1m by year 3, with revenue accounting for circa 80% of the scheme operating costs. By year 10 the annual subsidy requirement is expected to be less than £0.5m.

Table 3.16: Financial Appraisal of Franchise Options T1 and T2

Year	T1		T2	
	Subsidy Requirement*	% costs covered	Subsidy Requirement*	% costs covered
1	-2.5m	44%	-3.4m	46%
2	-1.5m	66%	-1.9m	69%
3	-1.0m	77%	-1.2m	82%
5	-0.5m	89%	-0.4m	94%
10	-0.5m	89%	-0.3m	95%

2018 prices

** (-) indicates that the additional revenue accrued by the Franchised operator does not fully cover its operating costs*

3.4.9 Table 3.17 summarises the financial appraisal undertaken for the Concession options A1 and A2. As discussed above the subsidy requirement is calculated as the difference between the operator's estimated net incremental revenue and the scheme/operator's operating costs. The table indicates that the Concession operator is likely to require ongoing revenue support of between £2.0m and £4.5m across the first three years of operation as demand ramps up. This falls to a revenue support requirement of £1.4m by year 10 for Option A1 and £1.9m by year 10 for Option A2.

3.4.10 There are a number of reasons why the Concession operator will require a greater level of revenue support than the Franchise operator would:

- The Concession operator receives marginally less revenue than the Franchise operator in the study corridor by 2039, due to the lower fares and the fact that whilst these lower fares do attract additional demand, it is not enough to offset the impact of the lower fares;
- The Concession operator's operating costs are circa 8% to 10% higher than the Franchise-based operating costs. At this stage, however, it would be premature to assume that this would remain the case as the scheme is further developed and the Concession-based approach is refined via more detailed and thorough market testing. A sensitivity test that presents the impact on the scheme appraisal of a 20% reduction in the Concession-based operating costs has been undertaken and is reported in Section 3.8;
- The Concession operator does not have the benefit of additional revenue elsewhere on the rail network like Northern does.

3.4.11 It is worth noting that any additional revenue associated with use of the Tyne & Wear Metro (e.g. through transferring at Northumberland Park) has not been included in this analysis. In other words, the revenue used in this appraisal is essentially that associated with the 'heavy rail' operation on the Northumberland Line.

Table 3.17: Financial Appraisal of Concession Options A1 and A2

Year	A1		A2	
	Subsidy Requirement*	% costs covered	Subsidy Requirement*	% costs covered
1	-3.1m	35%	-4.5m	36%
2	-2.3m	52%	-3.3m	53%
3	-1.9m	61%	-2.7m	62%
5	-1.5m	69%	-2.1m	71%
10	-1.4m	72%	-1.9m	74%

2018 prices

** (-) indicates that the additional revenue accrued by the Concession operator does not fully cover its operating costs*

3.5 Investment Costs

3.5.1 The engineering feasibility and cost development undertaken at the SOBC stage built on the work carried out by Network Rail in their development of the Governance for Rail Investment Projects (GRIP) stage 2 report (June 2016) and addendum (May 2018). The Technical Summary Report in the SOBC identified locations for the six new stations, and estimated costs and journey times based on a four-phase delivery strategy. This was deemed sufficient to support the SOBC submission to the Department for Transport (DfT) for the 'Decision to Develop' within the Rail Network Enhancements Pipeline (RNEP) process.

3.5.2 At SOBC the team was limited by the information provided in the outputs of previous studies and publicly available documents or site access. In this OBC stage, the Asset Protection Agreement between Network Rail and NCC enabled the team to obtain records data, meet with Network Rail Route Asset Managers (RAMs) and carry out inspections on the railway. Although still incomplete, the step-change in base data to work from has enabled a much greater understanding of the presence, type, condition and plans for the various different assets along the Northumberland Line.

3.5.3 In addition, a public consultation exercise, environmental surveys and preliminary engagement with landowners along the route have provided a broader context for the development and selection of sub-options for stations and other route-wide interventions.

3.5.4 In parallel with this enhanced data collection, the project team embarked upon a series of workshops to challenge previous decisions based on emerging information, and then to develop and test each proposal against emerging requirements obtained through stakeholder engagement exercises. Workshops included relevant discipline design experts, along with representatives from NCC, Network Rail and Morgan Sindall to ensure inputs from the client, the infrastructure owner and a major UK contractor engaged through an Early Contractor Involvement (ECI) exercise.

3.5.5 Wider consultation and elicitation of specific requirements was achieved through ongoing project steering group and project board meetings, an initial public consultation exercise, as well as direct discussions with key stakeholders such as Network Rail, TOCs & FOCs, Nexus, DfT, ORR and landowners.

3.5.6 Through development of design ideas and discussions with organisations and individuals who may be affected by the scheme, the project team has developed a clearer understanding of both the requirements to be met and the constraints within which they must be achieved. In most cases the team has been able to test the proposed solutions with relevant stakeholders and reflect emerging concerns in the selection or development of sub-options, though this work will be refined further in the next stage. This has been undertaken in a collaborative workshop environment with attendees presenting work in progress and peer reviewing across disciplines to ensure integration.

3.5.7 The four-phase approach in the SOBC has been refined to a two-phase approach. This is because of the extent of Phase 3 signalling work that the project team decided now needed to be brought forward into Phase 1. The remaining works in Phases 3 and 4 were then relatively small packages of work and considered likely to be bundled into Phase 2 works for efficient procurement and minimise disruption to what will by then be a live passenger railway environment.

3.5.8 Phase 2 remains primarily defined by works that may require a full Transport and Works Act Order (TWAO) and thus are unlikely to be deliverable within the TCF timescales and/or are lower priority features that would otherwise increase project costs beyond what the Phase 1 budget is likely to be able to bear. If the Phase 1 budget were to increase, and land negotiations concluded without the need for a TWAO, then it is possible that some Phase 2 elements could be brought forward into Phase 1.

3.5.9 The proposed solutions have been developed for pricing and quantified risk assessment purposes to update the Anticipated Final Cost (AFC) for the scheme and its component Phases. These costs are presented below in Table 3.18.

Table 3.18: Summary of Capital Costs by Infrastructure Phase

Cost Breakdown	Phase 1, £m	Phase 2, £m	Cumulative Total, £m
Direct Construction Costs	52.8	13.3	66.0
Indirect Construction Costs	26.2	7.6	33.8
Design, Project Management & Other Project Costs	26.1	6.7	32.8
Land Costs	0.4	1.3	1.8
Risk Costs (QRA)	19.5	8.0	27.5
Anticipated Final Cost (AFC)	**124.9**	**36.9**	**161.9**

Costs at 2019Q3

3.5.10 For the purposes of scheme appraisal, these costs have been developed to a GRIP3 equivalent level of design. Therefore, the AFC cost is taken forward to the appraisal model (i.e. incorporating the QRA risk costs), where an appropriate level of optimism Bias has been applied (in this case 18%).

3.5.11 These costs at OBC stage can be compared to the costs calculated at the SOBC stage, where the equivalent AFC costs (i.e. with a risk allowance)[31] were £120.0m for Phase 1 and £173.5m for Phase 4. The comparison of total costs indicates just a small 4.1% increase in Phase 1, and this is dominated by the changes in Permanent Way costs, of which £3.8m in direct costs comes from the inclusion of works to rehabilitate Furnace Way sidings that was specifically excluded in the SOBC. Additional Permanent Way cost increases come from the need to upgrade significantly more track than anticipated. Further Phase 1 increases come from stations and signalling, although these are partially offset by savings in level crossings and utility diversions, as well as a reduction in overhead allowances following further assessment. The OBC Phase 2 can be compared with SOBC Phase 4 and shows a significant reduction of £11.6m or 6.7%. This is a result of reduced scope in signalling, operational power and in particular the removal of the need for significant earthworks after Phase 1. Risk and overheads have fallen as the relocation of the passing loop has assisted in the efficiency of construction.

[31] After adjustment to 2019 Q3 prices

3.5.12 The capital costs presented in Table 3.18 above are the costs associated with taking the scheme forward from this point and, as such, do not include for costs that have already been spent on developing the scheme to date. These have been confirmed by NCC and added to the scheme appraisal:

- 2015: £0.05m
- 2016: £0.45m
- 2017: £0.11m
- 2018: £0.01m
- 2019: £3.50m

3.5.13 An additional item of capital expenditure has been added to the two Concession-based options (A1/A2) to represent the construction of a depot and office facilities to house the rolling stock and staff. At this stage this is assumed to be a sum of £15m. This cost item will be subject to more detailed refinement at the next stage of scheme development.

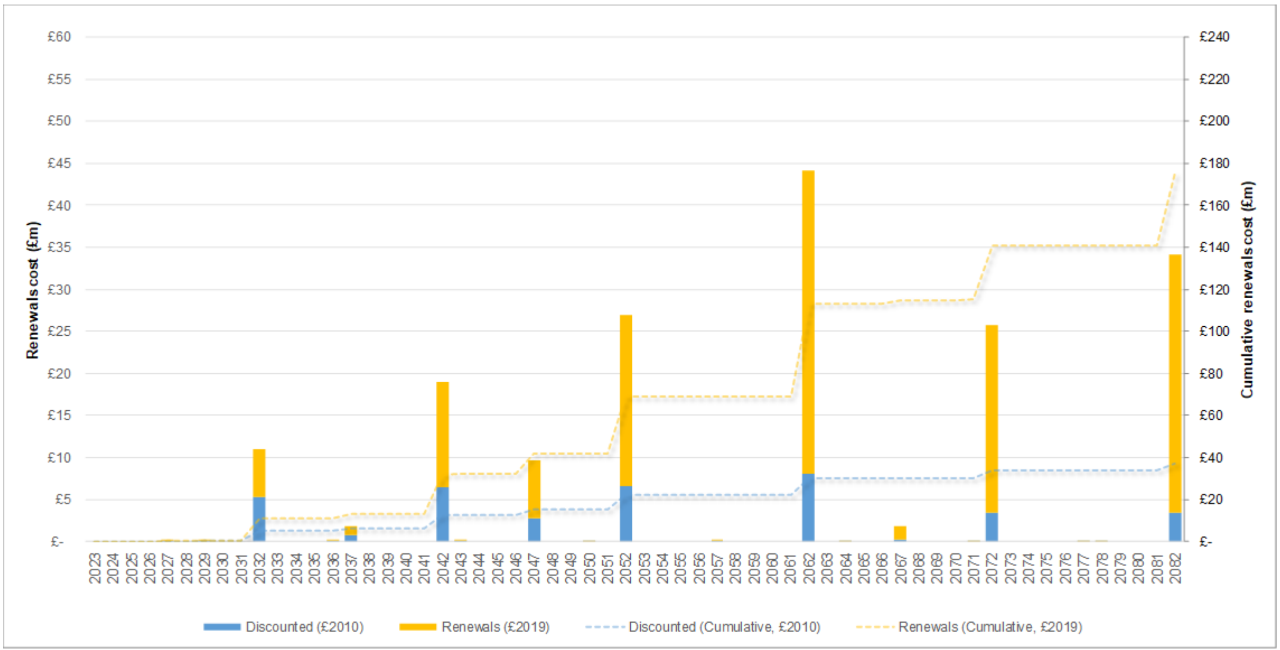
3.5.14 Mobilisation costs are the one-off costs experienced by the train operator during service mobilisation including items such as driver recruitment and training, route learning, new uniforms and conductor ticket machines. For the Franchise-based options, based on previous experience on other projects, an allowance of £90,000 per additional traincrew required has been added to the scheme appraisal. In addition to this, following further discussions with Northern Rail, a sum of £150,000 was added to this cost to represent anticipated costs that would be incurred at Heaton depot. For the Concession-based options, mobilisation costs were provided via the market testing exercise. In total the mobilisation costs ranged from between £1.0m and £1.5m.

3.5.15 There are incremental renewals costs associated with renewing and replacing the additional infrastructure provided by the scheme over the defined appraisal period (60 years). The method for ensuring a cost allowance for this in the economic appraisal was to estimate the frequency (in years) and extent (as a percentage of first cost) of renewals, undertaken by the discipline engineers to reflect both minor and major renewals. Minor renewals recognises that for some assets, there are significant components that are renewed at a more regular frequency than the major renewals, where the majority (though not necessarily all) of the asset is renewed. The frequency of renewals is assumed to be repeated throughout the 60-year horizon, with costs captured at nominal values and then discounted in the business case model.

3.5.16 Figure 3.4 and Figure 3.5 present the incremental renewal costs for Phase 1 and Phase 2 respectively and illustrate the how these costs are distributed over the 60 year scheme life as well as presenting the overall cumulative totals. Renewals costs are made up of both the direct and indirect construction costs. The diagrams show both the nominal values in 2019 prices (including real cost inflation) and the discounted values (to 2010) at 2010 prices. The latter values represent what is input to the economic appraisal analysis and demonstrates how the costs reduce in value over time once discounting has been applied.

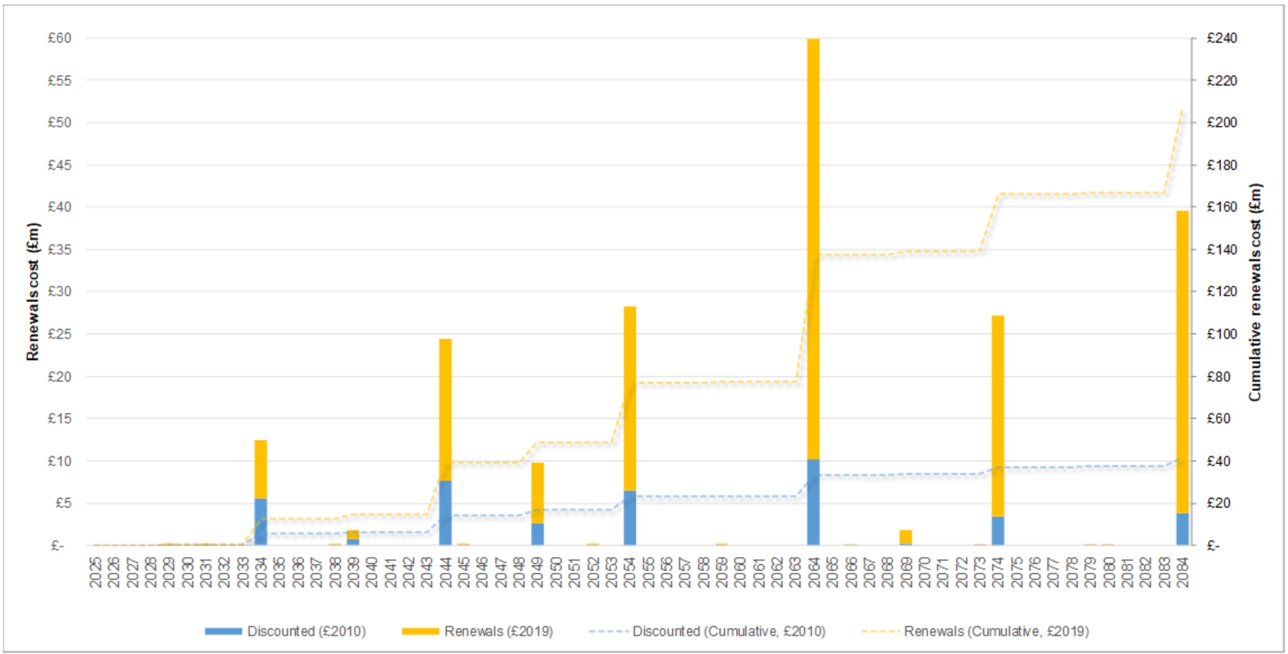
3.5.17 In total, Phase 1's cumulative renewals cost is £175m over 60 years (2019 prices) and it can be seen how this distributes across a number of key years at the 10/20/30/40/50 and 60 year mark, representing when it is considered that key major renewals are anticipated. Whilst the indication from the diagram is that there is a particular focus on renewals costs in key years, this does hide what is in fact a considerable mix of cost allocations and frequency of spend across the various engineering elements. For example, permanent way minor renewals are allocated as 5% of initial cost every 10 years and a major renewal of 75% of initial cost every 40 years, a signalling minor renewal has been assumed as being 20% of initial cost every 10 years whilst a major renewal is 50% of initial cost every 25 years, whilst level crossing minor and major renewals vary by type of level crossing. Once the discounting factor is added, alongside a re-basing to 2010 prices, then the total cumulative value becomes £37m for Phase 1.

Figure 3.4: Phase 1 Renewals Costs over 60 Years



3.5.18 It is a similar pattern for Phase 2, with a total cumulative renewals cost of £206m over 60 years (2019 prices), again focussing on a number of key years at the 10/20/30/40/50 and 60 year mark. Once the discounting factor is added, alongside a re-basing to 2010 prices, then the total cumulative value becomes £41m for Phase 2.

Figure 3.5: Phase 2 Renewals Costs over 60 Years



3.5.19 Some new assets provided by the project will be replacing existing assets that would otherwise be renewed by Network Rail in accordance with the relevant asset management policy. There is, therefore, a potential benefit to Network Rail that the renewal of these assets is effectively brought forward. The potential for 'costs avoided' by Network Rail over the 60-year project life is something that will be determined in greater detail in the Design Stage and reported in the FBC. For the purposes of the OBC a sensitivity test has been undertaken whereby the net renewals costs have been reduced by -10% / -30% / -50%.

3.6 Environmental Benefits

3.6.1 Environmental benefits have been quantified as follows:

- Noise: Both the benefits associated with removing cars from the road and the disbenefits associated with operating a greater number of trains in the study corridor have been quantified;
- Greenhouse Gases: The net changes in energy consumption (carbon dioxide emissions) have been determined via the benefits associated with removing cars from the road and the disbenefits associated with operating a greater number of trains in the study corridor;
- Local air quality: The benefits associated with removing cars from the road have been quantified.

3.6.2 The forecast levels of modal transfer from car to rail dictates the level of environmental benefits associated with the car-km removed from the road network. The estimated levels of net car-km removed from the road network in the forecast year (2039) are presented in Table 3.19. This is the net impact where the reductions in car-km associated with modal transfer are partially offset by increases in car-km associated with access to the new rail stations.

Table 3.19: Forecast levels of car-km removed from the road network (2039)

Option	Annual Car-km Removed
T1	10.9m
A1	13.4m
T2	16.0m
A2	20.1m

3.6.3 The Phase 1 options are forecast to remove between 11m and 13.5m car-km from the road network in 2039. This increases to between 16m and 20m when the Phase 2 timetable is introduced. This indicates that Phase 2 has the potential to remove nearly twice as much car-km from the road network than Phase 1 (albeit under a different operating scenario).

3.6.4 Noise benefits resulting from car-km removed from the road network have been determined by applying the standard unit rates of noise benefits sourced from the TAG Databook. These benefits are presented in Table 3.20.

3.6.5 Noise disbenefits associated with the operation of additional train services have been calculated in line with TAG guidance Unit A3. Appendix C reports this in detail, including the identification of households along the railway corridor that would be forecast to experience a change in noise levels as a result of the introduction of the scheme. For the Phase 1 options, just under 3,700 properties are anticipated to experience some form of increase in noise levels, with 163 experiencing a decrease. For the Phase 2 options nearly 6,400 properties are estimated to experience a noise level increase and 192 properties experience a noise level decrease. Using the TAG Noise Workbook, these have been converted into a monetary level of disbenefit, summarised in the table below.

Table 3.20: Noise related benefits over the scheme life

Option	Noise benefits due to reduced Car-km	Noise disbenefits due to additional trains	Net noise (dis)benefits
T1	+0.86	-1.59	-0.73
A1	+1.06	-1.59	-0.53
T2	+1.23	-2.93	-1.67
A2	+1.57	-2.93	-1.36

£m Present Value over 60 year appraisal period (2010 prices)

3.6.6 The scheme registers a slight net noise disbenefit in monetary terms, due to the noise disbenefits associated with the additional rail services outweighing the noise benefits associated with car-km removed from the road network.

3.6.7 Greenhouse Gas benefits have been determined in line with TAG guidance (TAG Unit A3), using the TAG Greenhouse Gases Workbook. An estimation has been made of the changes in energy consumption, both in terms of reduced car usage (car km removed from the road network) and also increased train operation (additional vehicle miles). Standard TAG rates for converting fuel consumption into carbon dioxide emissions have been used to determine the incremental change in emissions to feed into the TAG Greenhouse Gases Workbook.

3.6.8 The analysis takes into account the anticipated growth in the use of electric-operated cars (as per TAG guidance) and trains (services are assumed to be operated by battery-operated trains in the Concession-based scenario). In line with TAG guidance, any CO2 emissions generated by electric-operated vehicles (whether car or train) are assumed to be 'traded'. This means that these emissions would not have an impact on the UK net carbon account and therefore do not contribute to the BCR calculation. However, these impacts are reported via the ASTs. All CO2 emissions generated by other transport energy sources, such as diesel, petrol, etc, are deemed to be 'non-traded' and as such impact on the UK's net carbon account and are reported both via the BCR and the ASTs.

3.6.9 The estimated Greenhouse Gas emissions and monetised impacts are presented in Table 3.21. The TAG Workbook output sheets for each option are presented in Appendix D.

3.6.10 All the options generate CO2 emissions savings from the reduction in car-km as a result of modal transfer to rail. However, the Franchise-based options (T1 and T2) are assumed to operate diesel-powered trains for the full 60-year scheme life which results in a net increase in non-traded CO2 emissions, as the additional emissions associated with additional train km outweighs the reduction in emissions from the reduced car-km. It should be noted, however, that this can be considered a pessimistic assumption given the current government policy to eradicate diesel-only operated trains by 2040 in the UK. A sensitivity test has been added to the analysis that reflects this policy position and the revised impacts on CO2 emissions for Options T1 and T2 are reported below. In Options A1 and A2, where the train services are electric-operated, the non-traded benefits reflect the reduction in (diesel & petrol) car-km only. The levels of traded emissions and monetary values are a lot smaller, reflecting the separate treatment of energy consumption for electric-operated transport. As per the non-traded values, in Options A1 and A2 the impacts associated with the additional train-miles outweighs the reduction in (electric) car-km.

Table 3.21: Greenhouse Gases related benefits over the scheme life

Option	Total Scheme Life Emissions, tCO2e			Total Scheme Life Monetary Value, £m Present Value			
	Non-Traded emissions	Traded emissions	Total emissions	*Non-Traded Benefits due to reduced Car-km*	*Non-Traded Disbenefits due to additional trains*	Non-Traded Net (dis)benefits*	Traded Net (dis)benefits
T1	50,268	-1,144	49,124	*2.26*	*-4.52*	-2.25	0.05
A1	-63,528	6,580	-56,947	*2.79*	*0.00*	2.79	-0.27
T2	81,356	-1,641	79,715	*3.16*	*-6.81*	-3.65	0.07
A2	-90,094	9,386	-80,707	*3.97*	*0.00*	3.97	-0.39

** These values contribute to the BCR calculation*

3.6.12 Local Air quality benefits have been determined as a function of the car-km removed from the road network. The value of these benefits is presented in Table 3.22. The monetised benefits associated with local air quality improvements are relatively low, valued at between £70,000 and £100,000 PV over 60 years.

Table 3.22: Local Air Quality related benefits over the scheme life

Option	LAQ benefits due to reduced Car-km
T1	0.07
A1	0.09
T2	0.08
A2	0.10

£m Present Value over 60-year appraisal period (2010 prices)

3.7 Economic Appraisal

3.7.1 A full economic appraisal of each option was undertaken in line with DfT TAG appraisal guidance. Benefits such as rail user time savings, decongestion benefits and environmental and accident benefits were calculated. Impacts on rail and bus revenue were incorporated as well as indirect taxation impacts on the exchequer. Operating costs and capital costs were also incorporated.

3.7.2 Table 3.23 sets out the level 1 economic appraisal results in 2010 prices. A more detailed breakdown of the economic appraisal results are presented in the TEE, Public Accounts and AMCB tables presented in Appendix E.

Table 3.23: Level 1 Economic appraisal results, figures in 2010 prices

Phase	Operating Scenario	Option	PVB (£m)	PVC (£m)	NPV (£m)	Level 1 BCR
1	Franchise	T1	241.9	97.9	144.0	**2.47**
1	Concession	A1	308.7	115.7	193.0	**2.67**
2	Franchise	T2	361.3	94.6	266.7	**3.82**
2	Concession	A2	470.8	114.2	356.6	**4.12**

3.7.3 All options return a positive business case, with the Present Value of Benefits exceeding the Present Value of Costs.

3.7.4 The Phase 1 results demonstrate that the initial service proposition of an hourly service, with some additional peak services, will generate a BCR of between 2.47 and 2.67, depending on which operating model is procured. The appraisal results therefore suggest that the scheme would be categorised as a high value for money scheme. The Net Present Value of the Phase 1 scheme ranges from £145m to £195m.

3.7.5 The Phase 2 results demonstrate that the full service proposition of a half-hourly service will generate a BCR of between 3.82 and 4.12, depending on which operating model is procured. The appraisal results therefore suggest that the scheme would be categorised as a high value for money scheme, moving towards a very high value for money scheme. The Net Present Value of the Phase 2 scheme ranges from £265m to £355m.

3.7.6 A Phase 2 versus Phase 1 incremental analysis suggests that there is a circa 50% increase in the PVB moving from Phase 1 to Phase 2. This reflects the additional demand generating increased user and non-user benefits. The PVC hardly changes between Phase 1 and Phase 2, suggesting that in broad terms the increased costs (capital, renewals and operating) are being offset by the increase in revenue to rail and Metro. As a result, the NPV in Phase 2 is circa 80% higher than in Phase 1 and the BCRs improve from 2.47 to 3.82 (Phase 1) and from 2.67 to 4.12 (Phase 2). Therefore, it is clear that Phase 2 performs better than Phase 1 and that there would be a clear benefit in moving from Phase 1 to Phase 2 (i.e. an hourly service with four stations to a half-hourly service with six stations).

3.7.7 Comparing the Franchise options and the Concession options, it is clear that the PVC increases with the Concession options reflecting the higher operating costs and slightly higher capital costs (new depot), coupled with the lower revenue generated (due to the lower fares). PVC therefore increases by circa 20%. However, the additional demand generated by the lower fares, and to a lesser extent the slightly quicker journey times, generates an additional 30% in the PVB user and non-user benefits, which more than offsets the increase in the PVC. As a result the Concession options record an NPV that is circa 35% greater than for the Franchise options and the relative BCRs jump from 2.47 to 2.67 (Phase 1) and from 3.82 to 4.12 (Phase 2). This would suggest that a Concession-based operation would be favourable to a Franchise operation. However, the format of a Concession-based operation could take a number of different forms which could significantly alter the construction of the benefits and costs that feed into the scheme appraisal. Therefore further work to refine the possible Concession-based approach for this scheme needs to be undertaken as the scheme is developed through the Design Stage. What can be highlighted is that the analysis suggests that the use of lower fares that are integrated with the Metro fares generates significant benefits that would likely improve the scheme's overall business case[32].

Wider Economic Benefits

3.7.8 This section presents the outputs of the Adjusted BCR following the WEB estimation, as described in Section 2.3. Table 3.24 presents the WEB results in 2010 prices. The WEB value reported represents the sum of the agglomeration and the labour supply benefits.

Table 3.24: Impact of wider economic benefits in economic appraisal results, 2010 prices

Option	Level 1 (Initial BCR)				Level 2 (Adjusted BCR)				
	PVB (£m)	PVC (£m)	NPV (£m)	BCR	WEB (£m)	PVB (£m)	PVC (£m)	NPV (£m)	BCR
T1	241.9	97.9	144.0	**2.47**	**42.4**	284.3	97.9	186.4	**2.90**
A1	308.7	115.7	193.0	**2.67**	**46.1**	354.8	115.7	239.1	**3.07**
T2	361.3	94.6	266.7	**3.82**	**45.7**	407.0	94.6	312.4	**4.30**
A2	470.8	114.2	356.6	**4.12**	**50.4**	521.2	114.2	407.0	**4.56**

3.7.9 Results show a similar range of wider economic benefits across all scenarios. WEB results are mostly driven by changes in the average Generalised Travel Cost, where the peak demand weighs more in this calculation. There is less service headway variation in the peaks across the options (40min in T1/A1 v 30min in T2/A2), as opposed to the interpeak period (60min in T1/A1 v 30min in T2/A2).

3.7.10 Furthermore, the Concession-based options (A1 and A2) provide significantly cheaper fares on the Northumberland line compared to the Franchise-operated scenarios T1 and T2. Consequently, cheaper travel costs combined with slightly faster journey times result in higher WEBs.

3.7.11 PVBs increase by a range of +10% (A2) to +18% (T1). Given the absolute value of the WEBs benefits ranges from just £42m to £50m across all the options, the higher user benefits a scenario has, the lower the impact of WEBs in the adjusted PVB. On average, the adjusted BCR implies an increment of 0.4-0.5 in the BCR value.

3.7.12 The agglomeration impacts account for 93% of the total estimated welfare benefits, on average.

[32] It is, however, worth noting that the sensitivity testing, as set out in Section 3.8, suggests that with increasing demand there comes a point where the Franchise-based options do overtake the Concession-based options in terms of their relative BCRs.

3.8 Sensitivity Tests

3.8.1 This section presents outputs from the sensitivity tests described in Paragraph 2.3. Due to the large number of sensitivity tests defined, which have been applied across all four options that have been appraised in this OBC, then the results have been presented for the Phase 1 options (T1 and A1) and then the Phase 2 options (T2 and A2) separately. This allows for analysis of the sensitivity test impacts at each anticipated stage of scheme implementation.

3.8.2 Table 3.25 and Figure 3.6 below illustrate how the sensitivity test alters the economic indicators from the core set of results for the Phase 1 options. In all cases, the BCR for the scheme remains positive (i.e. above 1.0) and in most cases remains 'high value for money' (i.e. a BCR greater than 2.0), with the impacts of one test pushing the BCRs into the 'very high value for money' (i.e. a BCR greater than 4.0) category. Those tests that reduce overall forecast demand by 20% push the BCR for the scheme into the 'medium value for money' category.

Table 3.25: Economic Appraisal Sensitivity Test Results for Phase 1 Options

Sensitivity Test	Option T1				Option A1			
	PVB (£m)	PVC (£m)	NPV (£m)	BCR	PVB (£m)	PVC (£m)	NPV (£m)	BCR
Core	***241.9***	***97.9***	***144.0***	***2.47***	***308.7***	***115.7***	***193.0***	***2.67***
S1L	192.5	124.4	68.1	1.55	246.6	141.8	104.8	1.74
S1H	291.3	71.4	219.9	4.08	370.7	89.6	281.2	4.14
S2L	241.9	119.7	122.2	2.02	308.7	140.0	168.7	2.21
S2H	241.9	76.1	165.8	3.18	308.7	91.4	217.3	3.38
S3L	239.4	99.4	139.9	2.41	304.3	117.2	187.1	2.60
S3H	241.1	96.4	144.7	2.50	307.9	114.2	193.7	2.70
S4	240.9	104.3	136.6	2.31	-	-	-	-
S5	-	-	-	-	308.7	106.1	202.6	2.91
S6a	241.9	94.2	147.7	2.57	308.7	112.0	196.7	2.76
S6b	241.9	86.7	155.1	2.79	308.7	104.5	204.1	2.95
S6c	241.9	79.3	162.6	3.05	308.7	97.1	211.6	3.18
S7	245.2	97.9	147.3	2.50	-	-	-	-
S8					308.7	98.2	210.5	3.14

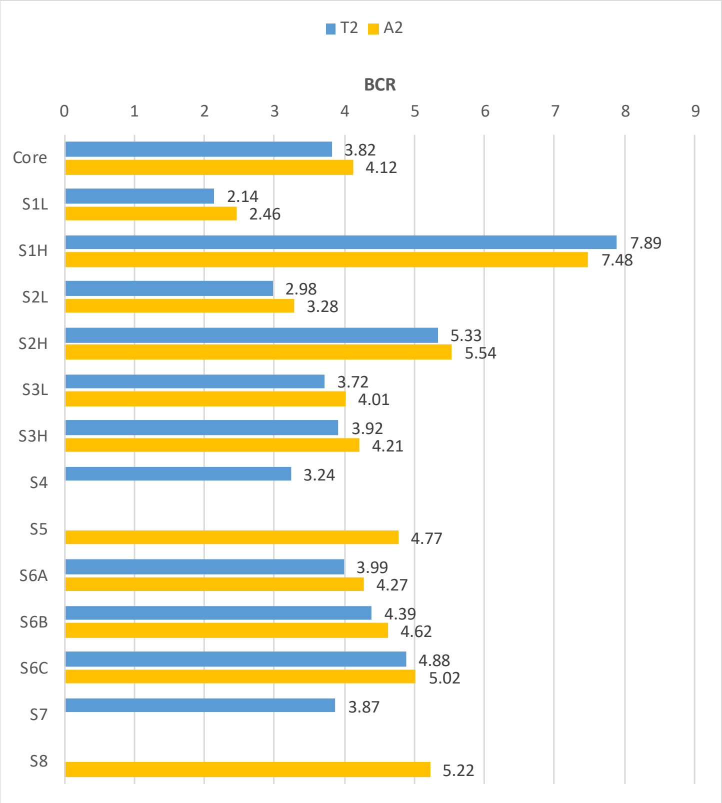
Figure 3.6: Sensitivity Test Benefit Cost Ratios for Phase 1 Options

3.8.3 Table 3.26 and Figure 3.7 below illustrate how the sensitivity test alters the economic indicators from the core set of results for the Phase 2 options. In all cases, the BCR for the scheme remains positive (i.e. above 1.0) and in all cases remains 'high value for money' (i.e. a BCR greater than 2.0) or 'very high value for money' (i.e. a BCR greater than 4.0).

Table 3.26: Economic Appraisal Sensitivity Test Results for Phase 2 Options

Sensitivity Test	Option T2				Option A2			
	PVB (£m)	PVC (£m)	NPV (£m)	BCR	PVB (£m)	PVC (£m)	NPV (£m)	BCR
Core	***361.3***	***94.6***	***266.7***	***3.82***	***470.8***	***114.2***	***356.6***	***4.12***
S1L	287.5	134.1	153.4	2.14	376.0	152.9	223.2	2.46
S1H	435.0	55.1	379.9	7.89	565.5	75.6	490.0	7.48
S2L	361.3	121.4	239.8	2.98	470.8	143.4	327.4	3.28
S2H	361.3	67.8	293.5	5.33	470.8	85.1	385.7	5.54
S3L	359.0	96.6	262.4	3.72	466.3	116.2	350.1	4.01
S3H	363.3	92.6	270.7	3.92	473.0	112.3	360.8	4.21
S4	359.3	111.1	248.3	3.24	-	-	-	-
S5	-	-	-	-	470.8	98.8	372.0	4.77
S6a	361.3	90.5	270.8	3.99	470.8	110.1	360.7	4.27
S6b	361.3	82.3	279.0	4.39	470.8	101.9	368.9	4.62
S6c	361.3	74.1	287.2	4.88	470.8	93.7	377.1	5.02
S7	366.4	94.6	271.8	3.87	-	-	-	-
S8					470.8	90.2	380.6	5.22

Figure 3.7: Sensitivity Test Benefit Cost Ratios for Phase 2 Options



3.8.4 It is apparent from the above figures that Sensitivity test 1 (20% change in demand) leads to the greatest changes in the scheme's BCR. This is because all the appraisal benefits are a direct product of the overall demand in the corridor. The mode choice model simply calculates a share of the overall demand travelling by rail in the Do-Minimum and Do-Something scenarios. This test highlights that changes in demand for travel have a marked influence on the value for money of the scheme. The reason for the different scale of impact on the BCR whether you increase or decrease demand is due to the fact that some benefits get allocated to the PVC (i.e. rail revenue) whilst all other benefits are in the PVB.

3.8.5 It is worth noting that in the Phase 2 options, when the demand increases by 20% the Franchise-based option (T2) now produces a better BCR than the Concession-based option. Further analysis of this has identified that the same impact occurs with the Phase 1 options when demand is increased by between 25% and 30%. The reason this occurs is due to the fact that revenue makes up a greater proportion of scheme costs in the Franchise-based options, so as revenue increases there comes a point within the BCR calculation (which is more sensitive to changes in the PVC as the denominator in the calculation) that increases in revenue (demand) has a proportionally greater impact than with the Concession-based options.

3.8.6 Changes in capital costs also lead to significant variations of the scheme's BCR. However, the tests reveal that an increase of 20% in the capital costs does not impact on the value for money categorisation of the scheme – with all BCRs remaining above 2.0. This demonstrates the potential impact that the capital cost has on the value for money of the scheme and the degree to which capital costs can fluctuate without altering the value for money categorisation. Construction costs constitute the largest component of the PVC, also driving renewals. In this sense, it must be noted that the optimism bias applied in the appraisal (in accordance with the TAG guidelines), alongside the QRA costs, reduces the risk of underestimating the eventual scheme costs.

3.8.7 A 20% increase or reduction in fuel costs can be expected to trigger a relatively small change in the scheme's BCR as indicated by sensitivity test 3.

3.8.8 The operation of a 3-car diesel fleet in Option T1, rather than a 2-car diesel fleet with peak strengthening, reduces the BCR from 2.47 to 2.31, reflecting a circa 10% increase in annual operating costs. In Option T2 the increase in operating costs is proportionally greater given the greater amount of train miles involved, and thus the BCR for T2 reduces from 3.82 to 3.24. In the Concession-based Option A1, altering the fleet composition from 3-car battery trains to 2-car battery trains (with peak strengthening) reduces the annual operating costs by 13%, which is reflected in the BCR increasing from 2.67 to 2.91. In Option A2 the same test increases the BCR from 4.12 to 4.77. These tests therefore demonstrate that the different rolling stock assumptions do not significantly alter the overall scheme's value for money categorisation.

3.8.9 The impacts of incorporating renewals costs saved by Network Rail as a result of the scheme investment are explored in Sensitivity test 6. This has been undertaken by reducing the scheme's renewals costs by 10% (S6a), 30% (S6b) or 50% (S6c), as a proxy for any savings on committed renewals that might be able to be captured by the scheme. In all cases, across both the Phase 1 and Phase 2 options, the BCRs increase in increments as the renewals costs are reduced. A renewals costs saving of 30% in Option T2 moves that option's BCR into the 'very high' value for money categorisation. The impacts of renewals costs savings will be developed in greater detail through the Design Stage.

3.8.10 The operation of the new diesel train services in Options T1 and T2 produce additional Greenhouse Gas emissions that outweigh any emissions savings from modal transfer from car to rail. This is over the scheme appraisal period, where the assumption is that diesel train operation continues throughout the 60 year period. However, in reality, and in line with current government policy, the operation of diesel-only trains is expected to be eradicated by 2040. Therefore, Sensitivity test 7 has looked at how the Greenhouse gas emissions alter for Options T1 and T2 based on this happening.

3.8.11 The changes in Greenhouse Gases monetised benefits are presented in Table 3.27. The level of disbenefits associated with the operation of the new trains reduces considerably, as the replacement of diesel trains by electric trains in 2040 switches the Greenhouse Gases emissions from the non-traded to the traded sector of emissions. As a result, the BCR for Option T1 increases slightly from 2.47 to 2.50, whilst the BCR for Option T2 increases from 3.82 to 3.87.

Table 3.27: Greenhouse Gases related benefits over the scheme life

Option	Test	Total Scheme Life Monetary Value, £m Present Value		
		Non-Traded Benefits due to reduced Car-km	*Non-Traded Disbenefits due to additional trains*	Non-Traded Net (dis)benefits
T1	*Core option*	*2.26*	*-4.52*	-2.25
T1	*S7*	*2.26*	*-1.18*	1.08
T2	*Core option*	*3.16*	*-6.81*	-3.65
T2	*S7*	*3.16*	*-1.62*	1.54

3.8.13 Sensitivity test 8 was undertaken to assess the impacts of a 20% reduction in the overall annual operating costs for the Concession-based scenarios, reflecting the potential opportunities that might exist to bring down the operating costs that have been determined through some initial market testing to inform this OBC. The impact of reducing the operating costs in Option A1 are to increase the BCR from 2.67 to 3.14. In Option A2 the BCR increases from 4.12 to 5.22.

Appendix A Risk Register

Northumberland Line Risk Register - Demand & Appraisal													
No.	Risk Title	Risk Description (actual or potential)	Date Created	Before Mitigation			Mitigation	Actionee	After Mitigation			Risk Status (Open/Closed)
				Likelihood	Consequence	Risk Level			Likelihood	Consequence	Risk Level	
RDA01	Base Demand	Base demand data used in modelling based on relatively old data, including Census JTW 2011. Factors used to expand data to represent other journey purposes and time periods. Potentially resulting in base demand data that is not fully representative of today's movements in the study corridor.		Possible	Major	High	Source factors from robust data. Benchmark outputs against observed data. Test impacts of decisions made at each stage of demand model development. Ensure robust model validation.		Unlikely	Major	Medium	Closed
RDA02	Walk-in catchments	Zoning used in model for SOBC is misrepresentative of true walk-in catchments. They have not been updated since early modelling and station locations have changed. Leads to poor results interpretation (eg: demand for car park spaces).		Possible	Minor	Low	Re-work the zoning in the model for OBC - add more zones following site visit.		Unlikely	Minor	Low	Closed
RDA03	External demand	Uplift demand factors are not representative of likely demand between the ABT corridor and external destinations		Possible	Moderate	Medium	Ensure basis for deriving the uplift factor is both relevant and robust. Use of observed data from existing rail corridor with similar characteristics (ie use LENNON data from Tyne Valley Line). Make adjustments to allow for local particulars (eg: Morpeth).		Unlikely	Minor	Low	closed
RDA04	Induced demand	Uplift demand factors are not representative of likely new demand to be generated by the new rail service		Possible	Moderate	Medium	Ensure basis for deriving the induced demand uplift factor is based on a robust set of evidence. Base on evidence from Borders Rail Line post-implementation studies.		Unlikely	Minor	Low	closed
RDA05	Calculation of car park sizes	Estimation of car park sizes at each station (an input to design and costs for the scheme) are inaccurate, given thay are based on a set of assumptions and use of an unconstrained demand model.		Probable	Minor	Medium	Increase the number of zones in the demand model, and tighten up the walk-in catchment zone. Use the most robust set of assumptions possible to convert the demand model outputs into demand for car park spaces.		Likely	Minor	Medium	open
RDA06	Calculation of train length requirements	Estimation of peak train length requirements (an input to design and costs for the scheme - platform length requirements) are inaccurate, given thay are based on a set of assumptions and use of an unconstrained demand model.		Possible	Minor	Low	Updated demand model for the OBC with better representation of peak demand flows. Use of more robust assumptions to translate and allocate peak demand across individual trains.		Unlikely	Minor	Low	open
RDA07	Demand growth	Reliance on mode-choice model in future years to determine rail demand growth, combined with use of TEMPRO-based forecasts, results in relatively low rates of growth (compared to rail industry growth rates). Noting that demand growth is capped in appraisal (2039 in this case).		Probable	Moderate	High	This is a function of the modelling tools being used and input data sources in line with guidance. This will be acknowledged in the OBC. We will have an option in the OBC to undertake a sensitivity test that uses an alternative growth rate that pivots off the base year (2018) mode choice model (sourced from DfT/Network Rail). Whether we undertake this sensitivity test will depend upon the emerging scheme appraisal results *[post risk register note: appraisal results demonstrate high value for money using core modelled growth, so no immediate reason to undertake this sensitivity test]* .		Probable	Minor	Medium	Closed

Northumberland Line Risk Register - Demand & Appraisal													
No.	Risk Title	Risk Description (actual or potential)	Date Created	Before Mitigation			Mitigation	Actionee	After Mitigation			Risk Status (Open/Closed)
				Likelihood	Consequence	Risk Level			Likelihood	Consequence	Risk Level	
RDA08	Competitive response from bus companies	Demand forecasting does not take into account possible competitive responses from bus company in the study corridor (this could take the form of more or less bus services, changes to fares, service quality, etc). Circa 30% of rail demand estimated to be sourced from bus.		Likely	Minor	Medium	No specific mitigation proposed. Possible sensitivity tests could be considered to demonstrate potential impacts.		Likely	Minor	Medium	closed
RDA9	No crowding model	Demand model functionality does not include the ability to constrain rail demand based on load factors experienced on trains (crowding function), leading to potential over-estimation of rail demand.		Possible	Minor	Low	No mitigation proposed. Incorporation of a crowding function into demand model would be disproportionate. Potential impacts on peak train loadings will be monitored. Where further capacity requirements are identified then additional capacity will be provided - thus the impact will flow through into the scheme appraisal via the additional opex.		Possible	Minor	Low	closed
RDA10	Unconstrained car park demand	Demand model functionality does not include the ability to constrain rail demand based on whether station car parks are full, leading to potential over-estimation of rail demand.		Possible	Minor	Low	No mitigation proposed. Assumption that rail passengers can park their car in the vicinity of a rail station in the event that the car park is full.		Possible	Minor	Low	closed
RDA11	Zone centroids	The location of the zone centroids (which dictates the times and costs for input to the model) are not representative		Possible	Moderate	Medium	Centroid locations have been reviewed in latest update of model. We are now using more and smaller zones, so less margin for misrepresentation. Identification of centroid locations has taken account of local population distributions and access to local public transport.		Unlikely	Minor	Low	closed
RDA12	Time and cost inputs to model	Mode choice model requires a comprehensive dataset of times and costs for each mode for each OD movement in the model, both for the base year and future years. There is an inherent risk surrounding the robustness of this data and the ability to best represent local transport times and costs in the study corridor.		Possible	Moderate	Medium	Ensure that the times and costs have been taken from the best available sources, plus certain variables have to follow WebTAG guidance (acknowledging that the use of generic WebTAG data does not necessarily reflect local study corridor travel conditions).		Possible	Minor	Low	Closed
RDA13	Lack of assignment in model process	Spreadsheet-based demand model with fixed allocation of zones to stations. Risk is that this remains a model limitation (eg: doesn't allow people from Ashington zones to use Bebside P&R station).		Probable	Minor	Medium	Will remain a modelling limitation. However, can be mitigated through use of smaller zones in new version of the model and allowing different allocations via CA and NCA elements of the demand. Not expected to have much impact on the overall outcomes for the scheme, but needs to be acknowledged when looking at impacts at individual stations.		Likely	Minor	Medium	closed
RDA15	Operating costs	Operating costs that feed into the scheme appraisal are founded on poor data and therefore unrealistic.		Possible	Moderate	Medium	Ensure that the operating costs: - are based on actual TOC rates (supplied by Northern) and NwR data - contingency is buit in (we include a %age uplift) - are benchmarked and re-assessed by Northern for OBC - include sensitivity testing in appraisal		Unlikely	Minor	Low	Closed

Appendix B Timetables

Infrastructure Phase 1 with class 170 (Option T1)

Northbound

			1	2	3	4	5	6	7	8	9	10	11	12
Formed By							2B00AA		2B01AA			2B03AA	2B04AA	
Signal ID			6A13AA	5A00XX	5A02XX	6A00AA	2A00AA	6A01AA	2A01AA	6Z14AA	6A02AA	2A03AA	2A04AA	6A03AA
Orig. Dep. Time			23.09	05+00	06+03½	06.12½	06.30	07.05	07.30	08.02½	07.57	08.31	08.59	09.11
Orig. Loc. Name			Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Bedl'Ton Furnaceway Sdgs	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn
Dest. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Bedlington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)
Timing Load			60H66S24	170	170	60H66S24	170	60H66S24	170	60H66S24	60H66S24	170	170	60H66S24
Operating Characteristics														
TOC			PE	ED	ED	PE	ED	PE	ED	PE	PE	ED	ED	PE
Day of Operation			ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO
Changes			New	New	New	New	New	New	New	New	New	New	New	New
To Form														
Newcastle	plt	1	...	1	1	...	1	...	1	...	...	1	1	...
	dep	2	...	05+00	06+03½	...	06.30	...	07.30	...	...	08.31	08.59	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...			...		...		...	...			...
Manors	arr	5	...	...	...	...	06.31½	...	07.31½	...	...	08.32½	...	...
	plt	6	...	...	...	...	...	...	...	...	...	...	...	...
	dep	7	...	...	...	...	06.32½	...	07.32½	...	...	08.33½	...	...
	dep-line	8	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	9	...	...	...	...	...	...	...	...	...	...	...	...
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	...	05/03	06/06½	...	06/34½	...	07/34½	...	...	08/35½	09/02	...
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13	...			...		...		...	...			...
Benton Nth Jn	plt	14	...	DM	DM	...	DM	...	DM	...	...	DM	DM	...
	dep	15	...	05/05½	06/09	06/19	06/37	07/11½	07/37	...	08/03½	08/38	09/04½	09/17½
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	...		(6)	(3½)		(5½)		...		(2)	(2½)	(20)
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	...	05/07½	06/17	06/25	06/39	07/19½	07/39	...	08/06	08/42	09/09	09/40
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21	...							...				
Northumberland Parkway	arr	22	...	...	...	...	06.41	...	07.41	...	...	08.44	09.11	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	...	05/09½	06/19	06/28	06.41½	07/22½	07.41½	...	08/09	08.44½	09.11½	09/43
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26	...							...				
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	...	05/11	06/20½	06/29½	06/43	07/24	07/43	...	08/10½	08/46	09/13	09/44½
	dep-line	29	...	...	...	LL	RL	LL	RL	...	LL	RL	RL	LL
	mgn	30	...							...				
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	...	05/12½	06/22	06/32	06/44½	07/26½	07/44½	...	08/13	08/47½	09/14½	09/47
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34	...							...				
Seaton Delaval	plt	35	...	...	...	...	...	...	...	...	...	...	...	...
	dep	36	...	05/13½	06/23	06/33	06/45½	07/27½	07/45½	...	08/14	08/48½	09/15½	09/48
	dep-line	37	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	38	...							...				
Hartley North	plt	39	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	...	05/15½	06/25	06/35½	06/47½	07/30	07/47½	...	08/16½	08/50½	09/17½	09/50½
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42	...							...				
Newsham	arr	43	...	...	...	...	06.49	...	07.49	...	...	08.52	09.19	...
	plt	44	...	...	...	...	...	...	...	...	...	...	...	...
	dep	45	...	05/17	06/26½	06/37½	06.50	07/32	07.50	...	08/18½	08.53	09.20	09/52½
	dep-line	46	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	47	...							...				
Blyth Parkway	plt	48	...	...	...	...	...	...	...	...	...	...	...	...
	dep	49	...	05/19½	06/29	06/41	06/53	07/35½	07/53	...	08/22	08/56	09/23	09/56
	dep-line	50	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	51	...							...				
Bedl'Ton Furnaceway Sdgs	plt	52	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	...	...	...	...	...	...	...	08.02½	...	...	...	...
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55	...	...	...	...	...	...	...	...	...	...	...	...
Bedlington	arr	56	...	...	...	...	06.55	...	07.55	08/04	...	08.58	09.25	...
	plt	57	...	...	...	...	...	...	...	...	...	...	...	...
	dep	58	...	05/21	06/30½	06/43½	06.56	07/38	07.56	...	08/24½	08.59	09.26	09/58½
	dep-line	59	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	60	...					(4)		...				
West Sleekburn Jn	arr	61	...	...	...	...	...	...	...	...	...	...	...	...
	plt	62	...	...	...	...	...	...	...	...	...	...	...	...
	dep	63	...	05/22½	06/32	06/47½	06/58½	07/46	07/58½	...	08/28½	09/01½	09/28½	10/02½
	dep-line	64	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	65	...							...				
Marcheys House Jn	plt	66	...	...	...	...	...	...	...	...	...	...	...	...
	dep	67	...	05/23	06/32½	06/48½	06/59	07/47	07/59	...	08/29½	09/02	09/29	10/03½
	dep-line	68	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	69	...	<2>						...				
Ashington	arr	70	<---	05+27	06+35	...	07.01½	...	08.01½	...	...	09.04½	09.31½	...
	plt	71	...	BAY	BAY	1	BAY	1	BAY	...	1	BAY	BAY	1
	dep	72	...	...	...	06/51½	...	07/50	...	...	08/32½	...	...	10/06½
	dep-line	73	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	74	...	...	...		...		...	...	{½}	...	...	{½}
Lynemouth Power Stn (FHH)	arr	75	00.00	...	...	07.06½	...	08.05	...	...	08.48	...	...	10.22
	plt	76	...	...	...	...	...	...	...	...	...	...	...	...

			13	14	15	16	17	18	19	20	21	22	23	24
Formed By			2B06AA	2B07AA		2B09AA		2B11AA		2B13AA		2B15AA		2B17AA
Signal ID			2A06AA	2A07AA	6A04AA	2A09AA	6A05AA	2A11AA	6A06AA	2A13AA	6A07AA	2A15AA	6A08AA	2A17AA
Orig. Dep. Time			09.58	10.30½	11.09	11.28	12.08	12.30	12.46	13.28	13.40	14.32½	15.09	15.31
Orig. Loc. Name			Newcastle	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle
Dest. Loc. Name			Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington
Timing Load			170	170	60H66S24	170	60H66S24	170	60H66S24	170	60H66S24	170	60H66S24	170
Operating Characteristics														
TOC			ED	ED	PE	ED	PE	ED	PE	ED	PE	ED	PE	ED
Day of Operation			ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO
Changes			New	New	New	New	New	New	New	New	New	New	New	New
To Form														
Newcastle	plt	1	5	1	...	1	...	1	...	1	...	1	...	1
	dep	2	09.58	10.30½	...	11.28	...	12.30	...	13.28	...	14.32½	...	15.31
	dep-line	3	SL	...	...	...	...	...	...	...	...	...	...	...
	mgn	4			...		...		...		...		...	
Manors	arr	5	...	10.32	...	11.29½	...	12.31½	...	13.29½	...	14.34	...	15.32½
	plt	6	...	...	...	...	...	...	...	...	...	...	...	...
	dep	7	...	10.33	...	11.30½	...	12.32½	...	13.30½	...	14.35	...	15.33½
	dep-line	8	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	9	...		...	(½)	...		...		...		...	
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	10/01½	10/35	...	11/33	...	12/34½	...	13/32½	...	14/37	...	15/35½
	dep-line	12	ML	...	...	...	...	...	...	...	...	...	...	...
	mgn	13	<½>		...		...		...		...		...	
Benton Nth Jn	plt	14	DM	DM	...	DM	...	DM	...	DM	...	DM	...	DM
	dep	15	10/04½	10/37½	11/15½	11/35½	12/14½	12/37	12/52½	13/35	13/46½	14/39½	15/15½	15/38
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	(2½)	(½)	(2)		(2)		(13)		(18)		(3)	(1)
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	10/09	10/40	11/20	11/37½	12/19	12/39	13/08	13/37	14/07	14/41½	15/21	15/41
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21												
Northumberland Parkway	arr	22	10.11	10.42	...	11.39½	...	12.41	...	13.39	...	14.43½	...	15.43
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	10.11½	10.42½	11/23	11.40	12/22	12.41½	13/11	13.39½	14/10	14.44	15/24	15.43½
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26												
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	10/13	10/44	11/24½	11/41½	12/23½	12/43	13/12½	13/41	14/11½	14/45½	15/25½	15/45
	dep-line	29	RL	RL	LL	RL	LL	RL	LL	RL	LL	RL	LL	RL
	mgn	30												
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	10/14½	10/45½	11/27	11/43	12/26	12/44½	13/15	13/42½	14/14	14/47	15/28	15/46½
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34												
Seaton Delaval	plt	35	...	...	...	...	...	...	...	...	...	...	...	...
	dep	36	10/15½	10/46½	11/28	11/44	12/27	12/45½	13/16	13/43½	14/15	14/48	15/29	15/47½
	dep-line	37	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	38												
Hartley North	plt	39	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	10/17½	10/48½	11/30½	11/46	12/29½	12/47½	13/18½	13/45½	14/17½	14/50	15/31½	15/49½
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42												
Newsham	arr	43	10.19	10.50	...	11.47½	...	12.49	...	13.47	...	14.51½	...	15.51
	plt	44	...	...	...	...	...	...	...	...	...	...	...	...
	dep	45	10.20	10.51	11/32½	11.48½	12/31½	12.50	13/20½	13.48	14/19½	14.52½	15/33½	15.52
	dep-line	46	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	47												
Blyth Parkway	plt	48	...	...	...	...	...	...	...	...	...	...	...	...
	dep	49	10/23	10/54	11/36	11/51½	12/35	12/53	13/24	13/51	14/23	14/55½	15/37	15/55
	dep-line	50	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	51												
Bedl'Ton Furnaceway Sdgs	plt	52	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	...	...	...	...	...	...	...	...	...	...	...	...
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55	...	...	...	...	...	...	...	...	...	...	...	...
Bedlington	arr	56	10.25	10.56	...	11.53½	...	12.55	...	13.53	...	14.57½	...	15.57
	plt	57	...	...	...	...	...	...	...	...	...	...	...	...
	dep	58	10.26	10.57	11/38½	11.54½	12/37½	12.56	13/26½	13.54	14/25½	14.58½	15/39½	15.58
	dep-line	59	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	60			(3½)		(6½)						(5½)	
West Sleekburn Jn	arr	61	...	...	...	...	...	...	...	...	...	...	...	...
	plt	62	...	...	...	...	...	...	...	...	...	...	...	...
	dep	63	10/28½	10/59½	11/46	11/57	12/48	12/58½	13/30½	13/56½	14/29½	15/01	15/49	16/00½
	dep-line	64	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	65												
Marcheys House Jn	plt	66	...	...	...	...	...	...	...	...	...	...	...	...
	dep	67	10/29	11/00	11/47	11/57½	12/49	12/59	13/31½	13/57	14/30½	15/01½	15/50	16/01
	dep-line	68	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	69												
Ashington	arr	70	10.31½	11.02½	...	12.00	...	13.01½	...	13.59½	...	15.04	...	16.03½
	plt	71	BAY	BAY	1	BAY	1	BAY	1	BAY	1	BAY	1	BAY
	dep	72	...	...	11/50	...	12/52	...	13/34½	...	14/33½	...	15/53	...
	dep-line	73	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	74	...	...	{½}	...	{½}	...	{½}	...	{½}	...	{½}	...
Lynemouth Power Stn (FHH)	arr	75	...	...	12.05½	...	13.07½	...	13.50	...	14.49	...	16.08½	...
	plt	76	...	...	...	...	...	...	...	...	...	...	...	...

			25	26	27	28	29	30	31	32	33	34	35	36	37
Formed By				2B19AA	2B21AA	2B22AA	2B24AA	2B26AA			2B27AA		2B28AA		
Signal ID			6A09AA	2A19AA	2A21AA	2A22BB	2A24AA	2A26AA	6Z16AA	6A10AA	2A27AA	6A11AA	2A28AA	6A12AA	6A13AA
Orig. Dep. Time			16.15½	16.30	17.30	18.00	18.59	19.57	20.29½	20.12	20.56	21.05	21.59	22.09	23.09
Orig. Loc. Name			Heaton North Jn	Newcastle	Newcastle	Newcastle	Newcastle	Newcastle	Bedl'Ton Furnaceway Sdgs	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Heaton North Jn
Dest. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Ashington	Ashington	West Sleekburn Jn	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Lynemouth Power Stn (FHH)
Timing Load			60H66S24	170	170	170	170	170	60H66S24	60H66S24	170	60H66S24	170	60H66S24	60H66S24
Operating Characteristics															
TOC			PE	ED	ED	ED	ED	ED	PE	PE	ED	PE	ED	PE	PE
Day of Operation			ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New
To Form															
Newcastle	plt	1	...	1	1	1	1	1	...	...	1	...	1	...	...
	dep	2	...	16.30	17.30	18.00	18.59	19.57	...	...	20.56	...	21.59	...	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...						...	...		...		...	...
Manors	arr	5	...	16.31½	17.31½	...	19.00½	19.58½	...	...	20.57½	...	22.00½	...	...
	plt	6	...	...	...	...	...	2	...	...	...	...	...	...	...
	dep	7	...	16.32½	17.32½	...	19.01½	19.59	...	...	20.58½	...	22.01½	...	...
	dep-line	8	...	...	...	...	ML	...	...	...	ML	...	ML	...	...
	mgn	9	...			...			...	...		...		...	...
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	...	16/34½	17/34½	18/03	19/03½	20/01	...	...	21/00½	...	22/03½	...	...
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13	...						...	...		...		...	...
Benton Nth Jn	plt	14	...	DM	DM	DM	DM	DM	...	...	DM	...	DM	...	...
	dep	15	16/22	16/37	17/37	18/05½	19/06	20/03½	...	20/18½	21/03	21/11½	22/06	22/15½	23/15½
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17							...	(17)	(2)	(26)	(1)	(23)	
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	16/24½	16/39	17/39	18/07½	19/08	20/05½	...	20/38	21/07	21/40	22/09	22/41	23/18
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21							...						
Northumberland Parkway	arr	22	...	16.41	17.41	18.09½	19.10	20.07½	...	...	21.09	...	22.11	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	16/27½	16.41½	17.41½	18.10	19.10½	20.08	...	20/41	21.09½	21/43	22.11½	22/44	23/21
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26							...						
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	16/29	16/43	17/43	18/11½	19/12	20/09½	...	20/42½	21/11	21/44½	22/13	22/45½	23/22½
	dep-line	29	LL	RL	RL	RL	RL	RL	...	LL	RL	LL	RL	LL	LL
	mgn	30							...						
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	16/31½	16/44½	17/44½	18/13	19/13½	20/11	...	20/45	21/12½	21/47	22/14½	22/48	23/25
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34							...						
Seaton Delaval	plt	35	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	36	16/32½	16/45½	17/45½	18/14	19/14½	20/12	...	20/46	21/13½	21/48	22/15½	22/49	23/26
	dep-line	37	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	38							...						
Hartley North	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	16/35	16/47½	17/47½	18/16	19/16½	20/14	...	20/48½	21/15½	21/50½	22/17½	22/51½	23/28½
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42							...						
Newsham	arr	43	...	16.49	17.49	18.17½	19.18	20.15½	...	...	21.17	...	22.19	...	...
	plt	44	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	45	16/37	16.50	17.50	18.18½	19.19	20.16½	...	20/50½	21.18	21/52½	22.20	22/53½	23/30½
	dep-line	46	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	47							...						
Blyth Parkway	plt	48	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	49	16/40½	16/53	17/53	18/21½	19/22	20/19½	...	20/54	21/21	21/56	22/23	22/57	23/34
	dep-line	50	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	51							...						
Bedl'Ton Furnaceway Sdgs	plt	52	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	...	...	...	...	...	...	20.29½	...	...	...	...	...	...
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55	...	...	...	...	...	...		...	...	...	...	...	...
Bedlington	arr	56	...	16.55	17.55	18.23½	19.24	20.21½	...	...	21.23	...	22.25	...	...
	plt	57	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	58	16/43	16.56	17.56	18.24½	19.25	20.22½	20/31	20/56½	21.24	21/58½	22.26	22/59½	23/36½
	dep-line	59	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	60	(3)												
West Sleekburn Jn	arr	61	...	...	...	...	...	...	20/35	...	...	...	...	...	...
	plt	62	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	63	16/50	16/58½	17/58½	18/27	19/27½	20/25	...	21/00½	21/26½	22/02½	22/28½	23/03½	23/40½
	dep-line	64	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	65							...						
Marcheys House Jn	plt	66	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	67	16/51	16/59	17/59	18/27½	19/28	20/25½	...	21/01½	21/27	22/03½	22/29	23/04½	23/41½
	dep-line	68	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	69							...						
Ashington	arr	70	...	17.01½	18.01½	18.30	19.30½	20.28	...	...	21.29½	...	22.31½	...	...
	plt	71	1	BAY	BAY	BAY	BAY	BAY	...	1	BAY	1	BAY	1	1
	dep	72	16/54	...	...	...	...	...	...	21/04½	...	22/06½	...	23/07½	23/44½
	dep-line	73	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	74		...	...	...	...	...	...	{½}	...	{½}	...	{½}	{½}
Lynemouth Power Stn (FHH)	arr	75	17.09	...	...	...	...	...	...	21.20	...	22.22	...	23.23	--->
	plt	76	...	...	...	...	...	...	...	...	...	...	...	...	...

Southbound

			1	2	3	4	5	6	7	8	9	10
Formed By												
Signal ID			2B00AA	6B00AA	2B01AA	6B01AA	6Z18AA	2B03AA	6B02AA	2B04AA	6B03AA	2B06AA
Orig. Dep. Time			05.39	05.32	06.41	06.34	07/05½	07.40	07.49	08.16	08.23	09.14
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	West Sleekburn Jn	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle
Timing Load			**170**	**60H66S24**	**170**	**60H66S24**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**	**170**
Operating Characteristics												
TOC			ED	PE	ED	PE	PE	ED	PE	ED	PE	ED
Day of Operation			**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**
Changes			New	New	New	New	New	New	New	New	New	New
To Form			2A00AA		2A01AA			2A03AA		2A04AA		2A06AA
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...
	dep	2	...	**05.32**	...	**06.34**	...	...	**07.49**	...	**08.23**	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...
	mgn	4	...		...		...	...	{½}	...	{½}	...
Ashington	plt	5	BAY	ML	BAY	ML	...	BAY	ML	BAY	ML	BAY
	dep	6	**05.39**	*05/47*	**06.41**	*06/49*	...	**07.40**	*08/04½*	**08.16**	*08/38½*	**09.14**
	dep-line	7	...	...	...	...	...	...	...	...	...	...
	mgn	8					...					
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...
	dep	10	*05/41½*	*05/50*	*06/43½*	*06/52*	...	*07/42½*	*08/07½*	*08/18½*	*08/41½*	*09/16½*
	dep-line	11	...	...	...	...	...	...	...	...	...	...
	mgn	12					...					
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...
	dep	14	*05/42*	*05/51*	*06/44*	*06/53*	*07/05½*	*07/43*	*08/08½*	*08/19*	*08/42½*	*09/17*
	dep-line	15	...	...	...	...	...	...	...	...	...	...
	mgn	16										
Bedlington	arr	17	**05.44½**	...	**06.46½**	...	...	**07.45½**	...	**08.21½**	...	**09.19½**
	plt	18	...	...	...	...	...	...	...	...	...	...
	dep	19	**05.45½**	*05/53*	**06.47½**	*06/55*	*07/07½*	**07.46½**	*08/10½*	**08.22½**	*08/44½*	**09.20½**
	dep-line	20	...	...	...	...	...	...	...	...	...	...
	mgn	21										
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	**07.10**	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	plt	24	...	...	...	...	...	...	...	...	...	...
	dep	25	*05/47½*	*05/57*	*06/49½*	*06/59*	...	*07/48½*	*08/14½*	*08/24½*	*08/48½*	*09/22½*
	dep-line	26	...	...	...	...	...	...	...	...	...	...
	mgn	27					...					
Newsham	arr	28	**05.50**	...	**06.52**	...	...	**07.51**	...	**08.27**	...	**09.25**
	plt	29	...	...	...	...	...	...	...	...	...	...
	dep	30	**05.51**	*06/00½*	**06.53**	*07/02½*	...	**07.52**	*08/18*	**08.28**	*08/52*	**09.26**
	dep-line	31	...	...	...	...	...	...	...	...	...	...
	mgn	32					...					
Hartley North	plt	33	...	...	...	...	...	...	...	...	...	...
	dep	34	*05/53*	*06/02*	*06/55*	*07/04*	...	*07/54*	*08/19½*	*08/30*	*08/53½*	*09/28*
	dep-line	35	...	...	...	...	...	...	...	...	...	...
	mgn	36					...					
Seaton Delaval	plt	37	...	...	...	...	...	...	...	...	...	...
	dep	38	*05/55*	*06/05½*	*06/57*	*07/07½*	...	*07/56*	*08/23*	*08/32*	*08/57*	*09/30*
	dep-line	39	...	...	...	...	...	...	...	...	...	...
	mgn	40					...					
Segill	plt	41	...	...	...	...	...	...	...	...	...	...
	dep	42	*05/56*	*06/07*	*06/58*	*07/09*	...	*07/57*	*08/24½*	*08/33*	*08/58½*	*09/31*
	dep-line	43	RL	RL	RL	RL	...	RL	RL	RL	RL	RL
	mgn	44					...					
Holywell LC	plt	45	...	...	...	...	...	...	...	...	...	...
	dep	46	*05/58*	*06/09½*	*07/00*	*07/11½*	...	*07/59*	*08/27*	*08/35*	*09/01*	*09/33*
	dep-line	47	...	...	...	...	...	...	...	...	...	...
	mgn	48					...					
Northumberland Parkway	arr	49	**05.59½**	...	**07.01½**	...	...	**08.00½**	...	**08.36½**	...	**09.34½**
	plt	50	...	...	...	...	...	...	...	...	...	...
	dep	51	**06.00**	*06/11½*	**07.02**	*07/13½*	...	**08.01**	*08/29*	**08.37**	*09/03*	**09.35**
	dep-line	52	...	...	...	...	...	...	...	...	...	...
	mgn	53					...					
Benton East Jn	plt	54	...	...	...	...	...	...	...	...	...	...
	dep	55	*06/02*	*06/14½*	*07/04*	*07/16½*	...	*08/03*	*08/32*	*08/39*	*09/06*	*09/37*
	dep-line	56	...	...	...	...	...	...	...	...	...	...
	mgn	57	(2)	(12)		(6)	...	<2>	(1½)		(16½)	(1)
Benton Nth Jn	plt	58	...	...	...	...	...	...	...	...	...	...
	dep	59	*06/06*	*06/28½*	*07/06*	*07/24½*	...	*08/07*	*08/35½*	*08/41*	*09/24½*	*09/40*
	dep-line	60	...	...	...	...	...	...	...	...	...	...
	mgn	61	[1]		[1]		...	[1]		[1]		[1],{½}
Heaton Sth. Jn.	arr	62	...	**06.34**	...	**07.30**	...	...	**08.41**	...	**09.30**	...
	plt	63	...	...	...	...	...	...	...	...	...	...
	dep	64	*06/09½*	...	*07/09½*	...	...	*08/10½*	...	*08/44½*	...	*09/44*
	dep-line	65	...	...	...	...	...	...	...	...	...	SL
	mgn	66		...		...	...		...		...	{½}
Manors	arr	67	**06.11**	...	**07.11**	...	...	**08.12**	...	**08.46**	...	...
	plt	68	...	...	...	...	...	...	...	...	...	...
	dep	69	**06.12**	...	**07.12**	...	...	**08.13**	...	**08.47**	...	...
	dep-line	70	...	...	...	...	...	...	...	...	...	...
	mgn	71	{½}	...	{½}	...	...	{½}	...	{½}	...	...
Newcastle	arr	72	**06.14**	...	**07.14**	...	...	**08.15**	...	**08.49**	...	**09.48**
	plt	73	1	...	1	...	...	1	...	1	...	5

			11	12	13	14	15	16	17	18	19	20
Formed By												
Signal ID			2B07AA	6B04AA	2B09AA	6B05AA	2B11AA	6B06AA	2B13AA	6B07AA	2B15AA	6B08AA
Orig. Dep. Time			09.43	09.54	10.41	10.34	11.40	11.33	12.42	12.51	13.41	13.50
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.
Timing Load			**170**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**
Operating Characteristics												
TOC			ED	PE	ED	PE	ED	PE	ED	PE	ED	PE
Day of Operation			**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**
Changes			New	New	New	New	New	New	New	New	New	New
To Form			2A07AA		2A09AA		2A11AA		2A13AA		2A15AA	
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...
	dep	2	...	**09.54**	...	**10.34**	...	**11.33**	...	**12.51**	...	**13.50**
	dep-line	3	...	...	...	...	...	...	...	...	...	...
	mgn	4	...	{½}	...	{½}	...	{½}	...	{½}	...	{½}
Ashington	plt	5	BAY	ML	BAY	ML	BAY	ML	BAY	ML	BAY	ML
	dep	6	**09.43**	*10/09½*	**10.41**	*10/49½*	**11.40**	*11/48½*	**12.42**	*13/06½*	**13.41**	*14/05½*
	dep-line	7	...	...	...	...	...	...	...	...	...	...
	mgn	8										
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...
	dep	10	*09/45½*	*10/12½*	*10/43½*	*10/52½*	*11/42½*	*11/51½*	*12/44½*	*13/09½*	*13/43½*	*14/08½*
	dep-line	11	...	...	...	...	...	...	...	...	...	...
	mgn	12										
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...
	dep	14	*09/46*	*10/13½*	*10/44*	*10/53½*	*11/43*	*11/52½*	*12/45*	*13/10½*	*13/44*	*14/09½*
	dep-line	15	...	...	...	...	...	...	...	...	...	...
	mgn	16										
Bedlington	arr	17	**09.48½**	...	**10.46½**	...	**11.45½**	...	**12.47½**	...	**13.46½**	...
	plt	18	...	...	...	...	...	...	...	...	...	...
	dep	19	**09.49½**	*10/15½*	**10.47½**	*10/55½*	**11.46½**	*11/54½*	**12.48½**	*13/12½*	**13.47½**	*14/11½*
	dep-line	20	...	...	...	...	...	...	...	...	...	...
	mgn	21										
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	plt	24	...	...	...	...	...	...	...	...	...	...
	dep	25	*09/51½*	*10/19½*	*10/49½*	*10/59½*	*11/48½*	*11/58½*	*12/50½*	*13/16½*	*13/49½*	*14/15½*
	dep-line	26	...	...	...	...	...	...	...	...	...	...
	mgn	27										
Newsham	arr	28	**09.54**	...	**10.52**	...	**11.51**	...	**12.53**	...	**13.52**	...
	plt	29	...	...	...	...	...	...	...	...	...	...
	dep	30	**09.55**	*10/23*	**10.53**	*11/03*	**11.52**	*12/02*	**12.54**	*13/20*	**13.53**	*14/19*
	dep-line	31	...	...	...	...	...	...	...	...	...	...
	mgn	32										
Hartley North	plt	33	...	...	...	...	...	...	...	...	...	...
	dep	34	*09/57*	*10/24½*	*10/55*	*11/04½*	*11/54*	*12/03½*	*12/56*	*13/21½*	*13/55*	*14/20½*
	dep-line	35	...	...	...	...	...	...	...	...	...	...
	mgn	36										
Seaton Delaval	plt	37	...	...	...	...	...	...	...	...	...	...
	dep	38	*09/59*	*10/28*	*10/57*	*11/08*	*11/56*	*12/07*	*12/58*	*13/25*	*13/57*	*14/24*
	dep-line	39	...	...	...	...	...	...	...	...	...	...
	mgn	40										
Segill	plt	41	...	...	...	...	...	...	...	...	...	...
	dep	42	*10/00*	*10/29½*	*10/58*	*11/09½*	*11/57*	*12/08½*	*12/59*	*13/26½*	*13/58*	*14/25½*
	dep-line	43	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL
	mgn	44										
Holywell LC	plt	45	...	...	...	...	...	...	...	...	...	...
	dep	46	*10/02*	*10/32*	*11/00*	*11/12*	*11/59*	*12/11*	*13/01*	*13/29*	*14/00*	*14/28*
	dep-line	47	...	...	...	...	...	...	...	...	...	...
	mgn	48										
Northumberland Parkway	arr	49	**10.03½**	...	**11.01½**	...	**12.00½**	...	**13.02½**	...	**14.01½**	...
	plt	50	...	...	...	...	...	...	...	...	...	...
	dep	51	**10.04**	*10/34*	**11.02**	*11/14*	**12.01**	*12/13*	**13.03**	*13/31*	**14.02**	*14/30*
	dep-line	52	...	...	...	...	...	...	...	...	...	...
	mgn	53										
Benton East Jn	plt	54	...	...	...	...	...	...	...	...	...	...
	dep	55	*10/06*	*10/37*	*11/04*	*11/17*	*12/03*	*12/16*	*13/05*	*13/34*	*14/04*	*14/33*
	dep-line	56	...	...	...	...	...	...	...	...	...	...
	mgn	57		(2)		(4½)		(4½)	<2>	(24½)	<2>	(21)
Benton Nth Jn	plt	58	...	...	...	...	...	...	...	...	...	...
	dep	59	*10/08*	*10/41*	*11/06*	*11/23½*	*12/05*	*12/22½*	*13/09*	*14/00½*	*14/08*	*14/56*
	dep-line	60	...	...	...	...	...	...	...	...	...	...
	mgn	61	[1]		[1]		[1]		[1]		[1]	{½}
Heaton Sth. Jn.	arr	62	...	**10.46½**	...	**11.29**	...	**12.28**	...	**14.06**	...	**15.02**
	plt	63	...	...	...	...	...	...	...	...	...	...
	dep	64	*10/11½*	...	*11/09½*	...	*12/08½*	...	*13/12½*	...	*14/11½*	...
	dep-line	65	...	...	...	...	...	...	...	...	...	...
	mgn	66		...		...		...		...		...
Manors	arr	67	**10.13**	...	**11.11**	...	**12.10**	...	**13.14**	...	**14.13**	...
	plt	68	...	...	...	...	...	...	...	...	...	...
	dep	69	**10.14**	...	**11.12**	...	**12.11**	...	**13.15**	...	**14.14**	...
	dep-line	70	...	...	...	...	...	...	...	...	...	...
	mgn	71	{½}	...	{½}	...	{½}	...	{½}	...	{½}	...
Newcastle	arr	72	**10.16**	...	**11.14**	...	**12.13**	...	**13.17**	...	**14.16**	...
	plt	73	1	...	1	...	1	...	1	...	1	...

			21	22	23	24	25	26	27	28	29	30
Formed By												
Signal ID			2B17AA	6B09AA	2B19AA	6B10AA	2B21AA	6B11AA	2B22AA	6B12AA	2B24AA	6B13AA
Orig. Dep. Time			14.42	14.35	15.43	15.39	16.44	16.37	17.13	17.22	18.13	18.21
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.
Timing Load			**170**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**
Operating Characteristics												
TOC			ED	PE	ED	PE	ED	PE	ED	PE	ED	PE
Day of Operation			**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**
Changes			New	New	New	New	New	New	New	New	New	New
To Form			2A17AA		2A19AA		2A21AA		2A22BB		2A24AA	
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...
	dep	2	...	**14.35**	...	**15.39**	...	**16.37**	...	**17.22**	...	**18.21**
	dep-line	3	...	...	...	...	...	...	...	...	...	...
	mgn	4	...	{½}	...		...		...		...	
Ashington	plt	5	BAY	ML	BAY	ML	BAY	ML	BAY	ML	BAY	ML
	dep	6	**14.42**	*14/50½*	**15.43**	*15/54*	**16.44**	*16/52*	**17.13**	*17/37*	**18.13**	*18/36*
	dep-line	7	...	...	...	...	...	...	...	...	...	...
	mgn	8										
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...
	dep	10	*14/44½*	*14/53½*	*15/45½*	*15/57*	*16/46½*	*16/55*	*17/15½*	*17/40*	*18/15½*	*18/39*
	dep-line	11	...	...	...	...	...	...	...	...	...	...
	mgn	12										
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...
	dep	14	*14/45*	*14/54½*	*15/46*	*15/58*	*16/47*	*16/56*	*17/16*	*17/41*	*18/16*	*18/40*
	dep-line	15	...	...	...	...	...	...	...	...	...	...
	mgn	16										
Bedlington	arr	17	**14.47½**	...	**15.48½**	...	**16.49½**	...	**17.18½**	...	**18.18½**	...
	plt	18	...	...	...	...	...	...	...	...	...	...
	dep	19	**14.48½**	*14/56½*	**15.49½**	*16/00*	**16.50½**	*16/58*	**17.19½**	*17/43*	**18.19½**	*18/42*
	dep-line	20	...	...	...	...	...	...	...	...	...	...
	mgn	21										
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	plt	24	...	...	...	...	...	...	...	...	...	...
	dep	25	*14/50½*	*15/00½*	*15/51½*	*16/04*	*16/52½*	*17/02*	*17/21½*	*17/47*	*18/21½*	*18/46*
	dep-line	26	...	...	...	...	...	...	...	...	...	...
	mgn	27										
Newsham	arr	28	**14.53**	...	**15.54**	...	**16.55**	...	**17.24**	...	**18.24**	...
	plt	29	...	...	...	...	...	...	...	...	...	...
	dep	30	**14.54**	*15/04*	**15.55**	*16/07½*	**16.56**	*17/05½*	**17.25**	*17/50½*	**18.25**	*18/49½*
	dep-line	31	...	...	...	...	...	...	...	...	...	...
	mgn	32										
Hartley North	plt	33	...	...	...	...	...	...	...	...	...	...
	dep	34	*14/56*	*15/05½*	*15/57*	*16/09*	*16/58*	*17/07*	*17/27*	*17/52*	*18/27*	*18/51*
	dep-line	35	...	...	...	...	...	...	...	...	...	...
	mgn	36										
Seaton Delaval	plt	37	...	...	...	...	...	...	...	...	...	...
	dep	38	*14/58*	*15/09*	*15/59*	*16/12½*	*17/00*	*17/10½*	*17/29*	*17/55½*	*18/29*	*18/54½*
	dep-line	39	...	...	...	...	...	...	...	...	...	...
	mgn	40										
Segill	plt	41	...	...	...	...	...	...	...	...	...	...
	dep	42	*14/59*	*15/10½*	*16/00*	*16/14*	*17/01*	*17/12*	*17/30*	*17/57*	*18/30*	*18/56*
	dep-line	43	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL
	mgn	44										
Holywell LC	plt	45	...	...	...	...	...	...	...	...	...	...
	dep	46	*15/01*	*15/13*	*16/02*	*16/16½*	*17/03*	*17/14½*	*17/32*	*17/59½*	*18/32*	*18/58½*
	dep-line	47	...	...	...	...	...	...	...	...	...	...
	mgn	48										
Northumberland Parkway	arr	49	**15.02½**	...	**16.03½**	...	**17.04½**	...	**17.33½**	...	**18.33½**	...
	plt	50	...	...	...	...	...	...	...	...	...	...
	dep	51	**15.03**	*15/15*	**16.04**	*16/18½*	**17.05**	*17/16½*	**17.34**	*18/01½*	**18.34**	*19/00½*
	dep-line	52	...	...	...	...	...	...	...	...	...	...
	mgn	53										
Benton East Jn	plt	54	...	...	...	...	...	...	...	...	...	...
	dep	55	*15/05*	*15/18*	*16/06*	*16/21½*	*17/07*	*17/19½*	*17/36*	*18/04½*	*18/36*	*19/03½*
	dep-line	56	...	...	...	...	...	...	...	...	...	...
	mgn	57		(11½)		(7)		<2½>	(2½)	(18½)	(2)	(17½)
Benton Nth Jn	plt	58	...	...	...	...	...	...	...	...	...	...
	dep	59	*15/07*	*15/31½*	*16/08*	*16/30½*	*17/09*	*17/24*	*17/40½*	*18/25*	*18/40*	*19/23*
	dep-line	60	...	...	...	...	...	...	...	...	...	...
	mgn	61	[1]		[1]		[1]		[1]		[1]	
Heaton Sth. Jn.	arr	62	...	**15.37**	...	**16.36**	...	**17.29½**	...	**18.30½**	...	**19.28½**
	plt	63	...	...	...	...	...	...	...	...	...	...
	dep	64	*15/10½*	...	*16/11½*	...	*17/12½*	...	*17/44*	...	*18/43½*	...
	dep-line	65	...	...	...	...	...	...	...	...	...	...
	mgn	66		...		...		...	{½}	...		...
Manors	arr	67	**15.12**	...	**16.13**	...	**17.14**	...	...	...	**18.45**	...
	plt	68	...	...	...	...	...	...	...	...	...	...
	dep	69	**15.13**	...	**16.14**	...	**17.15**	...	...	...	**18.46**	...
	dep-line	70	...	...	...	...	ML	...	...	...	...	...
	mgn	71	{½}	...	{½}	...	{½}	...	...	...	{½}	...
Newcastle	arr	72	**15.15**	...	**16.16**	...	**17.17**	...	**17.47**	...	**18.48**	...
	plt	73	1	...	1	...	1	...	1	...	1	...

			31	32	33	34	35	36	37	38	39	40
Formed By												
Signal ID			2B26AA	6B14AA	6Z20AA	2B27AA	6B15AA	2B28AA	6B16AA	2B29AA	6B17AA	5B00XX
Orig. Dep. Time			19.11	19.04	20/02	20.12	20.21	21.14	21.23	22.15	22.25	23+21
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Bedlington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle
Timing Load			**170**	**60H66S24**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**	**170**	**60H66S24**	**170**
Operating Characteristics												
TOC			ED	PE	PE	ED	PE	ED	PE	ED	PE	ED
Day of Operation			**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**
Changes			New	New	New	New	New	New	New	New	New	New
To Form			2A26AA			2A27AA		2A28AA				
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...
	dep	2	...	**19.04**	...	...	**20.21**	...	**21.23**	...	**22.25**	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...
	mgn	4	...		...	...	{½}	...	{½}	...	{½}	...
Ashington	plt	5	BAY	ML	...	BAY	ML	BAY	ML	BAY	ML	BAY
	dep	6	**19.11**	*19/19*	...	**20.12**	*20/36½*	**21.14**	*21/38½*	**22.15**	*22/40½*	**23+21**
	dep-line	7	...	...	...	...	...	...	...	...	...	...
	mgn	8			...							{½}
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...
	dep	10	*19/13½*	*19/22*	...	*20/14½*	*20/39½*	*21/16½*	*21/41½*	*22/17½*	*22/43½*	*23/24*
	dep-line	11	...	...	...	...	...	...	...	...	...	...
	mgn	12			...							
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...
	dep	14	*19/14*	*19/23*	...	*20/15*	*20/40½*	*21/17*	*21/42½*	*22/18*	*22/44½*	*23/24½*
	dep-line	15	...	...	...	...	...	...	...	...	...	...
	mgn	16			...							
Bedlington	arr	17	**19.16½**	...	...	**20.17½**	...	**21.19½**	...	**22.20½**	...	...
	plt	18	...	...	...	...	...	...	...	...	...	...
	dep	19	**19.17½**	*19/25*	*20/02*	**20.18½**	*20/42½*	**21.20½**	*21/44½*	**22.21½**	*22/46½*	*23/26*
	dep-line	20	...	...	...	...	...	...	...	...	...	...
	mgn	21										
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	**20.04½**	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	plt	24	...	...	...	...	...	...	...	...	...	...
	dep	25	*19/19½*	*19/29*	...	*20/20½*	*20/46½*	*21/22½*	*21/48½*	*22/23½*	*22/50½*	*23/27½*
	dep-line	26	...	...	...	...	...	...	...	...	...	...
	mgn	27			...							
Newsham	arr	28	**19.22**	...	...	**20.23**	...	**21.25**	...	**22.26**	...	...
	plt	29	...	...	...	...	...	...	...	...	...	...
	dep	30	**19.23**	*19/32½*	...	**20.24**	*20/50*	**21.26**	*21/52*	**22.27**	*22/54*	*23/30*
	dep-line	31	...	...	...	...	...	...	...	...	...	...
	mgn	32			...							
Hartley North	plt	33	...	...	...	...	...	...	...	...	...	...
	dep	34	*19/25*	*19/34*	...	*20/26*	*20/51½*	*21/28*	*21/53½*	*22/29*	*22/55½*	*23/31½*
	dep-line	35	...	...	...	...	...	...	...	...	...	...
	mgn	36			...							
Seaton Delaval	plt	37	...	...	...	...	...	...	...	...	...	...
	dep	38	*19/27*	*19/37½*	...	*20/28*	*20/55*	*21/30*	*21/57*	*22/31*	*22/59*	*23/33½*
	dep-line	39	...	...	...	...	...	...	...	...	...	...
	mgn	40			...							
Segill	plt	41	...	...	...	...	...	...	...	...	...	...
	dep	42	*19/28*	*19/39*	...	*20/29*	*20/56½*	*21/31*	*21/58½*	*22/32*	*23/00½*	*23/34½*
	dep-line	43	RL	RL	...	RL	RL	RL	RL	RL	RL	...
	mgn	44			...							
Holywell LC	plt	45	...	...	...	...	...	...	...	...	...	...
	dep	46	*19/30*	*19/41½*	...	*20/31*	*20/59*	*21/33*	*22/01*	*22/34*	*23/03*	*23/36½*
	dep-line	47	...	...	...	...	...	...	...	...	...	...
	mgn	48			...							
Northumberland Parkway	arr	49	**19.31½**	...	...	**20.32½**	...	**21.34½**	...	**22.35½**	...	...
	plt	50	...	...	...	...	...	...	...	...	...	...
	dep	51	**19.32**	*19/43½*	...	**20.33**	*21/01*	**21.35**	*22/03*	**22.36**	*23/05*	*23/38*
	dep-line	52	...	...	...	...	...	...	...	...	...	...
	mgn	53			...							
Benton East Jn	plt	54	...	...	...	...	...	...	...	...	...	...
	dep	55	*19/34*	*19/46½*	...	*20/35*	*21/04*	*21/37*	*22/06*	*22/38*	*23/08*	*23/40*
	dep-line	56	...	...	...	...	...	...	...	...	...	...
	mgn	57	(1)	<3>	...		(12½)		(10½)		(1½)	
Benton Nth Jn	plt	58	...	...	...	...	...	...	...	...	...	...
	dep	59	*19/37*	*19/51½*	...	*20/37*	*21/18½*	*21/39*	*22/18½*	*22/40*	*23/11½*	*23/42*
	dep-line	60	...	...	...	...	...	...	...	...	...	...
	mgn	61	[1]		...	[1]		[1]		[1]		
Heaton Sth. Jn.	arr	62	...	**19.57**	...	...	**21.24**	...	**22.24**	...	**23.17**	...
	plt	63	...	...	...	...	...	...	...	...	...	...
	dep	64	*19/40½*	...	...	*20/40½*	...	*21/42½*	...	*22/43½*	...	*23/44½*
	dep-line	65	...	...	...	...	...	...	...	...	...	...
	mgn	66		...	...		...		...		...	[1]
Manors	arr	67	**19.42**	...	...	**20.42**	...	**21.44**	...	**22.45**	...	...
	plt	68	...	...	...	...	...	...	...	...	...	...
	dep	69	**19.43**	...	...	**20.43**	...	**21.45**	...	**22.46**	...	...
	dep-line	70	...	...	...	...	...	...	...	...	...	...
	mgn	71	{½}	...	...	{½}	...	{½}	...	{½}	...	...
Newcastle	arr	72	**19.45**	...	...	**20.45**	...	**21.47**	...	**22.48**	...	**23+48**
	plt	73	1	...	...	1	...	1	...	1	...	1

Infrastructure Phase 2 with class 170 (Option T2)

Northbound

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Formed By							2B00BB				2B01BB	2B02BB		2B03BB	2B04BB		2B05BB	2B06BB	2B07BB
Signal ID			6A13BB	5A00XX	5A02XX	6A00BB	2A00BB	5A04XX	6Z14BB	6A01BB	2A01BB	2A02BB	6A02BB	2A03BB	2A04BB	6A03BB	2A05BB	2A06BB	2A07BB
Orig. Dep. Time			23.09	05+00	05+44½	06.05	06.30	06+42½	07.34½	07.05	07.30	07.57	08.16	08.31	08.59	09.11	09.23½	09.58	10.30½
Orig. Loc. Name			Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Bedl'Ton Furnaceway Sdgs	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Newcastle
Dest. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Bedlington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington
Timing Load			60H66S24	170	170	60H66S24	170	170	60H66S24	60H66S24	170	170	60H66S24	170	170	60H66S24	170	170	170
Operating Characteristics																			
TOC			PE	ED	ED	PE	ED	ED	PE	PE	ED	ED	PE	ED	ED	PE	ED	ED	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form																			
Newcastle	plt	1	...	1	1	...	1	1	...	...	1	5	...	1	1	...	1	5	1
	dep	2	...	05+00	05+44½	...	06.30	06+42½	...	...	07.30	07.57	...	08.31	08.59	...	09.23½	09.58	10.30½
	dep-line	3	...	...	...	...	...	...	...	...	...	SL	...	...	...	...	...	SL	...
	mgn	4	...			...			...	...		{½}	...			...			
Manors	arr	5	...	...	...	...	06.31½	...	...	...	07.31½	...	...	08.32½	...	...	09.25	...	10.32
	plt	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	7	...	...	...	...	06.32½	...	...	...	07.32½	...	...	08.33½	...	...	09.26	...	10.33
	dep-line	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	9	...	...	...	...		...	...	...		...	...		...	...		...	
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	...	05/03	05/47½	...	06/34½	06/45½	...	...	07/34½	08/01	...	08/35½	09/02	...	09/28	10/01½	10/35
	dep-line	12	...	...	...	...	...	...	...	...	...	ML	...	...	...	...	...	ML	...
	mgn	13	...			...			...	...		<½>	...			...		<½>	
Benton Nth Jn	plt	14	...	DM	DM	...	DM	DM	...	...	DM	DM	...	DM	DM	...	DM	DM	DM
	dep	15	...	05/05½	05/50	06/11½	06/37	06/48	...	07/11½	07/37	08/04	08/22½	08/38	09/04½	09/17½	09/30½	10/04½	10/37½
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	...						...	(5½)	(1½)	(2)		(2)	(2½)	(4)	(7)	(2)	(½)
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	...	05/07½	05/52	06/14	06/39	06/50	...	07/19½	07/40½	08/08	08/25	08/42	09/09	09/24	09/39½	10/08½	10/40
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21	...						...										
Northumberland Parkway	arr	22	...	...	...	...	06.41	...	...	...	07.42½	08.10	...	08.44	09.11	...	09.41½	10.10½	10.42
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	...	05/09½	05/54	06/17	06.41½	06/52	...	07/22½	07.43	08.10½	08/28	08.44½	09.11½	09/27	09.42	10.11	10.42½
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26	...						...										
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	...	05/11	05/55½	06/18½	06/43	06/53½	...	07/24	07/44½	08/12	08/29½	08/46	09/13	09/28½	09/43½	10/12½	10/44
	dep-line	29	...	...	...	LL	RL	...	...	LL	RL	RL	LL	RL	RL	LL	RL	RL	RL
	mgn	30	...		(4½)	(1)		(17)	...	(8½)			(4½)			(3½)			
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	...	05/12½	06/01½	06/22	06/44½	07/12	...	07/35	07/46	08/13½	08/36½	08/47½	09/14½	09/34½	09/45	10/14	10/45½
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34	...						...										
Seaton Delaval	arr	35	...	...	...	...	06.46	...	...	...	07.47½	08.15	...	08.49	09.16	...	09.46½	10.15½	10.47
	plt	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	37	...	05/13½	06/02½	06/23	06.46½	07/13	...	07/36	07.48	08.15½	08/37½	08.49½	09.16½	09/35½	09.47	10.16	10.47½
	dep-line	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	39	...						...										
Hartley North	plt	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	41	...	05/15½	06/04½	06/25½	06/49	07/15	...	07/38½	07/50½	08/18	08/40	08/52	09/19	09/38	09/49½	10/18½	10/50
	dep-line	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	43	...						...										
Newsham	arr	44	...	...	...	...	06.50½	...	...	...	07.52	08.19½	...	08.53½	09.20½	...	09.51	10.20	10.51½
	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	...	05/17	06/06	06/27½	06.51½	07/16½	...	07/40½	07.53	08.20½	08/42	08.54½	09.21½	09/40	09.52	10.21	10.52½
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48	...						...										
Blyth Parkway	arr	49	...	...	...	...	06.55	...	...	...	07.56½	08.24	...	08.58	09.25	...	09.55½	10.24½	10.56
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	...	05/19½	06/08½	06/31	06.55½	07/19	...	07/44	07.57	08.24½	08/45½	08.58½	09.25½	09/43½	09.56	10.25	10.56½
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53	...						...										
Bedl'Ton Furnaceway Sdgs	plt	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	55	...	...	...	...	...	...	07.34½	...	...	...	...	...	...	...	...	...	...
	dep-line	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bedlington	arr	58	...	...	...	...	06.58	...	07/36	...	07.59½	08.27	...	09.01	09.28	...	09.58½	10.27½	10.59
	plt	59	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	60	...	05/21	06/10	06/33½	06.59	07/20½	...	07/46½	08.00½	08.28	08/48	09.02	09.29	09/46	09.59½	10.28½	11.00
	dep-line	61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	62	...						...										
West Sleekburn Jn	arr	63	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	65	...	05/22½	06/11½	06/37½	07/01	07/22	...	07/50½	08/02½	08/30	08/52	09/04	09/31	09/50	10/01½	10/30½	11/02
	dep-line	66	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	67	...						...										
Marcheys House Jn	plt	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	69	...	05/23	06/12	06/38½	07/01½	07/22½	...	07/51½	08/03	08/30½	08/53	09/04½	09/31½	09/51	10/02	10/31	11/02½
	dep-line	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	71	...	<2>	<2>	(1½)		<2>	...										
Ashington	arr	72	<---	05+27	06+16	...	07.03½	07+26½	...	...	08.05	08.32½	...	09.06½	09.33½	...	10.04	10.33	11.04½
	plt	73	...	BAY	BAY	1	BAY	BAY	...	1	BAY	BAY	1	BAY	BAY	1	BAY	BAY	BAY
	dep	74	...	...	...	06/43	...	...	...	07/54½	...	...	08/56	...	...	09/54	...	...	...
	dep-line	75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	76	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lynemouth Power Stn (FHH)	arr	77	00.00	...	...	06.58	...	...	...	08.09½	...	...	09.11	...	...	10.09	...	...	...
	plt	78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

			18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Formed By			2B08BB		2B09BB	2B10BB		2B11BB		2B12BB	2B13BB		2B14BB	2B15BB	2B16BB		2B17BB	2B18BB		2B19BB
Signal ID			2A08BB	6A04BB	2A09BB	2A10BB	6A05BB	2A11BB	6A06BB	2A12BB	2A13BB	6A07BB	2A14BB	2A15BB	2A16BB	6A08BB	2A17BB	2A18BB	6A09BB	2A19BB
Orig. Dep. Time			10.57	11.09	11.28	11.56	12.08	12.30	12.46	13.00	13.26	13.40	13.59	14.32½	14.58	15.09	15.31	15.59	16.15½	16.30
Orig. Loc. Name			Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle
Dest. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington
Timing Load			170	60H66S24	170	170	60H66S24	170	60H66S24	170	170	60H66S24	170	170	170	60H66S24	170	170	60H66S24	170
Operating Characteristics																				
TOC			ED	PE	ED	ED	PE	ED	PE	ED	ED	PE	ED	ED	ED	PE	ED	ED	PE	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form																				
Newcastle	plt	1	1	...	1	1	...	1	...	1	1	...	1	1	1	...	1	1	...	1
	dep	2	10.57	...	11.28	11.56	...	12.30	...	13.00	13.26	...	13.59	14.32½	14.58	...	15.31	15.59	...	16.30
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4		...			...		...			...				...			...	
Manors	arr	5	...	...	11.29½	...	...	12.31½	...	...	13.27½	...	...	14.34	...	...	15.32½	...	...	16.31½
	plt	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	7	...	...	11.30½	...	...	12.32½	...	...	13.28½	...	...	14.35	...	...	15.33½	...	...	16.32½
	dep-line	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	9	...	...	(½)	...	...		...	...		...	...		...	...		...	...	
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	11/00	...	11/33	11/59	...	12/34½	...	13/03	13/30½	...	14/02	14/37	15/01	...	15/35½	16/02	...	16/34½
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13		...			...		...			...				...			...	
Benton Nth Jn	plt	14	DM	...	DM	DM	...	DM	...	DM	DM	...	DM	DM	DM	...	DM	DM	...	DM
	dep	15	11/02½	11/15½	11/35½	12/01½	12/14½	12/37	12/52½	13/05½	13/33	13/46½	14/04½	14/39½	15/03½	15/15½	15/38	16/04½	16/22	16/37
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	(2½)	(4)	(1)	(2½)	(4)			(2½)	(2½)	(4)	(2½)	(½)	(2½)	(5)	(1)	(2½)		(1½)
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	11/07	11/22	11/38½	12/06	12/21	12/39	12/55	13/10	13/37½	13/53	14/09	14/42	15/08	15/23	15/41	16/09	16/24½	16/40½
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21																		
Northumberland Parkway	arr	22	11.09	...	11.40½	12.08	...	12.41	...	13.12	13.39½	...	14.11	14.44	15.10	...	15.43	16.11	...	16.42½
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	11.09½	11/25	11.41	12.08½	12/24	12.41½	12/58	13.12½	13.40	13/56	14.11½	14.44½	15.10½	15/26	15.43½	16.11½	16/27½	16.43
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26																		
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	11/11	11/26½	11/42½	12/10	12/25½	12/43	12/59½	13/14	13/41½	13/57½	14/13	14/46	15/12	15/27½	15/45	16/13	16/29	16/44½
	dep-line	29	RL	LL	RL	RL	LL	RL	LL	RL	RL	LL	RL	RL	RL	LL	RL	RL	LL	RL
	mgn	30		(4)			(5½)		(2½)			(3½)				(5½)			(3½)	
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	11/12½	11/33	11/44	12/11½	12/33½	12/44½	13/04½	13/15½	13/43	14/03½	14/14½	14/47½	15/13½	15/35½	15/46½	16/14½	16/35	16/46
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34																		
Seaton Delaval	arr	35	11.14	...	11.45½	12.13	...	12.46	...	13.17	13.44½	...	14.16	14.49	15.15	...	15.48	16.16	...	16.47½
	plt	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	37	11.14½	11/34	11.46	12.13½	12/34½	12.46½	13/05½	13.17½	13.45	14/04½	14.16½	14.49½	15.15½	15/36½	15.48½	16.16½	16/36	16.48
	dep-line	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	39																		
Hartley North	plt	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	41	11/17	11/36½	11/48½	12/16	12/37	12/49	13/08	13/20	13/47½	14/07	14/19	14/52	15/18	15/39	15/51	16/19	16/38½	16/50½
	dep-line	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	43																		
Newsham	arr	44	11.18½	...	11.50	12.17½	...	12.50½	...	13.21½	13.49	...	14.20½	14.53½	15.19½	...	15.52½	16.20½	...	16.52
	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	11.19½	11/38½	11.51	12.18½	12/39	12.51½	13/10	13.22½	13.50	14/09	14.21½	14.54½	15.20½	15/41	15.53½	16.21½	16/40½	16.53
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48																		
Blyth Parkway	arr	49	11.23	...	11.54½	12.22	...	12.55	...	13.26	13.53½	...	14.25	14.58	15.24	...	15.57	16.25	...	16.56½
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	11.23½	11/42	11.55	12.22½	12/42½	12.55½	13/13½	13.26½	13.54	14/12½	14.25½	14.58½	15.24½	15/44½	15.57½	16.25½	16/44	16.57
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53																		
Bedl'Ton Furnaceway Sdgs	plt	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	55	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep-line	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bedlington	arr	58	11.26	...	11.57½	12.25	...	12.58	...	13.29	13.56½	...	14.28	15.01	15.27	...	16.00	16.28	...	16.59½
	plt	59	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	60	11.27	11/44½	11.58½	12.26	12/45	12.59	13/16	13.30	13.57½	14/15	14.29	15.02	15.28	15/47	16.01	16.29	16/46½	17.00½
	dep-line	61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	62										(1)								
West Sleekburn Jn	arr	63	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	65	11/29	11/48½	12/00½	12/28	12/49	13/01	13/20	13/32	13/59½	14/20	14/31	15/04	15/30	15/51	16/03	16/31	16/50½	17/02½
	dep-line	66	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	67																		
Marcheys House Jn	plt	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	69	11/29½	11/49½	12/01	12/28½	12/50	13/01½	13/21	13/32½	14/00	14/21	14/31½	15/04½	15/30½	15/52	16/03½	16/31½	16/51½	17/03
	dep-line	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	71																		
Ashington	arr	72	11.31½	...	12.03	12.30½	...	13.03½	...	13.34½	14.02	...	14.33½	15.06½	15.32½	...	16.05½	16.33½	...	17.05
	plt	73	BAY	1	BAY	BAY	1	BAY	1	BAY	BAY	1	BAY	BAY	BAY	1	BAY	BAY	1	BAY
	dep	74	...	11/52½	...	...	12/53	...	13/24	...	...	14/24	...	...	...	15/55	...	...	16/54½	...
	dep-line	75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	76	...	{½}	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...
Lynemouth Power Stn (FHH)	arr	77	...	12.08	...	...	13.08	...	13.39	...	...	14.39	...	...	...	16.10	...	...	17.09½	...
	plt	78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

			36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Formed By			2B20BB		2B21BB	2B22BB	2B23BB		2B24BB		2B25BB	2B26BB			2B27BB		2B28BB		
Signal ID			2A20BB	4A00BB	2A21BB	2A22BB	2A23BB	4A01BB	2A24BB	4A02BB	2A25BB	2A26BB	6A10BB	6Z16BB	2A27BB	6A11BB	2A28BB	6A12BB	6A13BB
Orig. Dep. Time			16.59	17.16½	17.30	18.00	18.30	18.41	18.59	19.16½	19.24	19.57	20.12	20.50½	20.56	21.05	21.59	22.09	23.09
Orig. Loc. Name			Newcastle	Heaton North Jn	Newcastle	Newcastle	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Bedl'Ton Furnaceway Sdgs	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Heaton North Jn
Dest. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	West Sleekburn Jn	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Lynemouth Power Stn (FHH)
Timing Load			170	75-66S06	170	170	170	75-66S06	170	75-66S06	170	170	60H66S24	60H66S24	170	60H66S24	170	60H66S24	60H66S24
Operating Characteristics																			
TOC			ED	PE	ED	ED	ED	PE	ED	PE	ED	ED	PE	PE	ED	PE	ED	PE	PE
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form																			
Newcastle	plt	1	1	...	1	1	1	...	1	...	5	1	...	...	1	...	1	...	...
	dep	2	16.59	...	17.30	18.00	18.30	...	18.59	...	19.24	19.57	...	...	20.56	...	21.59	...	...
	dep-line	3	SL	...	...	...	...	...	...	...	SL	...	...	...	...	...	...	...	...
	mgn	4		...				...		...			...	...		...		...	...
Manors	arr	5	17.00½	...	17.31½	...	18.31½	...	...	...	19.25½	19.58½	...	...	20.57½	...	22.00½	...	...
	plt	6	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...
	dep	7	17.01½	...	17.32½	...	18.32½	...	...	...	19.26½	19.59	...	...	20.58½	...	22.01½	...	...
	dep-line	8	ML	...	...	...	...	...	...	...	ML	...	...	...	ML	...	ML	...	...
	mgn	9		...		...		...	...	...			...	...		...		...	...
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	17/03½	...	17/34½	18/03	18/34½	...	19/02	...	19/28½	20/01	...	...	21/00½	...	22/03½	...	...
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13		...				...		...	<½>		...	...		...		...	...
Benton Nth Jn	plt	14	DM	...	DM	DM	DM	...	DM	...	DM	DM	...	...	DM	...	DM	...	...
	dep	15	17/06	17/21	17/37	18/05½	18/37	18/45½	19/04½	19/21	19/31½	20/03½	20/18½	...	21/03	21/11½	22/06	22/15½	23/15½
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	(1½)	(1)		(2½)	(1½)	(7)	(2½)		(5½)		(½)	...					
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	17/09½	17/24½	17/39	18/10	18/40½	18/55	19/09	19/23½	19/39	20/05½	20/21½	...	21/05	21/14	22/08	22/18	23/18
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21												...					
Northumberland Parkway	arr	22	17.11½	...	17.41	18.12	18.42½	...	19.11	...	19.41	20.07½	...	...	21.07	...	22.10	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	17.12	17/26	17.41½	18.12½	18.43	18/56½	19.11½	19/25	19.41½	20.08	20/24½	...	21.07½	21/17	22.10½	22/21	23/21
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26												...					
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	17/13½	17/28	17/43	18/14	18/44½	18/58½	19/13	19/27	19/43	20/09½	20/26	...	21/09	21/18½	22/12	22/22½	23/22½
	dep-line	29	RL	LL	RL	RL	RL	LL	RL	LL	RL	RL	LL	...	RL	LL	RL	LL	LL
	mgn	30		(3½)				(2½)		(4½)			(4)	...		(13½)		(25)	
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	17/15	17/33½	17/44½	18/15½	18/46	19/03	19/14½	19/33½	19/44½	20/11	20/32½	...	21/10½	21/34½	22/13½	22/50	23/25
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34												...					
Seaton Delaval	arr	35	17.16½	...	17.46	18.17	18.47½	...	19.16	...	19.46	20.12½	...	...	21.12	...	22.15	...	...
	plt	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	37	17.17	17/35	17.46½	18.17½	18.48	19/04½	19.16½	19/35	19.46½	20.13	20/33½	...	21.12½	21/35½	22.15½	22/51	23/26
	dep-line	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	39												...					
Hartley North	plt	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	41	17/19½	17/37	17/49	18/20	18/50½	19/06½	19/19	19/37	19/49	20/15½	20/36	...	21/15	21/38	22/18	22/53½	23/28½
	dep-line	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	43												...					
Newsham	arr	44	17.21	...	17.50½	18.21½	18.52	...	19.20½	...	19.50½	20.17	...	...	21.16½	...	22.19½	...	...
	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	17.22	17/39	17.51½	18.22½	18.53	19/08½	19.21½	19/39	19.51½	20.18	20/38	...	21.17½	21/40	22.20½	22/55½	23/30½
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48												...					
Blyth Parkway	arr	49	17.25½	...	17.55	18.26	18.56½	...	19.25	...	19.55	20.21½	...	...	21.21	...	22.24	...	...
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	17.26	17/42	17.55½	18.26½	18.57	19/11½	19.25½	19/42	19.55½	20.22	20/41½	...	21.21½	21/43½	22.24½	22/59	23/34
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53												...					
Bedl'Ton Furnaceway Sdgs	plt	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	55	...	...	...	...	...	...	...	...	...	...	...	20.50½	...	...	...	...	...
	dep-line	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bedlington	arr	58	17.28½	...	17.58	18.29	18.59½	...	19.28	...	19.58	20.24½	...	...	21.24	...	22.27	...	...
	plt	59	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	60	17.29½	17/43½	17.59	18.30	19.00½	19/13	19.29	19/43½	19.59	20.25½	20/44	20/52	21.25	21/46	22.28	23/01½	23/36½
	dep-line	61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	62		(1)															
West Sleekburn Jn	arr	63	...	...	...	...	...	...	...	...	...	...	...	20/56	...	...	...	...	...
	plt	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	65	17/31½	17/48	18/01	18/32	19/02½	19/16½	19/31	19/47	20/01	20/27½	20/48	...	21/27	21/50	22/30	23/05½	23/40½
	dep-line	66	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	67												...					
Marcheys House Jn	plt	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	69	17/32	17/48½	18/01½	18/32½	19/03	19/17	19/31½	19/47½	20/01½	20/28	20/49	...	21/27½	21/51	22/30½	23/06½	23/41½
	dep-line	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	71												...					
Ashington	arr	72	17.34	...	18.03½	18.34½	19.05	...	19.33½	...	20.03½	20.30	...	...	21.29½	...	22.32½	...	...
	plt	73	BAY	1	BAY	BAY	BAY	1	BAY	1	BAY	BAY	1	...	BAY	1	BAY	1	1
	dep	74	...	17/50½	...	...	...	19/19	...	19/49½	...	...	20/52	...	...	21/54	...	23/09½	23/44½
	dep-line	75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	76	...		...	...	...		...		...	...		...	...		...		{½}
Lynemouth Power Stn (FHH)	arr	77	...	18.05½	...	...	...	19.34	...	20.04½	...	...	21.07	...	...	22.09	...	23.24½	--->
	plt	78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Southbound

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Formed By																			
Signal ID			2B00BB	6B00BB	2B01BB	6B01BB	6Z18BB	2B02BB	2B03BB	6B02BB	2B04BB	2B05BB	6B03BB	2B06BB	2B07BB	6B04BB	2B08BB	2B09BB	6B05BB
Orig. Dep. Time			05.39	05.44	06.39	06.34	07/05½	07.12½	07.40	07.35½	08.14	08.41	08.36	09.12	09.41	09.36	10.12	10.39	10.34
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	West Sleekburn Jn	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.
Timing Load			170	60H66S24	170	60H66S24	60H66S24	170	170	60H66S24	170	170	60H66S24	170	170	60H66S24	170	170	60H66S24
Operating Characteristics																			
TOC			ED	PE	ED	PE	PE	ED	ED	PE	ED	ED	PE	ED	ED	PE	ED	ED	PE
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form			2A00BB		2A01BB			2A02BB	2A03BB		2A04BB	2A05BB		2A06BB	2A07BB		2A08BB	2A09BB	
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	...	05.44	...	06.34	...	...	...	07.35½	...	...	08.36	...	...	09.36	...	...	10.34
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...		...		...	...	...		...	...	{½}	...	...		...	...	{½}
Ashington	plt	5	BAY	ML	BAY	ML	...	BAY	BAY	ML	BAY	BAY	ML	BAY	BAY	ML	BAY	BAY	ML
	dep	6	05.39	05/59	06.39	06/49	...	07.12½	07.40	07/50½	08.14	08.41	08/51½	09.12	09.41	09/51	10.12	10.39	10/49½
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8					...												
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	05/41½	06/02	06/41½	06/52	...	07/15	07/42½	07/53½	08/16½	08/43½	08/54½	09/14½	09/43½	09/54	10/14½	10/41½	10/52½
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12					...												
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	05/42	06/03	06/42	06/53	07/05½	07/15½	07/43	07/54½	08/17	08/44	08/55½	09/15	09/44	09/55	10/15	10/42	10/53½
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16																	
Bedlington	arr	17	05.44	...	06.44	...	...	07.17½	07.45	...	08.19	08.46	...	09.17	09.46	...	10.17	10.44	...
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	05.45	06/05	06.45	06/55	07/07½	07.18½	07.46	07/56½	08.20	08.47	08/57½	09.18	09.47	09/57	10.18	10.45	10/55½
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21																	
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	07.10	...	...	...	...	...	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	arr	24	05.47½	...	06.47½	...	...	07.21	07.48½	...	08.22½	08.49½	...	09.20½	09.49½	...	10.20½	10.47½	...
	plt	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	26	05.48	06/09	06.48	06/59	...	07.21½	07.49	08/00½	08.23	08.50	09/01½	09.21	09.50	10/01	10.21	10.48	10/59½
	dep-line	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	28					...												
Newsham	arr	29	05.51	...	06.51	...	...	07.24½	07.52	...	08.26	08.53	...	09.24	09.53	...	10.24	10.51	...
	plt	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	31	05.52	06/12½	06.52	07/02½	...	07.25½	07.53	08/04	08.27	08.54	09/05	09.25	09.54	10/04½	10.25	10.52	11/03
	dep-line	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	33					...												
Hartley North	plt	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	35	05/54	06/14	06/54	07/04	...	07/27½	07/55	08/05½	08/29	08/56	09/06½	09/27	09/56	10/06	10/27	10/54	11/04½
	dep-line	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	37					...												
Seaton Delaval	arr	38	05.56½	...	06.56½	...	...	07.30	07.57½	...	08.31½	08.58½	...	09.29½	09.58½	...	10.29½	10.56½	...
	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	05.57	06/17½	06.57	07/07½	...	07.30½	07.58	08/09	08.32	08.59	09/10	09.30	09.59	10/09½	10.30	10.57	11/08
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42					...												
Segill	plt	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	44	05/58½	06/19	06/58½	07/09	...	07/32	07/59½	08/10½	08/33½	09/00½	09/11½	09/31½	10/00½	10/11	10/31½	10/58½	11/09½
	dep-line	45	RL	RL	RL	RL	...	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL
	mgn	46					...			(2)			(2)			(2)			(2)
Holywell LC	plt	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	48	06/00	06/21½	07/00	07/11½	...	07/33½	08/01	08/15	08/35	09/02	09/16	09/33	10/02	10/15½	10/33	11/00	11/14
	dep-line	49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	50					...												
Northumberland Parkway	arr	51	06.01½	...	07.01½	...	...	07.35	08.02½	...	08.36½	09.03½	...	09.34½	10.03½	...	10.34½	11.01½	...
	plt	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	06.02	06/23½	07.02	07/13½	...	07.35½	08.03	08/17	08.37	09.04	09/18	09.35	10.04	10/17½	10.35	11.02	11/16
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55					...												
Benton East Jn	plt	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	57	06/04	06/26½	07/04	07/16½	...	07/37½	08/05	08/20	08/39	09/06	09/21	09/37	10/06	10/20½	10/37	11/04	11/19
	dep-line	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	59				(6)	...	(½)		(13½)			(1½)	(1)	...	...	(1½)		(2½)
Benton Nth Jn	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	06/06	06/28½	07/06	07/24½	...	07/40	08/07	08/35½	08/41	09/08	09/24½	09/40	10/08	10/22½	10/40½	11/06	11/23½
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63	[1]		[1]		...	[1]	[1]		[1]	[1]		[1],{½}	[1]		[1]	[1]	
Heaton Sth. Jn.	arr	64	...	06.34	...	07.30	...	...	...	08.41	...	...	09.30	...	...	10.28	...	...	11.29
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	06/09½	...	07/09½	...	...	07/43½	08/10½	...	08/44½	09/11½	...	09/44	10/11½	...	10/44	11/09½	...
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	SL	...	...	...	...	...
	mgn	68		...		...	...	{½}		...			...	{½}		...	{½}		...
Manors	arr	69	06.11	...	07.11	...	...	07.45½	08.12	...	08.46	09.13	...	...	10.13	...	...	11.11	...
	plt	70	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...
	dep	71	06.12	...	07.12	...	...	07.46½	08.13	...	08.47	09.14	...	...	10.14	...	...	11.12	...
	dep-line	72	...	...	...	...	...	SL	...	...	...	...	...	...	...	...	...	...	...
	mgn	73	{½}	...	{½}	...	...	{½}	{½}	...	{½}	{½}	...	...	{½}	...	...	{½}	...
Newcastle	arr	74	06.14	...	07.14	...	...	07.49	08.15	...	08.49	09.16	...	09.48	10.16	...	10.47	11.14	...
	plt	75	1	...	1	...	...	5	1	...	1	1	...	5	1	...	1	1	...

			18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Formed By																				
Signal ID			2B10BB	2B11BB	6B06BB	2B12BB	2B13BB	2B14BB	6B07BB	2B15BB	2B16BB	6B08BB	2B17BB	6B09BB	2B18BB	2B19BB	6B10BB	2B20BB	2B21BB	6B11BB
Orig. Dep. Time			11.10½	11.38	11.33	12.11	12.42	13.10	13.04½	13.41	14.14	14.09	14.40	14.35	15.13	15.41	15.36	16.12½	16.42	16.37
Orig. Loc. Name			Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)
Dest. Loc. Name			Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.
Timing Load			170	170	60H66S24	170	170	170	60H66S24	170	170	60H66S24	170	60H66S24	170	170	60H66S24	170	170	60H66S24
Operating Characteristics																				
TOC			ED	ED	PE	ED	ED	ED	PE	ED	ED	PE	ED	PE	ED	ED	PE	ED	ED	PE
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form			2A10BB	2A11BB		2A12BB	2A13BB	2A14BB		2A15BB	2A16BB		2A17BB		2A18BB	2A19BB		2A20BB	2A21BB	
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	...	...	11.33	...	...	...	13.04½	...	...	14.09	...	14.35	...	...	15.36	...	...	16.37
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...	...	{½}	...	...	...	{½}	...	...	{½}	...	{½}	...	...	{½}	...	...	
Ashington	plt	5	BAY	BAY	ML	BAY	BAY	BAY	ML	BAY	BAY	ML	BAY	ML	BAY	BAY	ML	BAY	BAY	ML
	dep	6	11.10½	11.38	11/48½	12.11	12.42	13.10	13/20	13.41	14.14	14/24½	14.40	14/50½	15.13	15.41	15/51½	16.12½	16.42	16/52
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8																		
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	11/13	11/40½	11/51½	12/13½	12/44½	13/12½	13/23	13/43½	14/16½	14/27½	14/42½	14/53½	15/15½	15/43½	15/54½	16/15	16/44½	16/55
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12																		
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	11/13½	11/41	11/52½	12/14	12/45	13/13	13/24	13/44	14/17	14/28½	14/43	14/54½	15/16	15/44	15/55½	16/15½	16/45	16/56
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16																		
Bedlington	arr	17	11.15½	11.43	...	12.16	12.47	13.15	...	13.46	14.19	...	14.45	...	15.18	15.46	...	16.17½	16.47	...
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	11.16½	11.44	11/54½	12.17	12.48	13.16	13/26	13.47	14.20	14/30½	14.46	14/56½	15.19	15.47	15/57½	16.18½	16.48	16/58
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21																		
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	arr	24	11.19	11.46½	...	12.19½	12.50½	13.18½	...	13.49½	14.22½	...	14.48½	...	15.21½	15.49½	...	16.21	16.50½	...
	plt	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	26	11.19½	11.47	11/58½	12.20	12.51	13.19	13/30	13.50	14.23	14/34½	14.49	15/00½	15.22	15.50	16/01½	16.21½	16.51	17/02
	dep-line	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	28																		
Newsham	arr	29	11.22½	11.50	...	12.23	12.54	13.22	...	13.53	14.26	...	14.52	...	15.25	15.53	...	16.24½	16.54	...
	plt	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	31	11.23½	11.51	12/02	12.24	12.55	13.23	13/33½	13.54	14.27	14/38	14.53	15/04	15.26	15.54	16/05	16.25½	16.55	17/05½
	dep-line	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	33																		
Hartley North	plt	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	35	11/25½	11/53	12/03½	12/26	12/57	13/25	13/35	13/56	14/29	14/39½	14/55	15/05½	15/28	15/56	16/06½	16/27½	16/57	17/07
	dep-line	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	37																		
Seaton Delaval	arr	38	11.28	11.55½	...	12.28½	12.59½	13.27½	...	13.58½	14.31½	...	14.57½	...	15.30½	15.58½	...	16.30	16.59½	...
	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	11.28½	11.56	12/07	12.29	13.00	13.28	13/38½	13.59	14.32	14/43	14.58	15/09	15.31	15.59	16/10	16.30½	17.00	17/10½
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42																		
Segill	plt	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	44	11/30	11/57½	12/08½	12/30½	13/01½	13/29½	13/40	14/00½	14/33½	14/44½	14/59½	15/10½	15/32½	16/00½	16/11½	16/32	17/01½	17/12
	dep-line	45	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL
	mgn	46			(2)				(2)			(2)		(2)			(2)			(2)
Holywell LC	plt	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	48	11/31½	11/59	12/13	12/32	13/03	13/31	13/44½	14/02	14/35	14/49	15/01	15/15	15/34	16/02	16/16	16/33½	17/03	17/16½
	dep-line	49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	50																		
Northumberland Parkway	arr	51	11.33	12.00½	...	12.33½	13.04½	13.32½	...	14.03½	14.36½	...	15.02½	...	15.35½	16.03½	...	16.35	17.04½	...
	plt	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	11.33½	12.01	12/15	12.34	13.05	13.33	13/46½	14.04	14.37	14/51	15.03	15/17	15.36	16.04	16/18	16.35½	17.05	17/18½
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55																		
Benton East Jn	plt	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	57	11/35½	12/03	12/18	12/36	13/07	13/35	13/49½	14/06	14/39	14/54	15/05	15/20	15/38	16/06	16/21	16/37½	17/07	17/21½
	dep-line	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	59	(1)		(2½)	(2)			(9)		(1½)			(9½)	(1)		(7½)	(1)		(½)
Benton Nth Jn	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	11/38½	12/05	12/22½	12/40	13/09	13/37	14/00½	14/08	14/42½	14/56	15/07	15/31½	15/41	16/08	16/30½	16/40½	17/09	17/24
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63	[1]	[1]		[1]	[1]	[1]		[1]	[1]	{½}	[1]		[1]	[1]		[1]	[1]	
Heaton Sth. Jn.	arr	64	...	...	12.28	...	...	...	14.06	...	...	15.02	...	15.37	...	...	16.36	...	...	17.29½
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	11/42	12/08½	...	12/43½	13/12½	13/40½	...	14/11½	14/46	...	15/10½	...	15/44½	16/11½	...	16/44	17/12½	...
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	68	{½}		...	<½>,{½}		<½>,{½}	...		{½}	...		...	<½>,{½}		...	{½}		...
Manors	arr	69	...	12.10	...	...	13.14	...	...	14.13	...	...	15.12	...	...	16.13	...	...	17.14	...
	plt	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	71	...	12.11	...	...	13.15	...	...	14.14	...	...	15.13	...	...	16.14	...	...	17.15	...
	dep-line	72	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	73	...	{½}	...	...	{½}	...	...	<½>	...	...	{½}	...	...	{½}	...	...	{½}	...
Newcastle	arr	74	11.45	12.13	...	12.47	13.17	13.44	...	14.16	14.49	...	15.15	...	15.48	16.16	...	16.47	17.17	...
	plt	75	1	1	...	1	1	1	...	1	1	...	1	...	1	1	...	1	1	...

			36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Formed By																			
Signal ID			2B22BB	2B23BB	6B12BB	2B24BB	6B13BB	2B25BB	2B26BB	5B00XX	6B14BB	6Z20BB	2B27BB	6B15BB	2B28BB	6B16BB	2B29BB	6B17BB	5B02XX
Orig. Dep. Time			17.11	17.42	17.37	18.13	18.06	18.40½	19.11	19+42	19.33	20/02	20.10	20.19	21.12	21.22	22.13	22.12	22+46½
Orig. Loc. Name			Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Lynemouth Power Stn (FHH)	Bedlington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington
Dest. Loc. Name			Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle
Timing Load			170	170	60H66S24	170	60H66S24	170	170	170	60H66S24	60H66S24	170	60H66S24	170	60H66S24	170	60H66S24	170
Operating Characteristics																			
TOC			ED	ED	PE	ED	PE	ED	ED	ED	PE	PE	ED	PE	ED	PE	ED	PE	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form			2A22BB	2A23BB		2A24BB		2A25BB	2A26BB				2A27BB		2A28BB				
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	...	...	17.37	...	18.06	...	...	...	19.33	...	...	20.19	...	21.22	...	22.12	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...	...	{½}	...	{½}	...	...	...		...	...	{½}	...	{½}	...		...
Ashington	plt	5	BAY	BAY	ML	BAY	ML	BAY	BAY	BAY	ML	...	BAY	ML	BAY	ML	BAY	ML	BAY
	dep	6	17.11	17.42	17/52½	18.13	18/21½	18.40½	19.11	19+42	19/48	...	20.10	20/34½	21.12	21/37½	22.13	22/27	22+46½
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8										...							
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	17/13½	17/44½	17/55½	18/15½	18/24½	18/43	19/13½	19/44½	19/51	...	20/12½	20/37½	21/14½	21/40½	22/15½	22/30	22/49
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12										...							
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	17/14	17/45	17/56½	18/16	18/25½	18/43½	19/14	19/45	19/52	...	20/13	20/38½	21/15	21/41½	22/16	22/31	22/49½
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16										...							
Bedlington	arr	17	17.16	17.47	...	18.18	...	18.45½	19.16	...	...	...	20.15	...	21.17	...	22.18	...	...
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	17.17	17.48	17/58½	18.19	18/27½	18.46½	19.17	19/46½	19/54	20/02	20.16	20/40½	21.18	21/43½	22.19	22/33	22/51
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21																	
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	...	...	...	...	...	20.04½	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	arr	24	17.19½	17.50½	...	18.21½	...	18.49	19.19½	...	...	...	20.18½	...	21.20½	...	22.21½	...	...
	plt	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	26	17.20	17.51	18/02½	18.22	18/31½	18.49½	19.20	19/48	19/58	...	20.19	20/44½	21.21	21/47½	22.22	22/37	22/52½
	dep-line	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	28										...							
Newsham	arr	29	17.23	17.54	...	18.25	...	18.52½	19.23	...	...	...	20.22	...	21.24	...	22.25	...	...
	plt	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	31	17.24	17.55	18/06	18.26	18/35	18.53½	19.24	19/50½	20/01½	...	20.23	20/48	21.25	21/51	22.26	22/40½	22/55
	dep-line	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	33										...							
Hartley North	plt	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	35	17/26	17/57	18/07½	18/28	18/36½	18/55½	19/26	19/52	20/03	...	20/25	20/49½	21/27	21/52½	22/28	22/42	22/56½
	dep-line	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	37										...							
Seaton Delaval	arr	38	17.28½	17.59½	...	18.30½	...	18.58	19.28½	...	...	...	20.27½	...	21.29½	...	22.30½	...	...
	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	17.29	18.00	18/11	18.31	18/40	18.58½	19.29	19/54½	20/06½	...	20.28	20/53	21.30	21/56	22.31	22/45½	22/59
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42										...							
Segill	plt	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	44	17/30½	18/01½	18/12½	18/32½	18/41½	19/00	19/30½	19/55½	20/08	...	20/29½	20/54½	21/31½	21/57½	22/32½	22/47	23/00
	dep-line	45	RL	RL	RL	RL	RL	RL	RL	...	RL	...	RL	RL	RL	RL	RL	RL	...
	mgn	46			(2)		(3½)				(2)	...							
Holywell LC	plt	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	48	17/32	18/03	18/17	18/34	18/47½	19/01½	19/32	19/57	20/12½	...	20/31	20/57	21/33	22/00	22/34	22/49½	23/01½
	dep-line	49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	50										...							
Northumberland Parkway	arr	51	17.33½	18.04½	...	18.35½	...	19.03	19.33½	...	...	...	20.32½	...	21.34½	...	22.35½	...	...
	plt	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	17.34	18.05	18/19	18.36	18/49½	19.03½	19.34	19/58½	20/14½	...	20.33	20/59	21.35	22/02	22.36	22/51½	23/03
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55										...							
Benton East Jn	plt	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	57	17/36	18/07	18/22	18/38	18/52½	19/05½	19/36	20/00½	20/17½	...	20/35	21/02	21/37	22/05	22/38	22/54½	23/05
	dep-line	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	59	(2½)		(1)		(8½)			(9½)	(6½)	...		(14½)		(11½)			(5)
Benton Nth Jn	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	17/40½	18/09	18/25	18/40	19/03	19/07½	19/38	20/12	20/26	...	20/37	21/18½	21/39	22/18½	22/40	22/56½	23/12
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63	[1]	[1]		[1]		[1]	[1]			...	[1]		[1]		[1]		
Heaton Sth. Jn.	arr	64	...	...	18.30½	...	19.08½	...	...	...	20.31½	...	...	21.24	...	22.24	...	23.02	...
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	17/44	18/12½	...	18/43½	...	19/11	19/41½	20/14½	...	...	20/40½	...	21/42½	...	22/43½	...	23/14½
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	68	{½}		...	(2)	...			[1]	...	...		...		...		...	[1]
Manors	arr	69	...	18.14	...	...	...	19.12½	19.43	...	...	...	20.42	...	21.44	...	22.45	...	...
	plt	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	71	...	18.15	...	...	...	19.13½	19.44	...	...	...	20.43	...	21.45	...	22.46	...	...
	dep-line	72	...	...	...	...	...	SL	...	...	...	...	...	...	...	...	...	...	...
	mgn	73	...	{½}	...	...	...	{½}	{½}	...	...	...	{½}	...	{½}	...	{½}	...	...
Newcastle	arr	74	17.47	18.17	...	18.48	...	19.16	19.46	20+18	...	...	20.45	...	21.47	...	22.48	...	23+18
	plt	75	1	1	...	1	...	5	1	1	...	...	1	...	1	...	1	...	1

Infrastructure Phase 1 with class 230 (Option A1)

Northbound

			1	2	3	4	5	6	7	8	9	10	11	12	13
Formed By							2B00AA		2B01AA			2B03AA	2B04AA		2B06AA
Signal ID			**6A13AA**	**5A00XX**	**5A02XX**	**6A00AA**	**2A00AA**	**6A01AA**	**2A01AA**	**6Z14AA**	**6A02AA**	**2A03AA**	**2A04AA**	**6A03AA**	**2A06AA**
Orig. Dep. Time			23.09	05+21	06+27	06.12½	06.30	07.05	07.30	08.02½	07.57	08.31	08.59	09.11	09.58
Orig. Loc. Name			Heaton North Jn	Bedl'Ton Furnaceway Sdgs	Bedl'Ton Furnaceway Sdgs	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Bedl'Ton Furnaceway Sdgs	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle
Dest. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Bedlington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington
Timing Load			**60H66S24**	**230**	**230**	**60H66S24**	**230**	**60H66S24**	**230**	**60H66S24**	**60H66S24**	**230**	**230**	**60H66S24**	**230**
Operating Characteristics															
TOC			PE	ED	ED	PE	ED	PE	ED	PE	PE	ED	ED	PE	ED
Day of Operation			**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New
To Form															
Newcastle	plt	1	...	...	...	...	1	...	1	...	...	1	1	...	5
	dep	2	...	...	...	...	**06.30**	...	**07.30**	...	...	**08.31**	**08.59**	...	**09.58**
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	SL
	mgn	4	...	...	...	...		...		...	...			...	
Manors	arr	5	...	...	...	...	**06.31½**	...	**07.31½**	...	...	**08.32½**	...	...	...
	plt	6	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	7	...	...	...	...	**06.32½**	...	**07.32½**	...	...	**08.33½**	...	...	...
	dep-line	8	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	9	...	...	...	...		...		...	...		...	...	...
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	...	...	...	...	*06/34½*	...	*07/34½*	...	...	*08/35½*	*09/02*	...	*10/01*
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13	...	...	...	...		...		...	...			...	<½>
Benton Nth Jn	plt	14	...	...	...	...	DM	...	DM	...	...	DM	DM	...	DM
	dep	15	...	...	...	*06/19*	*06/37*	*07/11½*	*07/37*	...	*08/03½*	*08/38*	*09/04½*	*09/17½*	*10/04*
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	...	...	...	(3½)		(5½)		...		(2)	(2½)	(20)	(2½)
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	...	...	...	*06/25*	*06/39*	*07/19½*	*07/39*	...	*08/06*	*08/42*	*09/09*	*09/40*	*10/08½*
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21	...	...	...					...					
Northumberland Parkway	arr	22	...	...	...	...	**06.40½**	...	**07.40½**	...	...	**08.43½**	**09.10½**	...	**10.10**
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	...	...	...	*06/28*	**06.41**	*07/22½*	**07.41**	...	*08/09*	**08.44**	**09.11**	*09/43*	**10.10½**
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26	...	...	...					...					
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	...	...	...	*06/29½*	*06/42½*	*07/24*	*07/42½*	...	*08/10½*	*08/45½*	*09/12½*	*09/44½*	*10/12*
	dep-line	29	...	...	...	LL	RL	LL	RL	...	LL	RL	RL	LL	RL
	mgn	30	...	...	...					...					
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	...	...	...	*06/32*	*06/44*	*07/26½*	*07/44*	...	*08/13*	*08/47*	*09/14*	*09/47*	*10/13½*
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34	...	...	...					...					
Seaton Delaval	plt	35	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	36	...	...	...	*06/33*	*06/45*	*07/27½*	*07/45*	...	*08/14*	*08/48*	*09/15*	*09/48*	*10/14½*
	dep-line	37	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	38	...	...	...					...					
Hartley North	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	...	...	...	*06/35½*	*06/47*	*07/30*	*07/47*	...	*08/16½*	*08/50*	*09/17*	*09/50½*	*10/16½*
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42	...	...	...					...					
Newsham	arr	43	...	...	...	...	**06.48½**	...	**07.48½**	...	...	**08.51½**	**09.18½**	...	**10.18**
	plt	44	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	45	...	...	...	*06/37½*	**06.49½**	*07/32*	**07.49½**	...	*08/18½*	**08.52½**	**09.19½**	*09/52½*	**10.19**
	dep-line	46	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	47	...	...	...					...					
Blyth Parkway	plt	48	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	49	...	...	...	*06/41*	*06/52*	*07/35½*	*07/52*	...	*08/22*	*08/55*	*09/22*	*09/56*	*10/21½*
	dep-line	50	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	51	...	...	...					...					
Bedl'Ton Furnaceway Sdgs	arr	52	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	53	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	54	...	**05+21**	**06+27**	...	...	...	...	**08.02½**	...	...	...	...	...
	dep-line	55	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	56	...			...	...	...	...	...	...	...	...	...	...
Bedlington	arr	57	...	**05.22½**	**06.28½**	...	**06.54**	...	**07.54**	*08/04*	...	**08.57**	**09.24**	...	**10.23½**
	plt	58	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	59	...	**05.22½**	**06.28½**	*06/43½*	**06.55**	*07/38*	**07.55**	...	*08/24½*	**08.58**	**09.25**	*09/58½*	**10.24½**
	dep-line	60	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	61	...					(4½)		...					
West Sleekburn Jn	arr	62	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	63	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	64	...	*05/24½*	*06/30½*	*06/47½*	*06/57*	*07/46½*	*07/57*	...	*08/28½*	*09/00*	*09/27*	*10/02½*	*10/26½*
	dep-line	65	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	66	...							...					
Marcheys House Jn	plt	67	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	68	...	*05/25*	*06/31*	*06/48½*	*06/57½*	*07/47½*	*07/57½*	...	*08/29½*	*09/00½*	*09/27½*	*10/03½*	*10/27*
	dep-line	69	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	70	...	<2>	<2>					...					
Ashington	arr	71	<---	**05+29½**	**06+35½**	...	**07.00**	...	**08.00**	...	...	**09.03**	**09.30**	...	**10.29½**
	plt	72	...	BAY	BAY	1	BAY	1	BAY	...	1	BAY	BAY	1	BAY
	dep	73	...	...	...	*06/51½*	...	*07/50½*	...	...	*08/32½*	...	...	*10/06½*	...
	dep-line	74	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	75	...	...	...		...		...	...	{½}	...	...	{½}	...
Lynemouth Power Stn (FHH)	arr	76	**00.00**	...	...	**07.06½**	...	**08.05½**	...	...	**08.48**	...	...	**10.22**	...
	plt	77	...	...	...	...	...	...	...	...	...	...	...	...	...

			14	15	16	17	18	19	20	21	22	23	24	25	26
Formed By			2B07AA		2B09AA		2B11AA		2B13AA		2B15AA		2B17AA		2B19AA
Signal ID			**2A07AA**	**6A04AA**	**2A09AA**	**6A05AA**	**2A11AA**	**6A06AA**	**2A13AA**	**6A07AA**	**2A15AA**	**6A08AA**	**2A17AA**	**6A09AA**	**2A19AA**
Orig. Dep. Time			10.30½	11.09	11.28	12.08	12.30	12.46	13.28	13.40	14.32½	15.09	15.31	16.15½	16.30
Orig. Loc. Name			Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle
Dest. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington
Timing Load			**230**	**60H66S24**	**230**	**60H66S24**	**230**	**60H66S24**	**230**	**60H66S24**	**230**	**60H66S24**	**230**	**60H66S24**	**230**
Operating Characteristics															
TOC			ED	PE	ED	PE	ED	PE	ED	PE	ED	PE	ED	PE	ED
Day of Operation			**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New
To Form															
Newcastle	plt	1	1	...	1	...	1	...	1	...	1	...	1	...	1
	dep	2	**10.30½**	...	**11.28**	...	**12.30**	...	**13.28**	...	**14.32½**	...	**15.31**	...	**16.30**
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4		...		...		...		...		...		...	
Manors	arr	5	**10.32**	...	**11.29½**	...	**12.31½**	...	**13.29½**	...	**14.34**	...	**15.32½**	...	**16.31½**
	plt	6	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	7	**10.33**	...	**11.30½**	...	**12.32½**	...	**13.30½**	...	**14.35**	...	**15.33½**	...	**16.32½**
	dep-line	8	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	9		...	(½)	...		...		...		...		...	
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	*10/35*	...	*11/33*	...	*12/34½*	...	*13/32½*	...	*14/37*	...	*15/35½*	...	*16/34½*
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13		...		...		...		...		...		...	
Benton Nth Jn	plt	14	DM	...	DM	...	DM	...	DM	...	DM	...	DM	...	DM
	dep	15	*10/37½*	*11/15½*	*11/35½*	*12/14½*	*12/37*	*12/52½*	*13/35*	*13/46½*	*14/39½*	*15/15½*	*15/38*	*16/22*	*16/37*
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	(½)	(2)		(2)		(13)		(18)		(3)	(1)		
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	*10/40*	*11/20*	*11/37½*	*12/19*	*12/39*	*13/08*	*13/37*	*14/07*	*14/41½*	*15/21*	*15/41*	*16/24½*	*16/39*
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21													
Northumberland Parkway	arr	22	**10.41½**	...	**11.39**	...	**12.40½**	...	**13.38½**	...	**14.43**	...	**15.42½**	...	**16.40½**
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	**10.42**	*11/23*	**11.39½**	*12/22*	**12.41**	*13/11*	**13.39**	*14/10*	**14.43½**	*15/24*	**15.43**	*16/27½*	**16.41**
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26													
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	*10/43½*	*11/24½*	*11/41*	*12/23½*	*12/42½*	*13/12½*	*13/40½*	*14/11½*	*14/45*	*15/25½*	*15/44½*	*16/29*	*16/42½*
	dep-line	29	RL	LL	RL	LL	RL	LL	RL	LL	RL	LL	RL	LL	RL
	mgn	30													
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	*10/45*	*11/27*	*11/42½*	*12/26*	*12/44*	*13/15*	*13/42*	*14/14*	*14/46½*	*15/28*	*15/46*	*16/31½*	*16/44*
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34													
Seaton Delaval	plt	35	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	36	*10/46*	*11/28*	*11/43½*	*12/27*	*12/45*	*13/16*	*13/43*	*14/15*	*14/47½*	*15/29*	*15/47*	*16/32½*	*16/45*
	dep-line	37	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	38													
Hartley North	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	*10/48*	*11/30½*	*11/45½*	*12/29½*	*12/47*	*13/18½*	*13/45*	*14/17½*	*14/49½*	*15/31½*	*15/49*	*16/35*	*16/47*
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42													
Newsham	arr	43	**10.49½**	...	**11.47**	...	**12.48½**	...	**13.46½**	...	**14.51**	...	**15.50½**	...	**16.48½**
	plt	44	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	45	**10.50½**	*11/32½*	**11.48**	*12/31½*	**12.49½**	*13/20½*	**13.47½**	*14/19½*	**14.52**	*15/33½*	**15.51½**	*16/37*	**16.49½**
	dep-line	46	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	47													
Blyth Parkway	plt	48	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	49	*10/53*	*11/36*	*11/50½*	*12/35*	*12/52*	*13/24*	*13/50*	*14/23*	*14/54½*	*15/37*	*15/54*	*16/40½*	*16/52*
	dep-line	50	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	51													
Bedl'Ton Furnaceway Sdgs	arr	52	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	53	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	54	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep-line	55	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	56	...	...	...	...	...	...	...	...	...	...	...	...	...
Bedlington	arr	57	**10.55**	...	**11.52½**	...	**12.54**	...	**13.52**	...	**14.56½**	...	**15.56**	...	**16.54**
	plt	58	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	59	**10.56**	*11/38½*	**11.53½**	*12/37½*	**12.55**	*13/26½*	**13.53**	*14/25½*	**14.57½**	*15/39½*	**15.57**	*16/43*	**16.55**
	dep-line	60	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	61		(4)		(7)						(6)		(3½)	
West Sleekburn Jn	arr	62	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	63	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	64	*10/58*	*11/46½*	*11/55½*	*12/48½*	*12/57*	*13/30½*	*13/55*	*14/29½*	*14/59½*	*15/49½*	*15/59*	*16/50½*	*16/57*
	dep-line	65	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	66													
Marcheys House Jn	plt	67	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	68	*10/58½*	*11/47½*	*11/56*	*12/49½*	*12/57½*	*13/31½*	*13/55½*	*14/30½*	*15/00*	*15/50½*	*15/59½*	*16/51½*	*16/57½*
	dep-line	69	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	70													
Ashington	arr	71	**11.01**	...	**11.58½**	...	**13.00**	...	**13.58**	...	**15.02½**	...	**16.02**	...	**17.00**
	plt	72	BAY	1	BAY	1	BAY	1	BAY	1	BAY	1	BAY	1	BAY
	dep	73	...	*11/50½*	...	*12/52½*	...	*13/34½*	...	*14/33½*	...	*15/53½*	...	*16/54½*	...
	dep-line	74	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	75	...	{½}	...	{½}	...	{½}	...	{½}	...	{½}	...		...
Lynemouth Power Stn (FHH)	arr	76	...	**12.06**	...	**13.08**	...	**13.50**	...	**14.49**	...	**16.09**	...	**17.09½**	...
	plt	77	...	...	...	...	...	...	...	...	...	...	...	...	...

			27	28	29	30	31	32	33	34	35	36	37	38
Formed By			2B21AA	2B22AA	2B24AA	2B26AA			2B27AA		2B28AA			
Signal ID			**2A21AA**	**2A22BB**	**2A24AA**	**2A26AA**	**6Z16AA**	**6A10AA**	**2A27AA**	**6A11AA**	**2A28AA**	**6A12AA**	**6A13AA**	**5A00XX**
Orig. Dep. Time			17.30	18.00	18.59	19.57	20.29½	20.12	20.56	21.05	21.59	22.09	23.09	23+22
Orig. Loc. Name			Newcastle	Newcastle	Newcastle	Newcastle	Bedl'Ton Furnaceway Sdgs	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Heaton North Jn	Newcastle
Dest. Loc. Name			Ashington	Ashington	Ashington	Ashington	West Sleekburn Jn	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Lynemouth Power Stn (FHH)	Bedl'Ton Furnaceway Sdgs
Timing Load			**230**	**230**	**230**	**230**	**60H66S24**	**60H66S24**	**230**	**60H66S24**	**230**	**60H66S24**	**60H66S24**	**170**
Operating Characteristics														
TOC			ED	ED	ED	ED	PE	PE	ED	PE	ED	PE	PE	ED
Day of Operation			**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**	**ThO**
Changes			New	New	New	New	New	New	New	New	New	New	New	New
To Form														
Newcastle	plt	1	1	1	1	1	...	...	1	...	1	...	...	1
	dep	2	**17.30**	**18.00**	**18.59**	**19.57**	...	...	**20.56**	...	**21.59**	...	...	**23+22**
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4					...	...		...		...	...	
Manors	arr	5	**17.31½**	...	**19.00½**	**19.58½**	...	...	**20.57½**	...	**22.00½**	...	...	...
	plt	6	...	...	...	2	...	...	...	...	...	...	...	...
	dep	7	**17.32½**	...	**19.01½**	**19.59**	...	...	**20.58½**	...	**22.01½**	...	...	...
	dep-line	8	...	...	ML	...	...	...	ML	...	ML	...	...	...
	mgn	9		...			...	...		...		...	...	...
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	*17/34½*	*18/03*	*19/03½*	*20/01*	...	...	*21/00½*	...	*22/03½*	...	...	*23/25*
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13					...	...		...		...	...	
Benton Nth Jn	plt	14	DM	DM	DM	DM	...	...	DM	...	DM	...	...	DM
	dep	15	*17/37*	*18/05½*	*19/06*	*20/03½*	...	*20/18½*	*21/03*	*21/11½*	*22/06*	*22/15½*	*23/15½*	*23/27½*
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17					...	(17)	(2)	(26)	(1)	(23)		
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	*17/39*	*18/07½*	*19/08*	*20/05½*	...	*20/38*	*21/07*	*21/40*	*22/09*	*22/41*	*23/18*	*23/29½*
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21					...							
Northumberland Parkway	arr	22	**17.40½**	**18.09**	**19.09½**	**20.07**	...	...	**21.08½**	...	**22.10½**	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	**17.41**	**18.09½**	**19.10**	**20.07½**	...	*20/41*	**21.09**	*21/43*	**22.11**	*22/44*	*23/21*	*23/31½*
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26					...							
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	*17/42½*	*18/11*	*19/11½*	*20/09*	...	*20/42½*	*21/10½*	*21/44½*	*22/12½*	*22/45½*	*23/22½*	*23/33*
	dep-line	29	RL	RL	RL	RL	...	LL	RL	LL	RL	LL	LL	...
	mgn	30					...							
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	*17/44*	*18/12½*	*19/13*	*20/10½*	...	*20/45*	*21/12*	*21/47*	*22/14*	*22/48*	*23/25*	*23/34½*
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34					...							
Seaton Delaval	plt	35	...	...	...	...	...	...	...	...	...	...	...	...
	dep	36	*17/45*	*18/13½*	*19/14*	*20/11½*	...	*20/46*	*21/13*	*21/48*	*22/15*	*22/49*	*23/26*	*23/35½*
	dep-line	37	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	38					...							
Hartley North	plt	39	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	*17/47*	*18/15½*	*19/16*	*20/13½*	...	*20/48½*	*21/15*	*21/50½*	*22/17*	*22/51½*	*23/28½*	*23/37½*
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42					...							
Newsham	arr	43	**17.48½**	**18.17**	**19.17½**	**20.15**	...	...	**21.16½**	...	**22.18½**	...	...	...
	plt	44	...	...	...	...	...	...	...	...	...	...	...	...
	dep	45	**17.49½**	**18.18**	**19.18½**	**20.16**	...	*20/50½*	**21.17½**	*21/52½*	**22.19½**	*22/53½*	*23/30½*	*23/39*
	dep-line	46	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	47					...							
Blyth Parkway	plt	48	...	...	...	...	...	...	...	...	...	...	...	...
	dep	49	*17/52*	*18/20½*	*19/21*	*20/18½*	...	*20/54*	*21/20*	*21/56*	*22/22*	*22/57*	*23/34*	*23/41½*
	dep-line	50	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	51					...							
Bedl'Ton Furnaceway Sdgs	arr	52	...	...	...	...	...	...	...	...	...	...	...	**23+49½**
	plt	53	...	...	...	...	...	...	...	...	...	...	...	...
	dep	54	...	...	...	...	**20.29½**	...	...	...	...	...	...	...
	dep-line	55	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	56	...	...	...	...		...	...	...	...	...	...	...
Bedlington	arr	57	**17.54**	**18.22½**	**19.23**	**20.20½**	...	...	**21.22**	...	**22.24**	...	...	...
	plt	58	...	...	...	...	...	...	...	...	...	...	...	...
	dep	59	**17.55**	**18.23½**	**19.24**	**20.21½**	*20/31*	*20/56½*	**21.23**	*21/58½*	**22.25**	*22/59½*	*23/36½*	...
	dep-line	60	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	61												...
West Sleekburn Jn	arr	62	...	...	...	...	*20/35*	...	...	...	...	...	...	...
	plt	63	...	...	...	...	...	...	...	...	...	...	...	...
	dep	64	*17/57*	*18/25½*	*19/26*	*20/23½*	...	*21/00½*	*21/25*	*22/02½*	*22/27*	*23/03½*	*23/40½*	...
	dep-line	65	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	66					...							...
Marcheys House Jn	plt	67	...	...	...	...	...	...	...	...	...	...	...	...
	dep	68	*17/57½*	*18/26*	*19/26½*	*20/24*	...	*21/01½*	*21/25½*	*22/03½*	*22/27½*	*23/04½*	*23/41½*	...
	dep-line	69	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	70					...							...
Ashington	arr	71	**18.00**	**18.28½**	**19.29**	**20.26½**	...	...	**21.28**	...	**22.30**	...	...	...
	plt	72	BAY	BAY	BAY	BAY	...	1	BAY	1	BAY	1	1	...
	dep	73	...	...	...	...	...	*21/04½*	...	*22/06½*	...	*23/07½*	*23/44½*	...
	dep-line	74	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	75	...	...	...	...	...	{½}	...	{½}	...	{½}	{½}	...
Lynemouth Power Stn (FHH)	arr	76	...	...	...	...	...	**21.20**	...	**22.22**	...	**23.23**	--->	...
	plt	77	...	...	...	...	...	...	...	...	...	...	...	...

Southbound

			1	2	3	4	5	6	7	8	9	10	11	12	13
Formed By															
Signal ID			2B00AA	6B00AA	2B01AA	6B01AA	6Z18AA	2B03AA	6B02AA	2B04AA	6B03AA	2B06AA	2B07AA	6B04AA	2B09AA
Orig. Dep. Time			05.39½	05.32	06.41½	06.34	07/05½	07.40½	07.49	08.16½	08.23	09.14½	09.43½	09.54	10.41½
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	West Sleekburn Jn	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle
Timing Load			230	60H66S24	230	60H66S24	60H66S24	230	60H66S24	230	60H66S24	230	230	60H66S24	230
Operating Characteristics															
TOC			ED	PE	ED	PE	PE	ED	PE	ED	PE	ED	ED	PE	ED
Day of Operation			ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New
To Form			2A00AA		2A01AA			2A03AA		2A04AA		2A06AA	2A07AA		2A09AA
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	...	05.32	...	06.34	...	...	07.49	...	08.23	...	...	09.54	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...		...		...	...	{½}	...	{½}	...	...	{½}	...
Ashington	plt	5	BAY	ML	BAY	ML	...	BAY	ML	BAY	ML	BAY	BAY	ML	BAY
	dep	6	05.39½	05/47	06.41½	06/49	...	07.40½	08/04½	08.16½	08/38½	09.14½	09.43½	10/09½	10.41½
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8					...								
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	05/42	05/50	06/44	06/52	...	07/43	08/07½	08/19	08/41½	09/17	09/46	10/12½	10/44
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12					...								
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	05/42½	05/51	06/44½	06/53	07/05½	07/43½	08/08½	08/19½	08/42½	09/17½	09/46½	10/13½	10/44½
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16													
Bedlington	arr	17	05.45	...	06.47	...	...	07.46	...	08.22	...	09.20	09.49	...	10.47
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	05.46	05/53	06.48	06/55	07/07½	07.47	08/10½	08.23	08/44½	09.21	09.50	10/15½	10.48
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21													
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	07.10	...	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	plt	24	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	25	05/48	05/57	06/50	06/59	...	07/49	08/14½	08/25	08/48½	09/23	09/52	10/19½	10/50
	dep-line	26	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	27					...								
Newsham	arr	28	05.50½	...	06.52½	...	...	07.51½	...	08.27½	...	09.25½	09.54½	...	10.52½
	plt	29	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	30	05.51½	06/00½	06.53½	07/02½	...	07.52½	08/18	08.28½	08/52	09.26½	09.55½	10/23	10.53½
	dep-line	31	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	32					...								
Hartley North	plt	33	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	34	05/53½	06/02	06/55½	07/04	...	07/54½	08/19½	08/30½	08/53½	09/28½	09/57½	10/24½	10/55½
	dep-line	35	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	36					...								
Seaton Delaval	plt	37	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	38	05/55½	06/05½	06/57½	07/07½	...	07/56½	08/23	08/32½	08/57	09/30½	09/59½	10/28	10/57½
	dep-line	39	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	40					...								
Segill	plt	41	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	42	05/56½	06/07	06/58½	07/09	...	07/57½	08/24½	08/33½	08/58½	09/31½	10/00½	10/29½	10/58½
	dep-line	43	RL	RL	RL	RL	...	RL	RL	RL	RL	RL	RL	RL	RL
	mgn	44					...								
Holywell LC	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	05/58	06/09½	07/00	07/11½	...	07/59	08/27	08/35	09/01	09/33	10/02	10/32	11/00
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48					...								
Northumberland Parkway	arr	49	05.59½	...	07.01½	...	...	08.00½	...	08.36½	...	09.34½	10.03½	...	11.01½
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	06.00	06/11½	07.02	07/13½	...	08.01	08/29	08.37	09/03	09.35	10.04	10/34	11.02
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53					...								
Benton East Jn	plt	54	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	55	06/02	06/14½	07/04	07/16½	...	08/03	08/32	08/39	09/06	09/37	10/06	10/37	11/04
	dep-line	56	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	57	(2)	(12)		(6)	...	<2>	(1½)		(16½)	(1)		(2)	
Benton Nth Jn	plt	58	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	59	06/06	06/28½	07/06	07/24½	...	08/07	08/35½	08/41	09/24½	09/40	10/08	10/41	11/06
	dep-line	60	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	61	[1]		[1]		...	[1]		[1]		[1],{½}	[1]		[1]
Heaton Sth. Jn.	arr	62	...	06.34	...	07.30	...	...	08.41	...	09.30	...	...	10.46½	...
	plt	63	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	64	06/09½	...	07/09½	...	...	08/10½	...	08/44½	...	09/44	10/11½	...	11/09½
	dep-line	65	...	...	...	...	...	...	...	...	...	SL	...	...	...
	mgn	66		...		...	...		...		...	{½}		...	
Manors	arr	67	06.11	...	07.11	...	...	08.12	...	08.46	...	...	10.13	...	11.11
	plt	68	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	69	06.12	...	07.12	...	...	08.13	...	08.47	...	...	10.14	...	11.12
	dep-line	70	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	71	{½}	...	{½}	...	...	{½}	...	{½}	...	...	{½}	...	{½}
Newcastle	arr	72	06.14	...	07.14	...	...	08.15	...	08.49	...	09.48	10.16	...	11.14
	plt	73	1	...	1	...	...	1	...	1	...	5	1	...	1

			14	15	16	17	18	19	20	21	22	23	24	25	26	27
Formed By																
Signal ID			6B05AA	2B11AA	6B06AA	2B13AA	6B07AA	2B15AA	6B08AA	2B17AA	6B09AA	2B19AA	6B10AA	2B21AA	6B11AA	2B22AA
Orig. Dep. Time			10.34	11.40½	11.33	12.42½	12.51	13.41½	13.50	14.42½	14.35	15.43½	15.39	16.44½	16.37	17.13½
Orig. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington
Dest. Loc. Name			Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle
Timing Load			60H66S24	230	60H66S24	230	60H66S24	230	60H66S24	230	60H66S24	230	60H66S24	230	60H66S24	230
Operating Characteristics																
TOC			PE	ED	PE	ED	PE	ED	PE	ED	PE	ED	PE	ED	PE	ED
Day of Operation			ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form				2A11AA		2A13AA		2A15AA		2A17AA		2A19AA		2A21AA		2A22BB
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	10.34	...	11.33	...	12.51	...	13.50	...	14.35	...	15.39	...	16.37	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	{½}	...	{½}	...	{½}	...	{½}	...	{½}	...		...		...
Ashington	plt	5	ML	BAY	ML	BAY	ML	BAY	ML	BAY	ML	BAY	ML	BAY	ML	BAY
	dep	6	10/49½	11.40½	11/48½	12.42½	13/06½	13.41½	14/05½	14.42½	14/50½	15.43½	15/54	16.44½	16/52	17.13½
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8														
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	10/52½	11/43	11/51½	12/45	13/09½	13/44	14/08½	14/45	14/53½	15/46	15/57	16/47	16/55	17/16
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12														
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	10/53½	11/43½	11/52½	12/45½	13/10½	13/44½	14/09½	14/45½	14/54½	15/46½	15/58	16/47½	16/56	17/16½
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16														
Bedlington	arr	17	...	11.46	...	12.48	...	13.47	...	14.48	...	15.49	...	16.50	...	17.19
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	10/55½	11.47	11/54½	12.49	13/12½	13.48	14/11½	14.49	14/56½	15.50	16/00	16.51	16/58	17.20
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21														
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	plt	24	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	25	10/59½	11/49	11/58½	12/51	13/16½	13/50	14/15½	14/51	15/00½	15/52	16/04	16/53	17/02	17/22
	dep-line	26	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	27														
Newsham	arr	28	...	11.51½	...	12.53½	...	13.52½	...	14.53½	...	15.54½	...	16.55½	...	17.24½
	plt	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	30	11/03	11.52½	12/02	12.54½	13/20	13.53½	14/19	14.54½	15/04	15.55½	16/07½	16.56½	17/05½	17.25½
	dep-line	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	32														
Hartley North	plt	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	34	11/04½	11/54½	12/03½	12/56½	13/21½	13/55½	14/20½	14/56½	15/05½	15/57½	16/09	16/58½	17/07	17/27½
	dep-line	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	36														
Seaton Delaval	plt	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	38	11/08	11/56½	12/07	12/58½	13/25	13/57½	14/24	14/58½	15/09	15/59½	16/12½	17/00½	17/10½	17/29½
	dep-line	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	40														
Segill	plt	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	42	11/09½	11/57½	12/08½	12/59½	13/26½	13/58½	14/25½	14/59½	15/10½	16/00½	16/14	17/01½	17/12	17/30½
	dep-line	43	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL
	mgn	44														
Holywell LC	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	11/12	11/59	12/11	13/01	13/29	14/00	14/28	15/01	15/13	16/02	16/16½	17/03	17/14½	17/32
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48														
Northumberland Parkway	arr	49	...	12.00½	...	13.02½	...	14.01½	...	15.02½	...	16.03½	...	17.04½	...	17.33½
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	11/14	12.01	12/13	13.03	13/31	14.02	14/30	15.03	15/15	16.04	16/18½	17.05	17/16½	17.34
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53														
Benton East Jn	plt	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	55	11/17	12/03	12/16	13/05	13/34	14/04	14/33	15/05	15/18	16/06	16/21½	17/07	17/19½	17/36
	dep-line	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	57	(4½)		(4½)	<2>	(24½)	<2>	(21)		(11½)		(7)		<2½>	(2½)
Benton Nth Jn	plt	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	59	11/23½	12/05	12/22½	13/09	14/00½	14/08	14/56	15/07	15/31½	16/08	16/30½	17/09	17/24	17/40½
	dep-line	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	61		[1]		[1]		[1]	{½}	[1]		[1]		[1]		[1]
Heaton Sth. Jn.	arr	62	11.29	...	12.28	...	14.06	...	15.02	...	15.37	...	16.36	...	17.29½	...
	plt	63	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	64	...	12/08½	...	13/12½	...	14/11½	...	15/10½	...	16/11½	...	17/12½	...	17/44
	dep-line	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	66	...		...		...		...		...		...		...	{½}
Manors	arr	67	...	12.10	...	13.14	...	14.13	...	15.12	...	16.13	...	17.14	...	...
	plt	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	69	...	12.11	...	13.15	...	14.14	...	15.13	...	16.14	...	17.15	...	...
	dep-line	70	...	...	...	...	...	...	...	...	...	...	...	ML	...	...
	mgn	71	...	{½}	...	{½}	...	{½}	...	{½}	...	{½}	...	{½}	...	...
Newcastle	arr	72	...	12.13	...	13.17	...	14.16	...	15.15	...	16.16	...	17.17	...	17.47
	plt	73	...	1	...	1	...	1	...	1	...	1	...	1	...	1

			28	29	30	31	32	33	34	35	36	37	38	39	40	41
Formed By																
Signal ID			6B12AA	2B24AA	6B13AA	2B26AA	6B14AA	6Z20AA	2B27AA	6B15AA	2B28AA	6B16AA	2B29AA	6B17AA	5B00XX	5A00XX
Orig. Dep. Time			17.22	18.13½	18.21	19.11½	19.04	20/02	20.12½	20.21	21.14½	21.23	22.15½	22.25	23+21	23+22
Orig. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Bedlington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Newcastle
Dest. Loc. Name			Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Bedl'Ton Furnaceway Sdgs
Timing Load			60H66S24	230	60H66S24	230	60H66S24	60H66S24	230	60H66S24	230	60H66S24	230	60H66S24	230	170
Operating Characteristics																
TOC			PE	ED	PE	ED	PE	PE	ED	PE	ED	PE	ED	PE	ED	ED
Day of Operation			ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO	ThO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form				2A24AA		2A26AA			2A27AA		2A28AA					
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	17.22	...	18.21	...	19.04	...	...	20.21	...	21.23	...	22.25	...	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4		...		...		...	...	{½}	...	{½}	...	{½}	...	...
Ashington	plt	5	ML	BAY	ML	BAY	ML	...	BAY	ML	BAY	ML	BAY	ML	BAY	...
	dep	6	17/37	18.13½	18/36	19.11½	19/19	...	20.12½	20/36½	21.14½	21/38½	22.15½	22/40½	23+21	...
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8						...								...
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	17/40	18/16	18/39	19/14	19/22	...	20/15	20/39½	21/17	21/41½	22/18	22/43½	23/23½	...
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12						...								...
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	17/41	18/16½	18/40	19/14½	19/23	...	20/15½	20/40½	21/17½	21/42½	22/18½	22/44½	23/24	...
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16						...								...
Bedlington	arr	17	...	18.19	...	19.17	...	...	20.18	...	21.20	...	22.21	...	23.26½	23*43
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	17/43	18.20	18/42	19.18	19/25	20/02	20.19	20/42½	21.21	21/44½	22.22	22/46½	23.26½	23.47
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21														
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	...	20.04½	...	...	...	...	...	...	23+29	23+49½
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	plt	24	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	25	17/47	18/22	18/46	19/20	19/29	...	20/21	20/46½	21/23	21/48½	22/24	22/50½	...	...
	dep-line	26	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	27						...							...	...
Newsham	arr	28	...	18.24½	...	19.22½	...	...	20.23½	...	21.25½	...	22.26½	...	...	...
	plt	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	30	17/50½	18.25½	18/49½	19.23½	19/32½	...	20.24½	20/50	21.26½	21/52	22.27½	22/54	...	...
	dep-line	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	32						...							...	...
Hartley North	plt	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	34	17/52	18/27½	18/51	19/25½	19/34	...	20/26½	20/51½	21/28½	21/53½	22/29½	22/55½	...	...
	dep-line	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	36						...							...	...
Seaton Delaval	plt	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	38	17/55½	18/29½	18/54½	19/27½	19/37½	...	20/28½	20/55	21/30½	21/57	22/31½	22/59	...	...
	dep-line	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	40						...							...	...
Segill	plt	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	42	17/57	18/30½	18/56	19/28½	19/39	...	20/29½	20/56½	21/31½	21/58½	22/32½	23/00½	...	...
	dep-line	43	RL	RL	RL	RL	RL	...	RL	RL	RL	RL	RL	RL	...	...
	mgn	44						...							...	...
Holywell LC	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	17/59½	18/32	18/58½	19/30	19/41½	...	20/31	20/59	21/33	22/01	22/34	23/03	...	...
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48						...							...	...
Northumberland Parkway	arr	49	...	18.33½	...	19.31½	...	...	20.32½	...	21.34½	...	22.35½	...	...	...
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	18/01½	18.34	19/00½	19.32	19/43½	...	20.33	21/01	21.35	22/03	22.36	23/05	...	...
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53						...							...	...
Benton East Jn	plt	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	55	18/04½	18/36	19/03½	19/34	19/46½	...	20/35	21/04	21/37	22/06	22/38	23/08	...	...
	dep-line	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	57	(18½)	(2)	(17½)	(1)	<3>	...		(12½)		(10½)		(1½)	...	...
Benton Nth Jn	plt	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	59	18/25	18/40	19/23	19/37	19/51½	...	20/37	21/18½	21/39	22/18½	22/40	23/11½	...	...
	dep-line	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	61		[1]		[1]		...	[1]		[1]		[1]		...	...
Heaton Sth. Jn.	arr	62	18.30½	...	19.28½	...	19.57	...	...	21.24	...	22.24	...	23.17	...	...
	plt	63	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	64	...	18/43½	...	19/40½	...	...	20/40½	...	21/42½	...	22/43½	...	...	...
	dep-line	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	66	...		...		...	...		...		...		...	...	...
Manors	arr	67	...	18.45	...	19.42	...	...	20.42	...	21.44	...	22.45	...	...	...
	plt	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	69	...	18.46	...	19.43	...	...	20.43	...	21.45	...	22.46	...	...	...
	dep-line	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	71	...	{½}	...	{½}	...	...	{½}	...	{½}	...	{½}	...	...	...
Newcastle	arr	72	...	18.48	...	19.45	...	...	20.45	...	21.47	...	22.48	...	...	...
	plt	73	...	1	...	1	...	...	1	...	1	...	1	...	...	...

Infrastructure Phase 2 with class 230 (Option A2)

Northbound

Station		Row	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Formed By																				
Signal ID			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Orig. Dep. Time			23.09	05+21	06+26	06.05	06.30	07+26½	07.34½	07.05	07.30	07.57	08.16	08.31	08.59	09.11	09.23½	09.58	10.30½	10.57
Orig. Loc. Name			Heaton North Jn	Bedl'Ton Furnaceway Sdgs	Bedl'Ton Furnaceway Sdgs	Heaton North Jn	Newcastle	Bedl'Ton Furnaceway Sdgs	Bedl'Ton Furnaceway Sdgs	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Newcastle	Newcastle
Dest. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Bedlington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Ashington
Timing Load			60HK6524	230	230	60HK6524	230	230	60HK6524	60HK6524	230	230	60HK6524	230	230	60HK6524	230	230	230	230
Operating Characteristics																				
TOC			PE	ED	ED	PE	ED	ED	PE	PE	ED	ED	PE	ED	ED	PE	ED	ED	ED	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form																				
Newcastle	plt	1	...	...	...	...	1	...	...	...	1	5	...	1	1	...	1	5	1	1
	dep	2	...	...	...	...	06.30	...	...	...	07.30	07.57	...	08.31	08.59	...	09.23½	09.58	10.30½	10.57
	dep-line	3	...	...	...	...	...	...	...	...	...	SL	...	...	...	...	...	SL	...	...
	mgn	4	...	...	...	...	...	...	...	...	...	(½)	...	...	...	...	...	...	...	...
Manors	arr	5	...	...	...	...	06.31½	...	...	...	07.31½	...	...	08.32½	...	...	09.25	...	10.32	...
	plt	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	7	...	...	...	...	06.32½	...	...	...	07.32½	...	...	08.33½	...	...	09.26	...	10.33	...
	dep-line	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	9	...	...	...	...		...	...	...		...	...		...	...		...		...
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	...	...	...	...	06/34½	...	...	...	07/34½	08/01	...	08/35½	09/02	...	09/28	10/01½	10/35	11/00
	dep-line	12	...	...	...	...	...	...	...	...	...	ML	...	...	...	...	...	ML	...	...
	mgn	13	...	...	...	...		...	...	...		<½>	...			...		<½>		
Benton Nth Jn	plt	14	...	...	...	...	DM	...	...	...	DM	DM	...	DM	DM	...	DM	DM	DM	DM
	dep	15	...	...	...	06/11½	06/37	...	...	07/11½	07/37	08/04	08/22½	08/38	09/04½	09/17½	09/30½	10/04½	10/37½	11/02½
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	...	...	...			...	...	(5½)	(1)	(2)		(2)	(2½)	(3½)	(7)	(2)		(2½)
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	...	...	...	06/14	06/39	...	...	07/19½	07/40	08/08	08/25	08/42	09/09	09/23½	09/39½	10/08½	10/39½	11/07
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21	...	...	...			...	...											
Northumberland Parkway	arr	22	...	...	...	...	06.40½	...	...	...	07.41½	08.09½	...	08.43½	09.10½	...	09.41	10.10	10.41	11.08½
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	...	...	...	06/17	06.41	...	...	07/22½	07.42	08.10	08/28	08.44	09.11	09/26½	09.41½	10.10½	10.41½	11.09
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26	...	...	...			...	...											
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	...	...	...	06/18½	06/42½	...	...	07/24	07/43½	08/11½	08/29½	08/45½	09/12½	09/28	09/43	10/12	10/43	11/10½
	dep-line	29	...	...	...	LL	RL	...	...	LL	RL	RL	LL	RL	RL	LL	RL	RL	RL	RL
	mgn	30	...	...	...	(1)		...	...	(9)			(5)			(4½)				
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	...	...	...	06/22	06/44	...	...	07/35½	07/45	08/13	08/37	08/47	09/14	09/35	09/44½	10/13½	10/44½	11/12
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34	...	...	...			...	...											
Seaton Delaval	arr	35	...	...	...	...	06.45	...	...	...	07.46	08.14	...	08.48	09.15	...	09.45½	10.14½	10.45½	11.13
	plt	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	37	...	...	...	06/23	06.45½	...	...	07/36½	07.46½	08.14½	08/38	08.48½	09.15½	09/36	09.46	10.15	10.46	11.13½
	dep-line	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	39	...	...	...			...	...											
Hartley North	plt	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	41	...	...	...	06/25½	06/47½	...	...	07/39	07/48½	08/16½	08/40½	08/50½	09/17½	09/38½	09/48	10/17	10/48	11/15½
	dep-line	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	43	...	...	...			...	...											
Newsham	arr	44	...	...	...	...	06.49	...	...	...	07.50	08.18	...	08.52	09.19	...	09.49½	10.18½	10.49½	11.17
	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	...	...	...	06/27½	06.50	...	...	07/41	07.51	08.19	08/42½	08.53	09.20	09/40½	09.50½	10.19½	10.50½	11.18
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48	...	...	...			...	...											
Blyth Parkway	arr	49	...	...	...	...	06.53	...	...	...	07.54	08.22	...	08.56	09.23	...	09.53½	10.22½	10.53½	11.21
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	...	...	...	06/31	06.53½	...	...	07/44½	07.54½	08.22½	08/46	08.56½	09.23½	09/44	09.54	10.23	10.54	11.21½
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53	...	...	...			...	...											
Bedl'Ton Furnaceway Sdgs	arr	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	55	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	56	...	05+21	06+26	...	...	07+26½	07.34½	...	...	...	...	...	...	...	...	...	...	...
	dep-line	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	58	...			...	...			...	...	...	...	...	...	...	...	...	...	...
Bedlington	arr	59	...	05.22½	06.27½	...	06.55½	07.28	07/36	...	07.56½	08.24½	...	08.58½	09.25½	...	09.56	10.25	10.56	11.23½
	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	...	05.22½	06.27½	06/33½	06.56½	07.28	...	07/47	07.57½	08.25½	08/48½	08.59½	09.26½	09/46½	09.57	10.26	10.57	11.24½
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63	...						...											
West Sleekburn Jn	arr	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	...	05/24½	06/29½	06/37½	06/58½	07/30	...	07/51	07/59½	08/27½	08/52½	09/01½	09/28½	09/50½	09/59	10/28	10/59	11/26½
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	68	...						...											
Marcheys House Jn	plt	69	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	70	...	05/25	06/30	06/38½	06/59	07/30½	...	07/52	08/00	08/28	08/53½	09/02	09/29	09/51½	09/59½	10/28½	10/59½	11/27
	dep-line	71	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	72	...	<2>	<2>	(2½)		<2>	...											
Ashington	arr	73	<---	05+29	06+34	...	07.01	07+34½	...	...	08.02	08.30	...	09.04	09.31	...	10.01½	10.30½	11.01½	11.29
	plt	74	...	BAY	BAY	1	BAY	BAY	...	1	BAY	BAY	1	BAY	BAY	1	BAY	BAY	BAY	BAY
	dep	75	...	...	...	06/44	...	...	...	07/55	...	...	08/56½	...	...	09/54½	...	...	...	...
	dep-line	76	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lynemouth Power Stn (FHH)	arr	78	00.00	...	...	06.59	...	...	...	08.10	...	...	09.11½	...	...	10.09½	...	...	...	...
	plt	79	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Station		Row	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Formed By																				
Signal ID			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Orig. Dep. Time			11.09	11.28	11.56	12.08	12.30	12.46	13.00	13.26	13.40	13.59	14.32½	14.58	15.09	15.31	15.59	16.15½	16.30	16.59
Orig. Loc. Name			Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Newcastle	Newcastle
Dest. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington
Timing Load			60HK6524	230	230	60HK6524	230	60HK6524	230	230	60HK6524	230	230	230	60HK6524	230	230	60HK6524	230	230
Operating Characteristics																				
TOC			PE	ED	ED	PE	ED	PE	ED	ED	PE	ED	ED	ED	PE	ED	ED	PE	ED	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form																				
Newcastle	plt	1	...	1	1	...	1	...	1	1	...	1	1	1	...	1	1	...	1	1
	dep	2	...	11.28	11.56	...	12.30	...	13.00	13.26	...	13.59	14.32½	14.58	...	15.31	15.59	...	16.30	16.59
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	SL
	mgn	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Manors	arr	5	...	11.29½	...	...	12.31½	...	...	13.27½	...	...	14.34	...	...	15.32½	...	...	16.31½	17.00½
	plt	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	7	...	11.30½	...	...	12.32½	...	...	13.28½	...	...	14.35	...	...	15.33½	...	...	16.32½	17.01½
	dep-line	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	ML
	mgn	9	...	(½)	...	...		...	...		...	...		...	...		...	...		
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	...	11/33	11/59	...	12/34½	...	13/03	13/30½	...	14/02	14/37	15/01	...	15/35½	16/02	...	16/34½	17/03½
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13	...			...		...			...				...			...		
Benton Nth Jn	plt	14	...	DM	DM	...	DM	...	DM	DM	...	DM	DM	DM	...	DM	DM	...	DM	DM
	dep	15	11/15½	11/35½	12/01½	12/14½	12/37	12/52½	13/05½	13/33	13/46½	14/04½	14/39½	15/03½	15/15½	15/38	16/04½	16/22	16/37	17/06
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	(4)	(1)	(2½)	(4)			(2½)	(2½)	(4)	(2½)	(½)	(2½)	(5)	(1)	(2½)		(1½)	(1½)
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	11/22	11/38½	12/06	12/21	12/39	12/55	13/10	13/37½	13/53	14/09	14/42	15/08	15/23	15/41	16/09	16/24½	16/40½	17/09½
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21																		
Northumberland Parkway	arr	22	...	11.40	12.07½	...	12.40½	...	13.11½	13.39	...	14.10½	14.43½	15.09½	...	15.42½	16.10½	...	16.42	17.11
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	11/25	11.40½	12.08	12/24	12.41	12/58	13.12	13.39½	13/56	14.11	14.44	15.10	15/26	15.43	16.11	16/27½	16.42½	17.11½
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26																		
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	11/26½	11/42	12/09½	12/25½	12/42½	12/59½	13/13½	13/41	13/57½	14/12½	14/45½	15/11½	15/27½	15/44½	16/12½	16/29	16/44	17/13
	dep-line	29	LL	RL	RL	LL	RL	LL	RL	RL	LL	RL	RL	RL	LL	RL	RL	LL	RL	RL
	mgn	30	(4½)			(6)		(3)			(4)				(6)			(4)		
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	11/33½	11/43½	12/11	12/34	12/44	13/05	13/15	13/42½	14/04	14/14	14/47	15/13	15/36	15/46	16/14	16/35½	16/45½	17/14½
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34																		
Seaton Delaval	arr	35	...	11.44½	12.12	...	12.45	...	13.16	13.43½	...	14.15	14.48	15.14	...	15.47	16.15	...	16.46½	17.15½
	plt	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	37	11/34½	11.45	12.12½	12/35	12.45½	13/06	13.16½	13.44	14/05	14.15½	14.48½	15.14½	15/37	15.47½	16.15½	16/36½	16.47	17.16
	dep-line	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	39																		
Hartley North	plt	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	41	11/37	11/47	12/14½	12/37½	12/47½	13/08½	13/18½	13/46	14/07½	14/17½	14/50½	15/16½	15/39½	15/49½	16/17½	16/39	16/49	17/18
	dep-line	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	43																		
Newsham	arr	44	...	11.48½	12.16	...	12.49	...	13.20	13.47½	...	14.19	14.52	15.18	...	15.51	16.19	...	16.50½	17.19½
	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	11/39	11.49½	12.17	12/39½	12.50	13/10½	13.21	13.48½	14/09½	14.20	14.53	15.19	15/41½	15.52	16.20	16/41	16.51½	17.20½
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48																		
Blyth Parkway	arr	49	...	11.52½	12.20	...	12.53	...	13.24	13.51½	...	14.23	14.56	15.22	...	15.55	16.23	...	16.54½	17.23½
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	11/42½	11.53	12.20½	12/43	12.53½	13/14	13.24½	13.52	14/13	14.23½	14.56½	15.22½	15/45	15.55½	16.23½	16/44½	16.55	17.24
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53																		
Bedl'Ton Furnaceway Sdgs	arr	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	55	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep-line	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bedlington	arr	59	...	11.55	12.22½	...	12.55½	...	13.26½	13.54	...	14.25½	14.58½	15.24½	...	15.57½	16.25½	...	16.57	17.26
	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	11/45	11.56	12.23½	12/45½	12.56½	13/16½	13.27½	13.55	14/15½	14.26½	14.59½	15.25½	15/47½	15.58½	16.26½	16/47	16.58	17.27
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63									(2)									
West Sleekburn Jn	arr	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	11/49	11/58	12/25½	12/49½	12/58½	13/20½	13/29½	13/57	14/21½	14/28½	15/01½	15/27½	15/51½	16/00½	16/28½	16/51	17/00	17/29
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	68																		
Marcheys House Jn	plt	69	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	70	11/50	11/58½	12/26	12/50½	12/59	13/21½	13/30	13/57½	14/22½	14/29	15/02	15/28	15/52½	16/01	16/29	16/52	17/00½	17/29½
	dep-line	71	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	72																		
Ashington	arr	73	...	12.00½	12.28	...	13.01	...	13.32	13.59½	...	14.31	15.04	15.30	...	16.03	16.31	...	17.02½	17.31½
	plt	74	1	BAY	BAY	1	BAY	1	BAY	BAY	1	BAY	BAY	BAY	1	BAY	BAY	1	BAY	BAY
	dep	75	11/53	...	...	12/53½	...	13/24½	...	...	14/25½	...	...	...	15/55½	...	...	16/55	...	...
	dep-line	76	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	77	{½}	...	...		...		...	...		...	...	...		...	...	...	...	...
Lynemouth Power Stn (FHH)	arr	78	12.08½	...	...	13.08½	...	13.39½	...	...	14.40½	...	...	...	16.10½	...	...	17.10	...	...
	plt	79	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Station		Row	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Formed By																	
Signal ID			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Orig. Dep. Time			17.16½	17.30	18.00	18.30	18.41	18.59	19.16½	19.24	19.57	20.12	20.50½	20.56	21.05	21.59	22.09	23.09	23+22
Orig. Loc. Name			Heaton North Jn	Newcastle	Newcastle	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Newcastle	Newcastle	Heaton North Jn	Bedl'Ton Furnaceway Sdgs	Newcastle	Heaton North Jn	Newcastle	Heaton North Jn	Heaton North Jn	Newcastle
Dest. Loc. Name			Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	West Sleekburn Jn	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Lynemouth Power Stn (FHH)	Bedl'Ton Furnaceway Sdgs
Timing Load			75-66506	230	230	230	75-66506	230	75-66506	230	230	60HK6524	60HK6524	230	60HK6524	230	60HK6524	60HK6524	230
Operating Characteristics																	
TOC			PE	ED	ED	ED	PE	ED	PE	ED	ED	PE	PE	ED	PE	ED	PE	PE	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form																	
Newcastle	plt	1	...	1	1	1	...	1	...	5	1	...	...	1	...	1	...	...	1
	dep	2	...	17.30	18.00	18.30	...	18.59	...	19.24	19.57	...	...	20.56	...	21.59	...	...	23+22
	dep-line	3	...	...	...	...	...	...	...	SL	...	...	...	...	...	...	...	...	...
	mgn	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Manors	arr	5	...	17.31½	...	18.31½	...	...	...	19.25½	19.58½	...	...	20.57½	...	22.00½	...	...	...
	plt	6	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...
	dep	7	...	17.32½	...	18.32½	...	...	...	19.26½	19.59	...	...	20.58½	...	22.01½	...	...	...
	dep-line	8	...	...	...	...	...	...	...	ML	...	...	...	ML	...	ML	...	...	...
	mgn	9	...		...		...	...	...			...	...		...		...	...	...
Heaton Sth. Jn.	plt	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	11	...	17/34½	18/03	18/34½	...	19/02	...	19/28½	20/01	...	...	21/00½	...	22/03½	...	...	23/25
	dep-line	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	13	...				...		...	<½>		...	...		...		...	...	
Benton Nth Jn	plt	14	...	DM	DM	DM	...	DM	...	DM	DM	...	...	DM	...	DM	...	...	DM
	dep	15	17/21	17/37	18/05½	18/37	18/45½	19/04½	19/21	19/31½	20/03½	20/18½	...	21/03	21/11½	22/06	22/15½	23/15½	23/27½
	dep-line	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	17	(1)		(2½)	(1½)	(7)	(2½)		(5½)		(½)	...						
Benton East Jn	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	17/24½	17/39	18/10	18/40½	18/55	19/09	19/23½	19/39	20/05½	20/21½	...	21/05	21/14	22/08	22/18	23/18	23/29½
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21											...						
Northumberland Parkway	arr	22	...	17.40½	18.11½	18.42	...	19.10½	...	19.40½	20.07	...	...	21.06½	...	22.09½	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	24	17/26	17.41	18.12	18.42½	18/56½	19.11	19/25	19.41	20.07½	20/24½	...	21.07	21/17	22.10	22/21	23/21	23/31½
	dep-line	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	26											...						
Holywell LC	plt	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	28	17/28	17/42½	18/13½	18/44	18/58½	19/12½	19/27	19/42½	20/09	20/26	...	21/08½	21/18½	22/11½	22/22½	23/22½	23/33
	dep-line	29	LL	RL	RL	RL	LL	RL	LL	RL	RL	LL	...	RL	LL	RL	LL	LL	...
	mgn	30	(4)				(3)		(5)			(4½)	...		(14)		(25)		
Segill	plt	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	32	17/34	17/44	18/15	18/45½	19/03½	19/14	19/34	19/44	20/10½	20/33	...	21/10	21/35	22/13	22/50	23/25	23/34½
	dep-line	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	34											...						
Seaton Delaval	arr	35	...	17.45	18.16	18.46½	...	19.15	...	19.45	20.11½	...	...	21.11	...	22.14	...	...	...
	plt	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	37	17/35½	17.45½	18.16½	18.47	19/05	19.15½	19/35½	19.45½	20.12	20/34	...	21.11½	21/36	22.14½	22/51	23/26	23/35½
	dep-line	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	39											...						
Hartley North	plt	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	41	17/37½	17/47½	18/18½	18/49	19/07	19/17½	19/37½	19/47½	20/14	20/36½	...	21/13½	21/38½	22/16½	22/53½	23/28½	23/37½
	dep-line	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	43											...						
Newsham	arr	44	...	17.49	18.20	18.50½	...	19.19	...	19.49	20.15½	...	...	21.15	...	22.18	...	...	...
	plt	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	46	17/39½	17.50	18.21	18.51½	19/09	19.20	19/39½	19.50	20.16½	20/38½	...	21.16	21/40½	22.19	22/55½	23/30½	23/39
	dep-line	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	48											...						
Blyth Parkway	arr	49	...	17.53	18.24	18.54½	...	19.23	...	19.53	20.19½	...	...	21.19	...	22.22	...	...	...
	plt	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	51	17/42½	17.53½	18.24½	18.55	19/12	19.23½	19/42½	19.53½	20.20	20/42	...	21.19½	21/44	22.22½	22/59	23/34	23/41½
	dep-line	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	53											...						
Bedl'Ton Furnaceway Sdgs	arr	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	23+49½
	plt	55	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	56	...	...	...	...	...	...	...	...	...	...	20.50½	...	...	...	...	...	...
	dep-line	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	58	...	...	...	...	...	...	...	...	...	...		...	...	...	...	...	...
Bedlington	arr	59	...	17.55½	18.26½	18.57	...	19.25½	...	19.55½	20.22	...	...	21.21½	...	22.24½	...	...	...
	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	17/44	17.56½	18.27½	18.58	19/13½	19.26½	19/44	19.56½	20.23	20/44½	20/52	21.22½	21/46½	22.25½	23/01½	23/36½	...
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63	(1)				(1½)												...
West Sleekburn Jn	arr	64	...	...	...	...	...	...	...	...	...	...	20/56	...	...	...	...	...	...
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	17/48½	17/58½	18/29½	19/00	19/18½	19/28½	19/47½	19/58½	20/25	20/48½	...	21/24½	21/50½	22/27½	23/05½	23/40½	...
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	68											...						...
Marcheys House Jn	plt	69	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	70	17/49	17/59	18/30	19/00½	19/19	19/29	19/48	19/59	20/25½	20/49½	...	21/25	21/51½	22/28	23/06½	23/41½	...
	dep-line	71	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	72											...						...
Ashington	arr	73	...	18.01	18.32	19.02½	...	19.31	...	20.01	20.27½	...	...	21.27	...	22.30	...	...	...
	plt	74	1	BAY	BAY	BAY	1	BAY	1	BAY	BAY	1	...	BAY	1	BAY	1	1	...
	dep	75	17/51	...	...	...	19/21	...	19/50	...	...	20/52½	...	...	21/54½	...	23/09½	23/44½	...
	dep-line	76	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{½}	...
Lynemouth Power Stn (FHH)	arr	78	18.06	...	...	...	19.36	...	20.05	...	...	21.07½	...	...	22.09½	...	23.24½	--->	...
	plt	79	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Southbound

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Formed By																				
Signal ID			2B00BB	6B00BB	2B01BB	6B01BB	6Z18BB	2B02BB	2B03BB	6B02BB	2B04BB	2B05BB	6B03BB	2B06BB	2B07BB	6B04BB	2B08BB	2B09BB	6B05BB	2B10BB
Orig. Dep. Time			05.41	05.44	06.41	06.34	07/05½	07.14½	07.42	07.35	08.16	08.43	08.35½	09.14	09.43	09.35½	10.13½	10.41	10.33½	11.12½
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	West Sleekburn Jn	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle
Timing Load			230	60H66S24	230	60H66S24	60H66S24	230	230	60H66S24	230	230	60H66S24	230	230	60H66S24	230	230	60H66S24	230
Operating Characteristics																				
TOC			ED	PE	ED	PE	PE	ED	ED	PE	ED	ED	PE	ED	ED	PE	ED	ED	PE	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form			2A00BB		2A01BB			2A02BB	2A03BB		2A04BB	2A05BB		2A06BB	2A07BB		2A08BB	2A09BB		2A10BB
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	...	05.44	...	06.34	...	...	...	07.35	...	...	08.35½	...	...	09.35½	...	...	10.33½	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...	...	...	...	...	...	...	...	...	...	{½}	...	...		...	...	{½}	...
Ashington	plt	5	BAY	ML	BAY	ML	...	BAY	BAY	ML	BAY	BAY	ML	BAY	BAY	ML	BAY	BAY	ML	BAY
	dep	6	05.41	05/59	06.41	06/49	...	07.14½	07.42	07/50	08.16	08.43	08/51	09.14	09.43	09/50½	10.13½	10.41	10/49	11.12½
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8					...													
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	05/43	06/02	06/43	06/52	...	07/16½	07/44	07/53	08/18	08/45	08/54	09/16	09/45	09/53½	10/15½	10/43	10/52	11/14½
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12					...													
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	05/43½	06/03	06/43½	06/53	07/05½	07/17	07/44½	07/54	08/18½	08/45½	08/55	09/16½	09/45½	09/54½	10/16	10/43½	10/53	11/15
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16																		
Bedlington	arr	17	05.45½	...	06.45½	...	...	07.19	07.46½	...	08.20½	08.47½	...	09.18½	09.47½	...	10.18	10.45½	...	11.17
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	05.46½	06/05	06.46½	06/55	07/07½	07.20	07.47½	07/56	08.21½	08.48½	08/57	09.19½	09.48½	09/56½	10.19	10.46½	10/55	11.18
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21																		
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	07.10	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	arr	24	05.49	...	06.49	...	...	07.22½	07.50	...	08.24	08.51	...	09.22	09.51	...	10.21½	10.49	...	11.20½
	plt	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	26	05.49½	06/09	06.49½	06/59	...	07.23	07.50½	08/00	08.24½	08.51½	09/01	09.22½	09.51½	10/00½	10.22	10.49½	10/59	11.21
	dep-line	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	28					...													
Newsham	arr	29	05.52½	...	06.52½	...	...	07.26	07.53½	...	08.27½	08.54½	...	09.25½	09.54½	...	10.25	10.52½	...	11.24
	plt	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	31	05.53½	06/12½	06.53½	07/02½	...	07.27	07.54½	08/03½	08.28½	08.55½	09/04½	09.26½	09.55½	10/04	10.26	10.53½	11/02½	11.25
	dep-line	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	33					...													
Hartley North	plt	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	35	05/55	06/14	06/55	07/04	...	07/28½	07/56	08/05	08/30	08/57	09/06	09/28	09/57	10/05½	10/27½	10/55	11/04	11/26½
	dep-line	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	37					...													
Seaton Delaval	arr	38	05.57½	...	06.57½	...	...	07.31	07.58½	...	08.32½	08.59½	...	09.30½	09.59½	...	10.30	10.57½	...	11.29
	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	05.58	06/17½	06.58	07/07½	...	07.31½	07.59	08/08½	08.33	09.00	09/09½	09.31	10.00	10/09	10.30½	10.58	11/07½	11.29½
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42					...													
Segill	plt	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	44	05/59	06/19	06/59	07/09	...	07/32½	08/00	08/10	08/34	09/01	09/11	09/32	10/01	10/10½	10/31½	10/59	11/09	11/30½
	dep-line	45	RL	RL	RL	RL	...	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL
	mgn	46					...			(2)			(2)			(2)			(2)	
Holywell LC	plt	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	48	06/00½	06/21½	07/00½	07/11½	...	07/34	08/01½	08/14½	08/35½	09/02½	09/15½	09/33½	10/02½	10/15	10/33	11/00½	11/13½	11/32
	dep-line	49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	50					...													
Northumberland Parkway	arr	51	06.02	...	07.02	...	...	07.35½	08.03	...	08.37	09.04	...	09.35	10.04	...	10.34½	11.02	...	11.33½
	plt	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	06.02½	06/23½	07.02½	07/13½	...	07.36	08.03½	08/16½	08.37½	09.04½	09/17½	09.35½	10.04½	10/17	10.35	11.02½	11/15½	11.34
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55					...													
Benton East Jn	plt	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	57	06/04	06/26½	07/04	07/16½	...	07/37½	08/05	08/19½	08/39	09/06	09/20½	09/37	10/06	10/20	10/36½	11/04	11/18½	11/35½
	dep-line	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	59				(6)	...	(½)		(14)			(2)	(1)		(½)	(2)		(3)	(1)
Benton Nth Jn	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	06/06	06/28½	07/06	07/24½	...	07/40	08/07	08/35½	08/41	09/08	09/24½	09/40	10/08	10/22½	10/40½	11/06	11/23½	11/38½
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63	[1]		[1]		...	[1]	[1]		[1]	[1]		[1],{½}	[1]		[1]	[1]		[1]
Heaton Sth. Jn.	arr	64	...	06.34	...	07.30	...	...	...	08.41	...	...	09.30	...	...	10.28	...	...	11.29	...
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	06/09½	...	07/09½	...	...	07/43½	08/10½	...	08/44½	09/11½	...	09/44	10/11½	...	10/44	11/09½	...	11/42
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	SL	...	...	...	...	...	...
	mgn	68		...		...	...	{½}		...			...	{½}		...	{½}		...	{½}
Manors	arr	69	06.11	...	07.11	...	...	07.45½	08.12	...	08.46	09.13	...	...	10.13	...	...	11.11	...	...
	plt	70	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...
	dep	71	06.12	...	07.12	...	...	07.46½	08.13	...	08.47	09.14	...	...	10.14	...	...	11.12	...	...
	dep-line	72	...	...	...	...	...	SL	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	73	{½}	...	{½}	...	...	{½}	{½}	...	{½}	{½}	...	...	{½}	...	...	{½}	...	...
Newcastle	arr	74	06.14	...	07.14	...	...	07.49	08.15	...	08.49	09.16	...	09.48	10.16	...	10.47	11.14	...	11.45
	plt	75	1	...	1	...	...	5	1	...	1	1	...	5	1	...	1	1	...	1

			19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Formed By																				
Signal ID			2B11BB	6B06BB	2B12BB	2B13BB	2B14BB	6B07BB	2B15BB	2B16BB	6B08BB	2B17BB	6B09BB	2B18BB	2B19BB	6B10BB	2B20BB	2B21BB	6B11BB	2B22BB
Orig. Dep. Time			11.40	11.32½	12.13	12.44	13.12	13.04	13.43	14.16	14.08½	14.42	14.34½	15.15	15.43	15.35½	16.14½	16.44	16.36½	17.13
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Lynemouth Power Stn (FHH)	Ashington
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Heaton Sth. Jn.	Newcastle
Timing Load			230	60H66S24	230	230	230	60H66S24	230	230	60H66S24	230	60H66S24	230	230	60H66S24	230	230	60H66S24	230
Operating Characteristics																				
TOC			ED	PE	ED	ED	ED	PE	ED	ED	PE	ED	PE	ED	ED	PE	ED	ED	PE	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form			2A11BB		2A12BB	2A13BB	2A14BB		2A15BB	2A16BB		2A17BB		2A18BB	2A19BB		2A20BB	2A21BB		2A22BB
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	...	11.32½	...	...	...	13.04	...	...	14.08½	...	14.34½	...	...	15.35½	...	...	16.36½	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...	{½}	...	...	...	{½}	...	...	{½}	...	{½}	...	...	{½}	...	...		...
Ashington	plt	5	BAY	ML	BAY	BAY	BAY	ML	BAY	BAY	ML	BAY	ML	BAY	BAY	ML	BAY	BAY	ML	BAY
	dep	6	11.40	11/48	12.13	12.44	13.12	13/19½	13.43	14.16	14/24	14.42	14/50	15.15	15.43	15/51	16.14½	16.44	16/51½	17.13
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8																		
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	11/42	11/51	12/15	12/46	13/14	13/22½	13/45	14/18	14/27	14/44	14/53	15/17	15/45	15/54	16/16½	16/46	16/54½	17/15
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12																		
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	11/42½	11/52	12/15½	12/46½	13/14½	13/23½	13/45½	14/18½	14/28	14/44½	14/54	15/17½	15/45½	15/55	16/17	16/46½	16/55½	17/15½
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16																		
Bedlington	arr	17	11.44½	...	12.17½	12.48½	13.16½	...	13.47½	14.20½	...	14.46½	...	15.19½	15.47½	...	16.19	16.48½	...	17.17½
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	11.45½	11/54	12.18½	12.49½	13.17½	13/25½	13.48½	14.21½	14/30	14.47½	14/56	15.20½	15.48½	15/57	16.20	16.49½	16/57½	17.18½
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21																		
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	arr	24	11.48	...	12.21	12.52	13.20	...	13.51	14.24	...	14.50	...	15.23	15.51	...	16.22½	16.52	...	17.21
	plt	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	26	11.48½	11/58	12.21½	12.52½	13.20½	13/29½	13.51½	14.24½	14/34	14.50½	15/00	15.23½	15.51½	16/01	16.23	16.52½	17/01½	17.21½
	dep-line	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	28																		
Newsham	arr	29	11.51½	...	12.24½	12.55½	13.23½	...	13.54½	14.27½	...	14.53½	...	15.26½	15.54½	...	16.26	16.55½	...	17.24½
	plt	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	31	11.52½	12/01½	12.25½	12.56½	13.24½	13/33	13.55½	14.28½	14/37½	14.54½	15/03½	15.27½	15.55½	16/04½	16.27	16.56½	17/05	17.25½
	dep-line	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	33																		
Hartley North	plt	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	35	11/54	12/03	12/27	12/58	13/26	13/34½	13/57	14/30	14/39	14/56	15/05	15/29	15/57	16/06	16/28½	16/58	17/06½	17/27
	dep-line	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	37																		
Seaton Delaval	arr	38	11.56½	...	12.29½	13.00½	13.28½	...	13.59½	14.32½	...	14.58½	...	15.31½	15.59½	...	16.31	17.00½	...	17.29½
	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	11.57	12/06½	12.30	13.01	13.29	13/38	14.00	14.33	14/42½	14.59	15/08½	15.32	16.00	16/09½	16.31½	17.01	17/10	17.30
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42																		
Segill	plt	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	44	11/58	12/08	12/31	13/02	13/30	13/39½	14/01	14/34	14/44	15/00	15/10	15/33	16/01	16/11	16/32½	17/02	17/11½	17/31
	dep-line	45	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL
	mgn	46		(2)				(2)			(2)		(2)			(2)			(2)	
Holywell LC	plt	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	48	11/59½	12/12½	12/32½	13/03½	13/31½	13/44	14/02½	14/35½	14/48½	15/01½	15/14½	15/34½	16/02½	16/15½	16/34	17/03½	17/16	17/32½
	dep-line	49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	50																		
Northumberland Parkway	arr	51	12.01	...	12.34	13.05	13.33	...	14.04	14.37	...	15.03	...	15.36	16.04	...	16.35½	17.05	...	17.34
	plt	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	12.01½	12/14½	12.34½	13.05½	13.33½	13/46	14.04½	14.37½	14/50½	15.03½	15/16½	15.36½	16.04½	16/17½	16.36	17.05½	17/18	17.34½
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55																		
Benton East Jn	plt	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	57	12/03	12/17½	12/36	13/07	13/35	13/49	14/06	14/39	14/53½	15/05	15/19½	15/38	16/06	16/20½	16/37½	17/07	17/21	17/36
	dep-line	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	59		(3)	(2)			(9½)		(1½)	(½)		(10)	(1)		(8)	(1)		(1)	(2½)
Benton Nth Jn	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	12/05	12/22½	12/40	13/09	13/37	14/00½	14/08	14/42½	14/56	15/07	15/31½	15/41	16/08	16/30½	16/40½	17/09	17/24	17/40½
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63	[1]		[1]	[1]	[1]		[1]	[1]	(½)	[1]		[1]	[1]		[1]	[1]		[1]
Heaton Sth. Jn.	arr	64	...	12.28	...	...	...	14.06	...	...	15.02	...	15.37	...	...	16.36	...	...	17.29½	...
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	12/08½	...	12/43½	13/12½	13/40½	...	14/11½	14/46	...	15/10½	...	15/44½	16/11½	...	16/44	17/12½	...	17/44
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	68		...	<½>,{½}		<½>,{½}	...		{½}	...		...	<½>,{½}		...	{½}		...	{½}
Manors	arr	69	12.10	...	...	13.14	...	...	14.13	...	...	15.12	...	...	16.13	...	...	17.14	...	...
	plt	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	71	12.11	...	...	13.15	...	...	14.14	...	...	15.13	...	...	16.14	...	...	17.15	...	...
	dep-line	72	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	73	{½}	...	...	{½}	...	...	<½>	...	...	{½}	...	...	{½}	...	...	{½}	...	...
Newcastle	arr	74	12.13	...	12.47	13.17	13.44	...	14.16	14.49	...	15.15	...	15.48	16.16	...	16.47	17.17	...	17.47
	plt	75	1	...	1	1	1	...	1	1	...	1	...	1	1	...	1	1	...	1

			37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Formed By																			
Signal ID			2B23BB	6B12BB	2B24BB	6B13BB	2B25BB	2B26BB	5B00XX	6B14BB	6Z20BB	2B27BB	6B15BB	2B28BB	6B16BB	2B29BB	6B17BB	5B02XX	5A00XX
Orig. Dep. Time			17.44	17.36½	18.15	18.07	18.42½	19.13	19+41	19.32½	20/02	20.12	20.19	21.14	21.22	22.15	22.12	22+36	23+22
Orig. Loc. Name			Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Ashington	Ashington	Lynemouth Power Stn (FHH)	Bedlington	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Lynemouth Power Stn (FHH)	Ashington	Newcastle
Dest. Loc. Name			Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Newcastle	Bedl'Ton Furnaceway Sdgs	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Newcastle	Heaton Sth. Jn.	Bedl'Ton Furnaceway Sdgs	Bedl'Ton Furnaceway Sdgs
Timing Load			230	60H66S24	230	60H66S24	230	230	230	60H66S24	60H66S24	230	60H66S24	230	60H66S24	230	60H66S24	230	230
Operating Characteristics																			
TOC			ED	PE	ED	PE	ED	ED	ED	PE	PE	ED	PE	ED	PE	ED	PE	ED	ED
Day of Operation			FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
Changes			New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New	New
To Form			2A23BB		2A24BB		2A25BB	2A26BB				2A27BB		2A28BB					
Lynemouth Power Stn (FHH)	plt	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	2	...	17.36½	...	18.07	...	...	...	19.32½	...	...	20.19	...	21.22	...	22.12	...	...
	dep-line	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	4	...	{½}	...	{½}	...	...	...		...	...	{½}	...	{½}	...		...	...
Ashington	plt	5	BAY	ML	BAY	ML	BAY	BAY	BAY	ML	...	BAY	ML	BAY	ML	BAY	ML	BAY	...
	dep	6	17.44	17/52	18.15	18/22½	18.42½	19.13	19+41	19/47½	...	20.12	20/34½	21.14	21/37½	22.15	22/27	22+36	...
	dep-line	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	8									...								...
Marcheys House Jn	plt	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	10	17/46	17/55	18/17	18/25½	18/44½	19/15	19/43½	19/50½	...	20/14	20/37½	21/16	21/40½	22/17	22/30	22/38½	...
	dep-line	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	12									...								...
West Sleekburn Jn	plt	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	14	17/46½	17/56	18/17½	18/26½	18/45	19/15½	19/44	19/51½	...	20/14½	20/38½	21/16½	21/41½	22/17½	22/31	22/39	...
	dep-line	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	16									...								...
Bedlington	arr	17	17.48½	...	18.19½	...	18.47	19.17½	19.46½	...	...	20.16½	...	21.18½	...	22.19½	...	22.41½	23*43
	plt	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	19	17.49½	17/58	18.20½	18/28½	18.48	19.18½	19.46½	19/53½	20/02	20.17½	20/40½	21.19½	21/43½	22.20½	22/33	22.41½	23.47
	dep-line	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	21																	...
Bedl'Ton Furnaceway Sdgs	arr	22	...	...	...	...	...	...	19+49	...	20.04½	...	...	...	...	...	...	22+44	23+49½
	plt	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Blyth Parkway	arr	24	17.52	...	18.23	...	18.50½	19.21	...	...	...	20.20	...	21.22	...	22.23	...	...	...
	plt	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	26	17.52½	18/02	18.23½	18/32½	18.51	19.21½	...	19/57½	...	20.20½	20/44½	21.22½	21/47½	22.23½	22/37	...	...
	dep-line	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	28							...		...							...	...
Newsham	arr	29	17.55½	...	18.26½	...	18.54	19.24½	...	...	...	20.23½	...	21.25½	...	22.26½	...	...	...
	plt	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	31	17.56½	18/05½	18.27½	18/36	18.55	19.25½	...	20/01	...	20.24½	20/48	21.26½	21/51	22.27½	22/40½	...	...
	dep-line	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	33							...		...							...	...
Hartley North	plt	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	35	17/58	18/07	18/29	18/37½	18/56½	19/27	...	20/02½	...	20/26	20/49½	21/28	21/52½	22/29	22/42	...	...
	dep-line	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	37							...		...							...	...
Seaton Delaval	arr	38	18.00½	...	18.31½	...	18.59	19.29½	...	...	...	20.28½	...	21.30½	...	22.31½	...	...	...
	plt	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	40	18.01	18/10½	18.32	18/41	18.59½	19.30	...	20/06	...	20.29	20/53	21.31	21/56	22.32	22/45½	...	...
	dep-line	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	42							...		...							...	...
Segill	plt	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	44	18/02	18/12	18/33	18/42½	19/00½	19/31	...	20/07½	...	20/30	20/54½	21/32	21/57½	22/33	22/47	...	...
	dep-line	45	RL	RL	RL	RL	RL	RL	...	RL	...	RL	RL	RL	RL	RL	RL	...	...
	mgn	46		(2)		(2)			...	(2)	...							...	...
Holywell LC	plt	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	48	18/03½	18/16½	18/34½	18/47	19/02	19/32½	...	20/12	...	20/31½	20/57	21/33½	22/00	22/34½	22/49½	...	...
	dep-line	49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	50							...		...							...	...
Northumberland Parkway	arr	51	18.05	...	18.36	...	19.03½	19.34	...	...	...	20.33	...	21.35	...	22.36	...	...	...
	plt	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	53	18.05½	18/18½	18.36½	18/49	19.04	19.34½	...	20/14	...	20.33½	20/59	21.35½	22/02	22.36½	22/51½	...	...
	dep-line	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	55							...		...							...	...
Benton East Jn	plt	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	57	18/07	18/21½	18/38	18/52	19/05½	19/36	...	20/17	...	20/35	21/02	21/37	22/05	22/38	22/54½	...	...
	dep-line	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	59		(1½)		(9)			...	(7)	...		(14½)		(11½)			...	...
Benton Nth Jn	plt	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	61	18/09	18/25	18/40	19/03	19/07½	19/38	...	20/26	...	20/37	21/18½	21/39	22/18½	22/40	22/56½	...	...
	dep-line	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	63	[1]		[1]		[1]	[1]	...		...	[1]		[1]		[1]		...	...
Heaton Sth. Jn.	arr	64	...	18.30½	...	19.08½	...	...	...	20.31½	...	...	21.24	...	22.24	...	23.02	...	...
	plt	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	66	18/12½	...	18/43½	...	19/11	19/41½	...	...	...	20/40½	...	21/42½	...	22/43½	...	...	...
	dep-line	67	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	68		...	(2)	...			...	...	...		...		...		...	...	...
Manors	arr	69	18.14	...	...	...	19.12½	19.43	...	...	...	20.42	...	21.44	...	22.45	...	...	...
	plt	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	dep	71	18.15	...	...	...	19.13½	19.44	...	...	...	20.43	...	21.45	...	22.46	...	...	...
	dep-line	72	...	...	...	...	SL	...	...	...	...	...	...	...	...	...	...	...	...
	mgn	73	{½}	...	...	...	{½}	{½}	...	...	...	{½}	...	{½}	...	{½}	...	...	...
Newcastle	arr	74	18.17	...	18.48	...	19.16	19.46	...	...	...	20.45	...	21.47	...	22.48	...	...	...
	plt	75	1	...	1	...	5	1	...	...	...	1	...	1	...	1	...	...	...

Appendix C Noise Assessment

Environment: Noise

Introduction

The proposed scheme operation will potentially affect noise levels as experienced by noise sensitive receptors (NSRs) in the vicinity of the railway. The potential change in railway noise levels at these NSRs is due to changes in numbers and type of trains on the line, line speed changes and changes to track.

The proposed scheme includes a maximum of two trains per night, compared to none currently. The additional night-time trains will not generate enough noise to cause quantifiable health effects. Therefore, night-time noise has not been considered.

The following may also affect noise or vibration levels at NSRs as a result of the proposed scheme, however they are excluded from the scope of this assessment:

- Construction activities;
- Changes in road traffic flows on surrounding receptors
- Ground-borne noise and vibration from the trains

The noise appraisal has been undertaken based upon the Transport Analysis Guidance (TAG)[33]. This guidance details the method for establishing the change in noise levels at residential properties due to proposed transportation schemes; to estimate the affected population and to generate a monetary valuation.

Results

Quantitative analysis

The results of the predicted population exposure to traffic noise in 3 dB noise bands for the Phase 1 options (T1 and A1) and the Phase 2 options (T2 and A2) are presented below, along with the costs of these changes.

Tables 1 and 2 present the results of the predicted population exposure to traffic noise in 3 dB noise bands, comparing the with and without scheme scenarios Phase 1 and Phase 2.

According to the TAG Noise Workbook (Tables 3 and 4), the Net Present Value of change in noise is £1.6m for the Phase 1 options. 3692 properties are anticipated to experience some form of increase in noise levels, with 163 experiencing a decrease. The Net Present Value for the Phase 2 options is £2.9m, with 6374 properties experiencing a noise level increase and 192 properties experiencing a noise level decrease.

[33] Department for Transport (2019) Transport Analysis Guidance TAG UNIT A3 Environmental Impact Appraisal.

Table 1: Population Noise Exposure (3dB Noise Bands) – Phase 1 Options

Without Scheme (dB)	With Scheme (dB)													
	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	4180	1566	154	11	0	0	0	0	0	0	0	0	0	0
45-47.9	17	1810	934	70	4	0	0	0	0	0	0	0	0	0
48-50.9	0	41	1162	470	27	5	0	0	0	0	0	0	0	0
51-53.9	0	0	16	627	342	24	1	0	0	0	0	0	0	0
54-56.9	0	0	0	15	306	67	3	0	0	0	0	0	0	0
57-59.9	3	0	0	0	0	284	11	0	0	0	0	0	0	0
60-62.9	7	0	0	0	0	27	256	3	0	0	0	0	0	0
63-65.9	0	3	0	0	0	0	24	109	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	10	39	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	7	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2: Population Noise Exposure (3dB Noise Bands) – Phase 2 Options

Without Scheme (dB)	With Scheme (dB)													
	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	3040	2581	273	17	0	0	0	0	0	0	0	0	0	0
45-47.9	67	937	1705	118	8	0	0	0	0	0	0	0	0	0
48-50.9	0	25	759	862	53	6	0	0	0	0	0	0	0	0
51-53.9	0	0	26	417	534	32	1	0	0	0	0	0	0	0
54-56.9	0	0	0	0	238	145	8	0	0	0	0	0	0	0
57-59.9	0	3	0	0	0	267	28	0	0	0	0	0	0	0
60-62.9	7	0	0	0	0	27	256	3	0	0	0	0	0	0
63-65.9	3	0	0	0	0	0	24	109	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	10	39	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	7	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3: Noise Workbook Outputs – Phase 1 Options

Noise Workbook - Worksheet 1

Proposal Name:	Ashington to Blythe Railway - Phase 1 Options
Present Value Base Year	2010
Current Year	2019
Proposal Opening year:	2023
Project (Road, Rail or Aviation):	rail

Net present value of change in noise (£):	-£1,590,484 *positive value reflects a net benefit (i.e. a reduction in noise)

Net present value of impact on sleep disturbance (£):	£0
Net present value of impact on amenity (£):	-£1,125,533
Net present value of impact on AMI (£):	£28,903
Net present value of impact on stroke (£):	-£196,448
Net present value of impact on dementia (£):	-£297,406

Quantitative results

Households experiencing increased daytime noise in forecast year:	3692
Households experiencing reduced daytime noise in forecast year:	163
Households experiencing increased night time noise in forecast year:	n/a
Households experiencing reduced night time noise in forecast year:	n/a

Qualitative Comments:

The forecast costs have been identified separately for each option, from comparison with the current baseline (known as the Do Minimum, DM) scenario.

The costs in the forecast year have been determined according to the standard WebTAG methodology which considers impacts 15 years after scheme opening. The change in noise levels 15 years after opening have been assumed to be the same as those in the opening year for that particular option. Therefore the cost for each option assumes that the line will continue to operate as defined by that option for at least 15 years.

No consideration has been given to the potential noise impacts of proposed new infrastructure as the design has not been finalised. If new stations are proposed near existing residential properties, then character and potentially levels of noise will be different to the predictions, due to trains starting/stopping compared to passing at constant speed. If proposed new stations had been included in the assessment, calculated noise levels from passenger trains according to the CRN methdology would likely be lower than predicted at the properties near the stations. This is because the speed would be lower and CRN does not take into account the potential additional sound of braking or accelerating from passenger trains.

It is assumed that any additional night-time trains will not generate sufficient noise to cause quantifiable health effects. Therefore night-time noise has not been considered.

It is understood that the current freight trains accelerate and decelerate at locations along the line, however it has not been possible to identify where this occurs. Once the infratructure improvements are completed, it will be likely that the freight trains can operate at a more constant speed. Accelerating locomotives result in higher noise emissions from the railway, therefore the baseline noise levels are likely to be higher than predicted and the change in noise emissions due to the proposed development will be lower than identified.

The existing track is likely to be upgraded as part of the proposed development (e.g. replacing jointed track with continuously welded rail), thereby reducing the track noise emissions. The locations where this will occur were not finalised at the time of the assessment, therefore these improvements were not included in the calculations. The assessment has assumed that all track is jointed and therefore the assessment assumes a worst-case.

Data Sources:

Trains have been assumed to be at line speed for each scenario as defined in the document 'Northumberland Line - Proposed Linespeed Profiles'

The route up and down lines have each been split into sections according to the following parameters:

Which freight trains are using the line (based on data provided by project team in document 'Northumberland Line Freight Train specifications based on current Access rights')

Whether freight train locomotives are accelerating (where known, based on data from the project team provided by e-mail dated 26 July)

Line speed

Predictions have been performed for each track section using the Calculation of Railway Noise (CRN) 1995 methodology. This method is applicable at distances of between 10 and 300 m from the track. Distance bands have been identified within which properties are anticipated to be exposed to the noise level bands specified in the WebTAG methodology.

Table 4: Noise Workbook Outputs – Phase 2 Options

Noise Workbook - Worksheet 1

Proposal Name: Ashington to Blythe Railway - Phase 2 Options

Present Value Base Year	2010
Current Year	2019
Proposal Opening year:	2025
Project (Road, Rail or Aviation):	rail

Net present value of change in noise (£):	-£2,928,042 *positive value reflects a net benefit (i.e. a reduction in noise)

Net present value of impact on sleep disturbance (£):	£0
Net present value of impact on amenity (£):	-£2,051,910
Net present value of impact on AMI (£):	£20,090
Net present value of impact on stroke (£):	-£356,539
Net present value of impact on dementia (£):	-£539,683

Quantitative results

Households experiencing increased daytime noise in forecast year:	6374
Households experiencing reduced daytime noise in forecast year:	192
Households experiencing increased night time noise in forecast year:	n/a
Households experiencing reduced night time noise in forecast year:	n/a

Qualitative Comments:

The forecast costs have been identified separately for each option, from comparison with the current baseline (known as the Do Minimum, DM) scenario.

The costs in the forecast year have been determined according to the standard WebTAG methodology which considers impacts 15 years after scheme opening. The change in noise levels 15 years after opening have been assumed to be the same as those in the opening year for that particular option. Therefore the cost for each option assumes that the line will continue to operate as defined by that option for at least 15 years.

No consideration has been given to the potential noise impacts of proposed new infrastructure as the design has not been finalised. If new stations are proposed near existing residential properties, then character and potentially levels of noise will be different to the predictions, due to trains starting/stopping compared to passing at constant speed. If proposed new stations had been included in the assessment, calculated noise levels from passenger trains according to the CRN methdology would likely be lower than predicted at the properties near the stations. This is because the speed would be lower and CRN does not take into account the potential additional sound of braking or accelerating from passenger trains.

It is assumed that any additional night-time trains will not generate sufficient noise to cause quantifiable health effects. Therefore night-time noise has not been considered.

It is understood that the current freight trains accelerate and decelerate at locations along the line, however it has not been possible to identify where this occurs. Once the infratructure improvements are completed, it will be likely that the freight trains can operate at a more constant speed. Accelerating locomotives result in higher noise emissions from the railway, therefore the baseline noise levels are likely to be higher than predicted and the change in noise emissions due to the proposed development will be lower than identified.

The existing track is likely to be upgraded as part of the proposed development (e.g. replacing jointed track with continuously welded rail), thereby reducing the track noise emissions. The locations where this will occur were not finalised at the time of the assessment, therefore these improvements were not included in the calculations. The assessment has assumed that all track is jointed and therefore the assessment assumes a worst-case.

Data Sources:

Trains have been assumed to be at line speed for each scenario as defined in the document 'Northumberland Line - Proposed Linespeed Profiles'

The route up and down lines have each been split into sections according to the following parameters:

Which freight trains are using the line (based on data provided by project team in document 'Northumberland Line Freight Train specifications based on current Access rights')

Whether freight train locomotives are accelerating (where known, based on data from the project team provided by e-mail dated 26 July)

Line speed

Predictions have been performed for each track section using the Calculation of Railway Noise (CRN) 1995 methodology. This method is applicable at distances of between 10 and 300 m from the track. Distance bands have been identified within which properties are anticipated to be exposed to the noise level bands specified in the WebTAG methodology.

Those properties which are anticipated to change noise level band due to the scheme are shown in Figure 1 (Phase 1 options) and Figure 2 (Phase 2 options). Most of the predicted noise level changes at NSRs are moves to the adjacent noise level band, indicating a change of between 0.1 and 3.0 dB. To put this in context, it is generally accepted that changes in noise levels of 1 dB or less are imperceptible, and changes of 1 to 3 dB are not widely perceptible.

For both options, noise levels at 13 properties in New Hartley decrease by at least 12 dB as a result of the scheme. These changes occur at locations where the proposed scheme will reduce the requirement for locomotives to accelerate away from Hartley Curve. This represents a significant and highly noticeable improvement in noise levels.

Worst-case noise level increases of at least 6 dB are anticipated at 21 and 32 properties (Phase 1 and Phase 2 options respectively) due to the proposed scheme. These noise level changes are likely to be noticeable and significant. The changes due to Phase 1 are due to increases in line speed in the vicinity of the proposed Seaton Delaval station and near to Holywell. The additional changes as a result of Phase 2 are due to the extra passenger trains and the line speed increases north of Blyth.

Qualitative Analysis

If new stations are proposed near existing residential properties, then the character and potentially levels of noise will be different due to trains starting/stopping compared to passing at constant speed. If the proposed new stations had been included in the assessment, the train speeds and hence the CRN calculated noise levels from passenger trains would be lower at the properties near the stations.

The baseline predictions did not include the stopping and starting of freight trains which currently occurs along the line. Accelerating locomotives result in higher noise emissions from the railway, therefore baseline noise levels are likely to be higher than predicted.

The proposed improvements to the track from jointed to continuously welded rail will reduce railway noise emissions at these locations. Whether these reductions will make a significant improvement to the noise levels at NSRs depends on the current track quality, the extent of the improvements and whether they are close to residential properties.

The qualitative analysis suggests the potential for reductions in the change in noise levels due to the scheme when compared to the assessment results. The combined effect of these reductions is not possible to state in terms of the overall impact. The reduction in railway noise levels at individual properties is potentially noticeable and significant, particularly if there are properties near locations where freight trains currently frequently stop and start that will not occur once the scheme is operational.

Figure 1: Properties anticipated to change noise level bands – Phase 1

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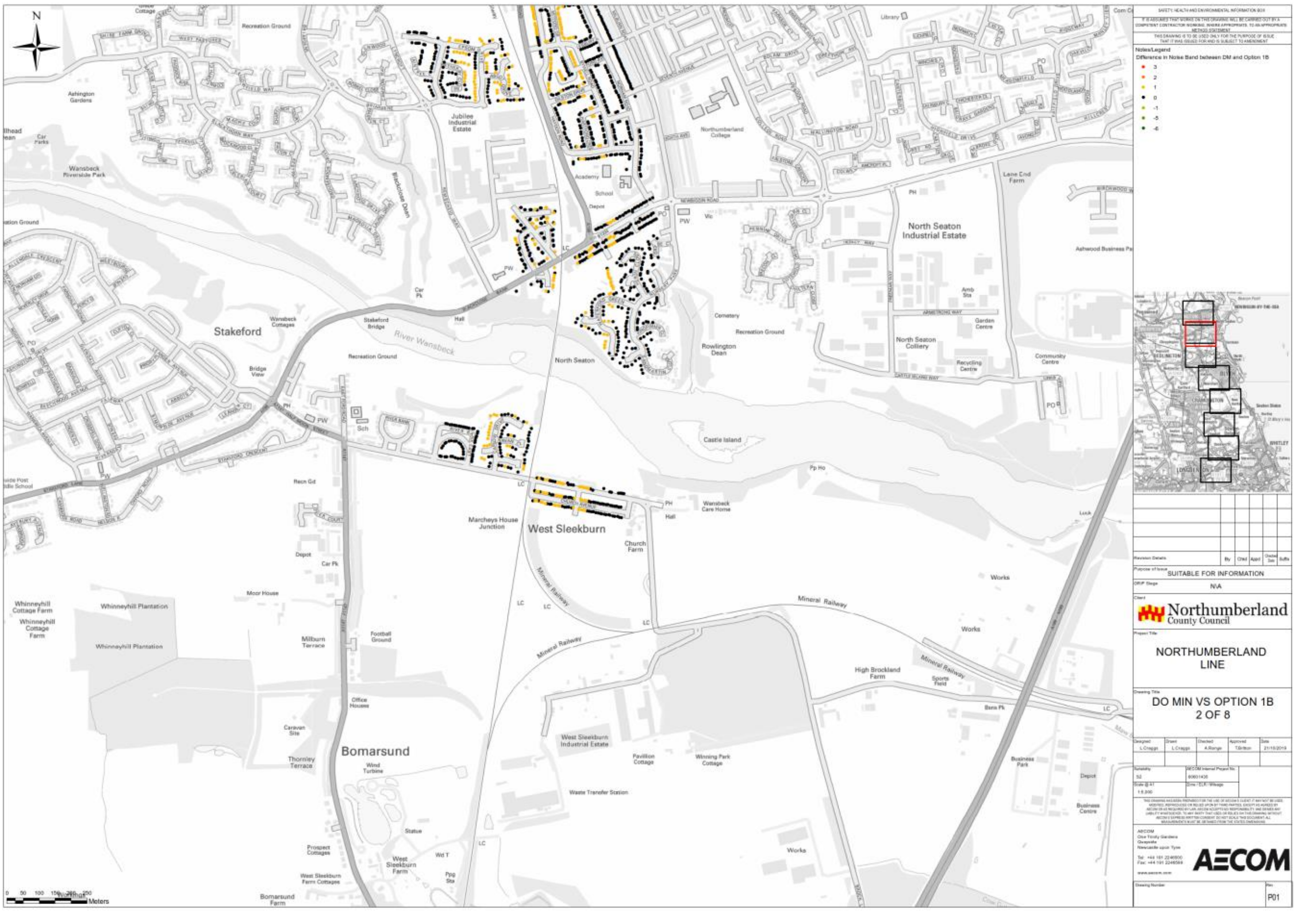
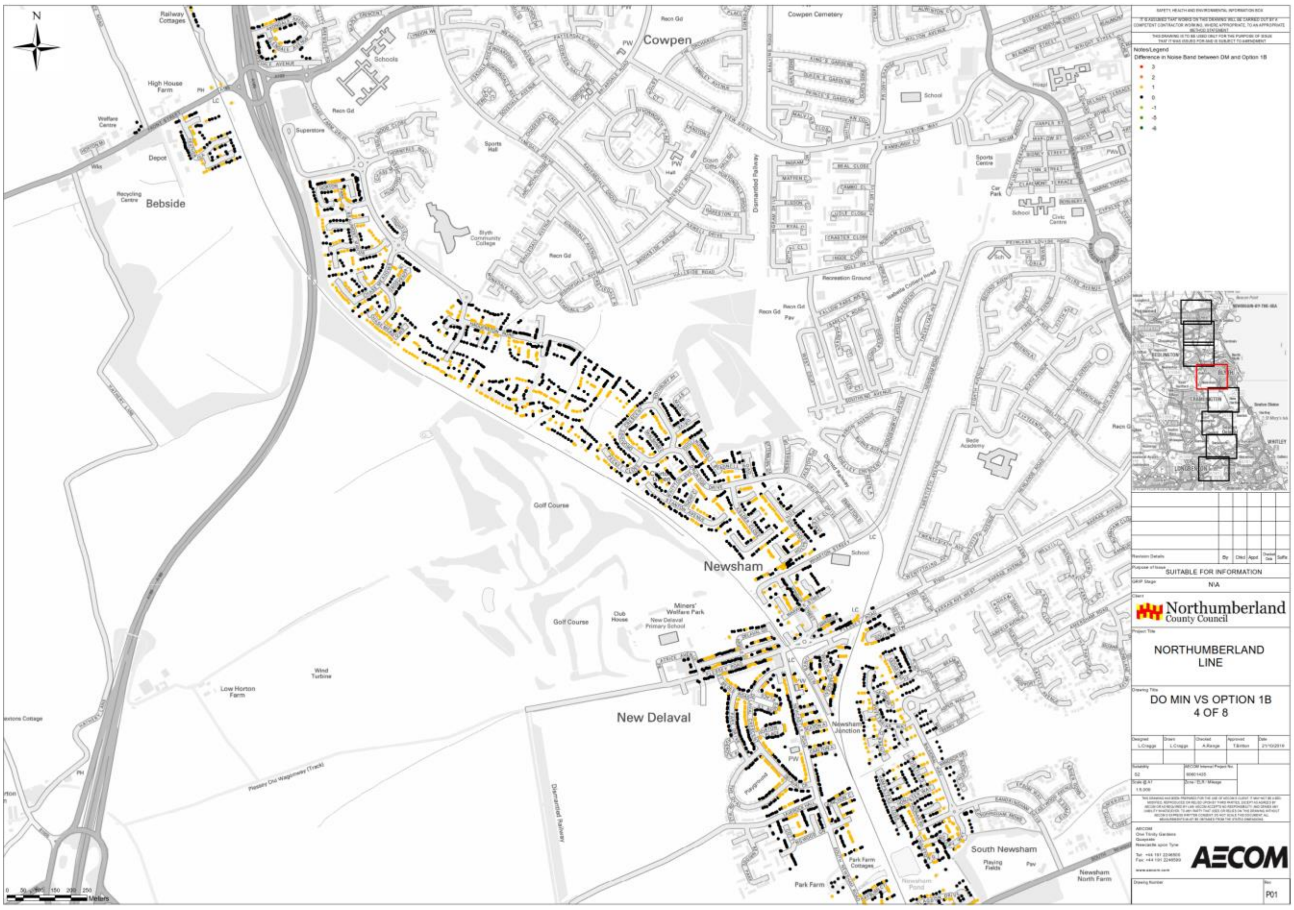



N
BEDLINGTON
Bedlington Station
East Sleekburn
Kitty Brewster
Gallagher Park
Bebside
Notes/Legend
Difference in Noise Band between DM and Option 1B
SUITABLE FOR INFORMATION
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 1B
3 OF 8
AECOM
P01


N
Cowpen
Bebside
Newsham
New Delaval
South Newsham
Golf Course
Notes/Legend
Difference in Noise Band between DM and Option 1B
SUITABLE FOR INFORMATION
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 1B
4 OF 8
AECOM
P01


N
Notes/Legend
Difference in Noise Band between DM and Option 1B
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 1B
5 OF 8
AECOM
P01
Hartley
Seaton
Mineral Railway
Newsham North Farm
Newsham South Farm
Poultry Farm
Park Farm
Lysdon Farm
Seaton Red House Farm
Round Plantation
Avenue North Farm
Delaval Trading Estate
Meters


N
Notes/Legend
Difference in Noise Band between DM and Option 1B
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 1B
6 OF 8
AECOM
P01
East Cramlington
Seaton Delaval
Seaton Terrace
Seghill
Blaketown
Holywell
Wheatridge
Mineral Railway
Recreation Ground
Holywell Dene
Meters


Notes/Legend
Difference in Noise Band between DM and Option 1B
3
2
1
0
-1
-5
-6
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 1B
7 OF 8
AECOM
P01
East Holywell
West Holywell
Earsdon
Backworth
Dismantled Railway

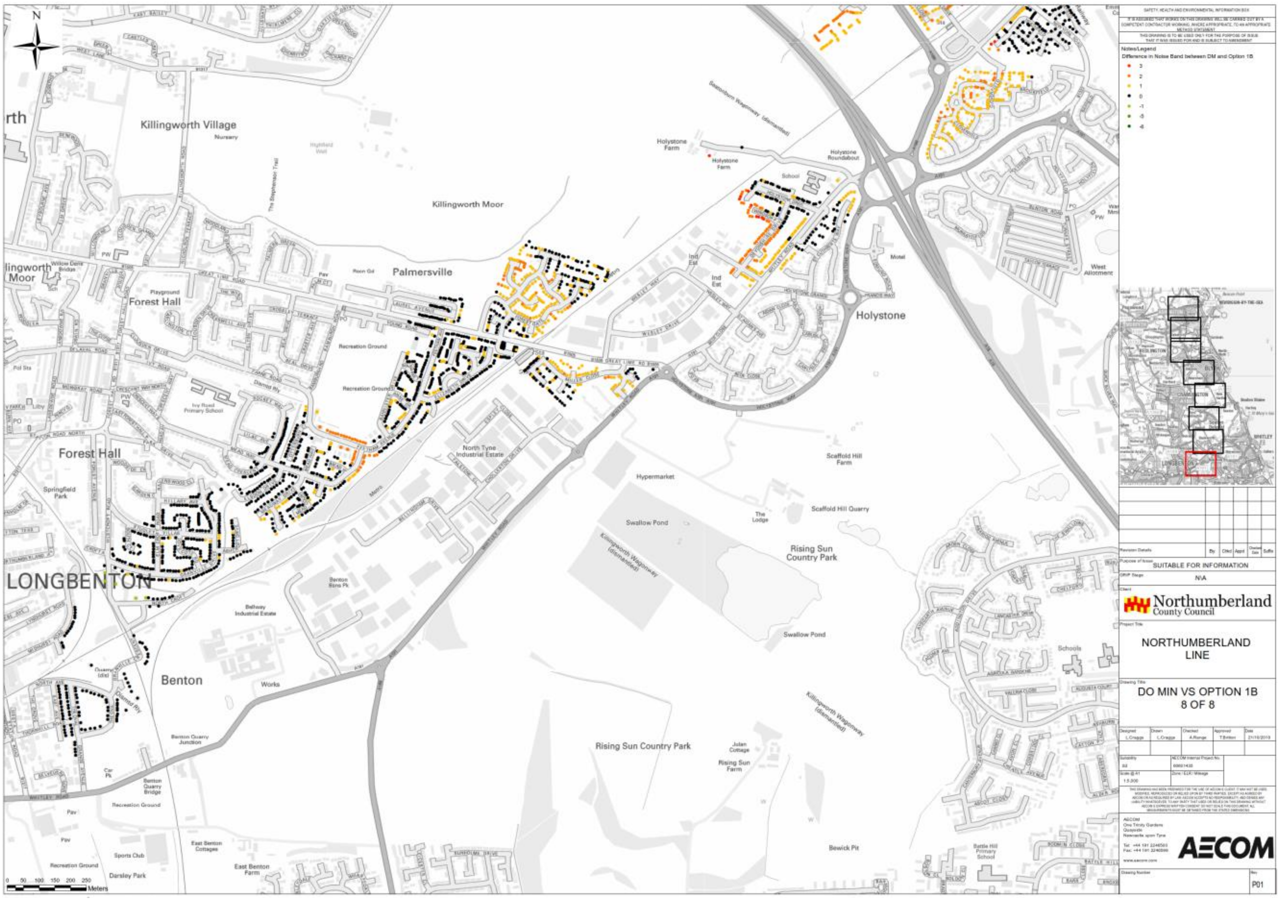
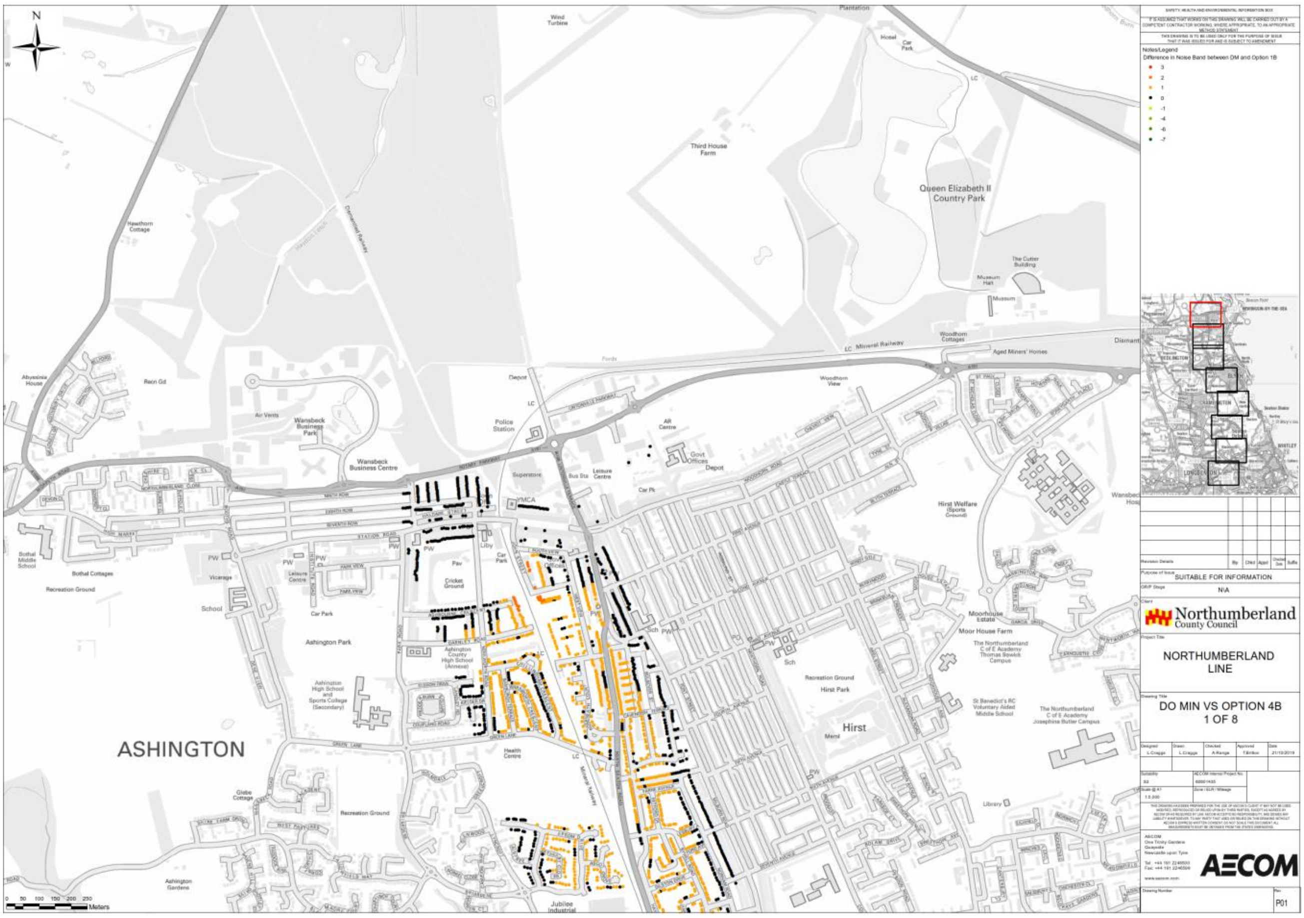
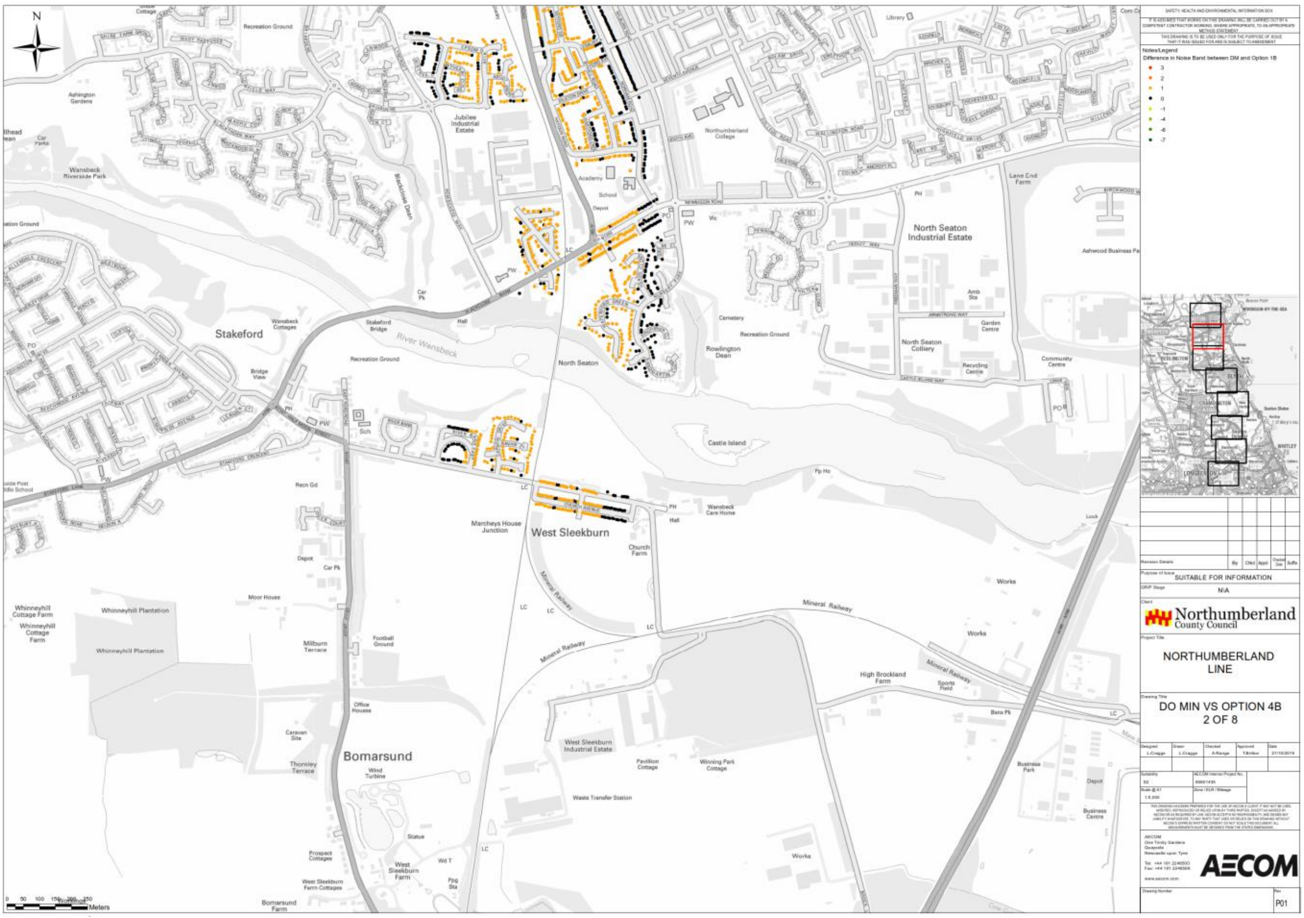
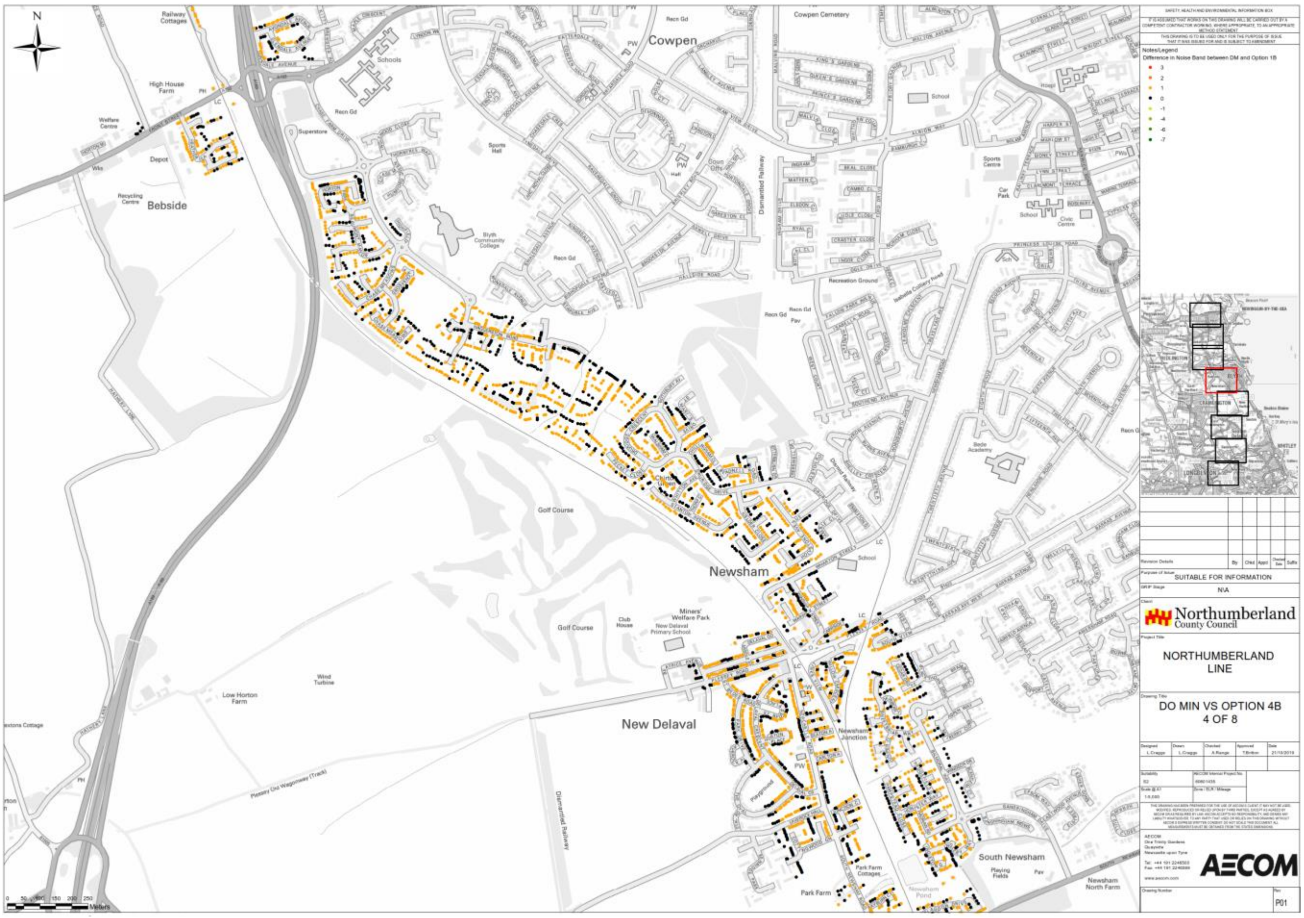

Notes/Legend
Difference in Noise Band between DM and Option 1B
3
2
1
0
-1
-5
-6
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 1B
8 OF 8
AECOM
P01
Killingworth Village
Killingworth Moor
Palmersville
Forest Hall
Holystone
LONGBENTON
Benton
Rising Sun Country Park

Figure 2: Properties anticipated to change noise level bands – Phase 2

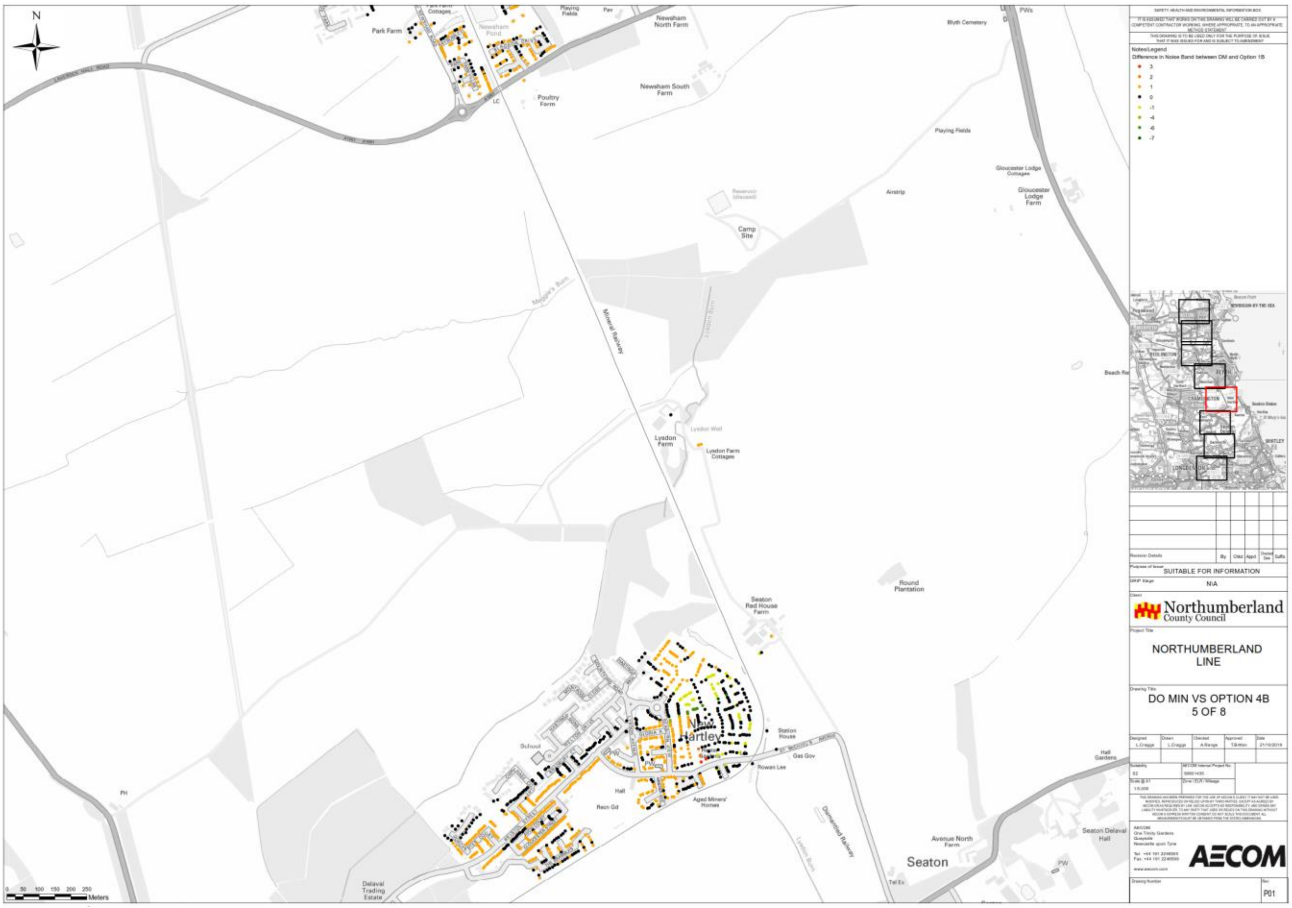




Notes/Legend
Difference in Noise Band between DM and Option 1B
BEDLINGTON
Bedlington Station
East Sleekburn
Kitty Brewster
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 4B
3 OF 8
AECOM
P01

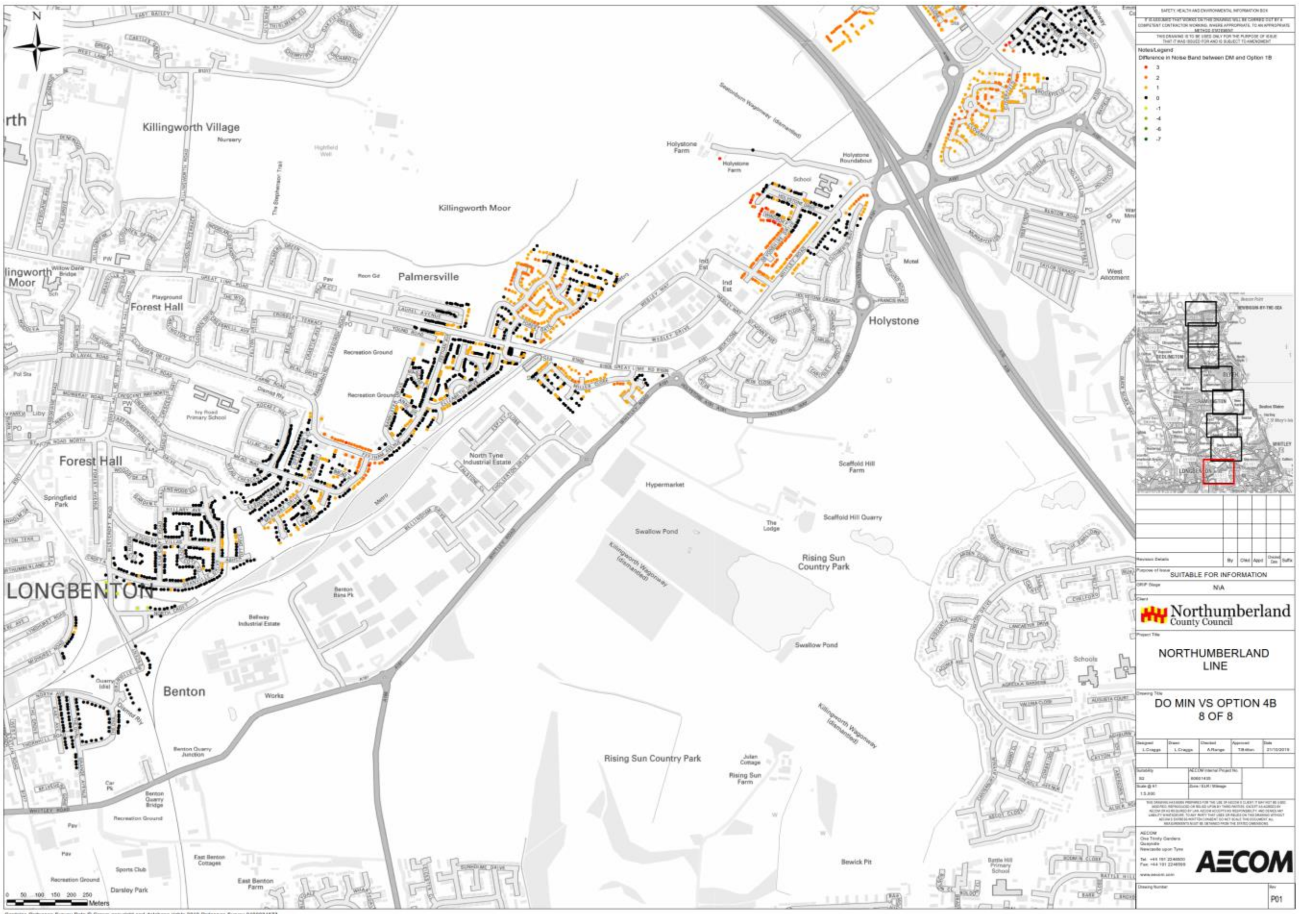


Notes/Legend
Difference in Noise Band between DM and Option 1B
Cowpen
Bebside
Newsham
New Delaval
South Newsham
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 4B
4 OF 8
AECOM
P01


N
Park Farm
Newsham North Farm
Blyth Cemetery
Newsham South Farm
Poultry Farm
Playing Fields
Gloucester Lodge Cottages
Gloucester Lodge Farm
Airstrip
Camp Site
Mineral Railway
Lysdon Farm
Lysdon Farm Cottages
Round Plantation
Seaton Red House Farm
Hartley
School
Station House
Gas Gov
Rowan Lea
Aged Miners' Homes
Hall
Recn Gd
Hall Gardens
Seaton Delaval Hall
Avenue North Farm
Seaton
Delaval Trading Estate
0 50 100 150 200 250 Meters
Notes/Legend
Difference in Noise Band between DM and Option 1B
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 4B
5 OF 8
AECOM
P01


N
Delaval Trading Estate
East View
East Cramlington
East Cramlington Industrial Estate
Depot
Wks
Football Ground
Seaton Delaval
Wheatridge
Manners Gardens
Mineral Railway
Seaton Terrace
Recn Gd
Middle Farm
Seghill
Mare Close Farm Cottages
Westbourne Terrace
School
Blaketown
Factory
Wooden Willy's Farm
Recreation Ground
Holywell
Greenacres
Seghill
Holywell Dene
Tip
West Field
0 50 100 150 200 250 Meters
Notes/Legend
Difference in Noise Band between DM and Option 1B
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 4B
6 OF 8
AECOM
P01

N
East Holywell
West Holywell
Earsdon
Backworth
Diamonded Railway
Holystone Farm
Notes/Legend
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 4B
7 OF 8
AECOM
P01
Meters



N
Killingworth Village
Killingworth Moor
Palmersville
Forest Hall
Holystone
LONGBENTON
Benton
Rising Sun Country Park
Notes/Legend
SUITABLE FOR INFORMATION
N/A
Northumberland County Council
NORTHUMBERLAND LINE
DO MIN VS OPTION 4B
8 OF 8
AECOM
P01
Meters

Appendix D Greenhouse Gas Workbook Outputs

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: Option T1

Present Value Base Year 2010

Current Year 2019

Proposal Opening year: 2023

Project (Road/Rail or Road and Rail): road/rail

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): -£2,253,640

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): 49,124
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -1144

Change in carbon dioxide equivalent emissions in opening year (tonnes): 307
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £50,434
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budg	Carbon Budg	Carbon Budget 4
Traded sector	0	0	0	-86
Non-traded sector	0	0	0	1913

Qualitative Comments:

Non-traded emissions: Impacts of additional train miles (diesel) outweigh reduction in car-km (diesel & petrol)

Traded emissions: Impacts of reduction in car-km (electric) only

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): -£3,484,570

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): -£1,023,750

Data Sources:

Northumberland Line Mode Choice Model & WebTAG Databook

Greenhouse Gases Workbook - Worksheet 1

Scheme Name:	Option A1
Present Value Base Year	2010
Current Year	2019
Proposal Opening year:	2023
Project (Road/Rail or Road and Rail):	road/rail

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £2,785,257

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): -56,947

(between 'with scheme' and 'without scheme' scenarios)

Of which Traded 6580

Change in carbon dioxide equivalent emissions in opening year (tonnes): -1,119

(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): -£272,395

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budg	Carbon Budge	Carbon Budget 4
Traded sector	0	0	0	2432
Non-traded sector	0	0	0	-8045

Qualitative Comments:

Non-traded emissions: Impacts of reduction in car-km (diesel & petrol) only

Traded emissions: Impacts of additional train miles (electric) outweigh reduction in car-km (electric)

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £4,274,584

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £1,296,988

Data Sources:

Northumberland Line Mode Choice Model & WebTAG Databook

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: Option T2

Present Value Base Year 2010

Current Year 2019

Proposal Opening year: 2025

Project (Road/Rail or Road and Rail): road/rail

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): -£3,649,236

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): 79,715
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -1641

Change in carbon dioxide equivalent emissions in opening year (tonnes): 671
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £72,477
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budg	Carbon Budge	Carbon Budget 4
Traded sector	0	0	0	-89
Non-traded sector	0	0	0	2235

Qualitative Comments:

Non-traded emissions: Impacts of additional train miles (diesel) outweigh reduction in car-km (diesel & petrol)

Traded emissions: Impacts of reduction in car-km (electric) only

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): -£5,642,859

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): -£1,657,645

Data Sources:

Northumberland Line Mode Choice Model & WebTAG Databook

Greenhouse Gases Workbook - Worksheet 1

Scheme Name:	Option A2
Present Value Base Year	2010
Current Year	2019
Proposal Opening year:	2025
Project (Road/Rail or Road and Rail):	road/rail

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £3,966,399

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): -80,707
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded 9386

Change in carbon dioxide equivalent emissions in opening year (tonnes): -1,612
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): -£391,108
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budg	Carbon Budge	Carbon Budget 4
Traded sector	0	0	0	2243
Non-traded sector	0	0	0	-7112

Qualitative Comments:

Non-traded emissions: Impacts of reduction in car-km (diesel & petrol) only

Traded emissions: Impacts of additional train miles (electric) outweigh reduction in car-km (electric)

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £6,094,746

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £1,841,053

Data Sources:

Northumberland Line Mode Choice Model & WebTAG Databook

Appendix E TEE/PA/AMCB tables

Option T1

NORTHUMBERLAND LINE RAIL STUDY - Option T1 AECOM

TEE TABLE

Economic Efficiency of the Transport System (TEE) £'000s

Non-business: Commuting	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	£ 146,966		£ 28,550		£ 118,416	
Vehicle operating costs	£ -					
User charges	£ -					
During Construction & Maintenance	£ -					
NET NON-BUSINESS BENEFITS: COMMUTING	£ 146,966	(1a)	£ 28,550	£ -	£ 118,416	£ -

Non-business: Other	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	£ 74,601		£ 35,748		£ 38,853	
Vehicle operating costs	£ -					
User charges	£ -					
During Construction & Maintenance	£ -					
NET NON-BUSINESS BENEFITS: OTHER	£ 74,601	(1b)	£ 35,748	£ -	£ 38,853	£ -

Business								
User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	£ 39,708			£ 14,588			£ 25,120	
Vehicle operating costs	£ -							
User charges	£ -							
During Construction & Maintenance	£ -							
Subtotal	£ 39,708	(2)	£ -	£ 14,588	£ -	£ -	£ 25,120	£ -
Private sector provider impacts						Freight	Passengers	
Revenue	£ 124,898				-£ 8,571		£ 128,891	£ 4,578
Operating costs	-£ 85,597						-£ 85,597	
Investment costs	£ -							
Grant/subsidy	£ -							
Revenue transfer	-£ 47,871						-£ 43,293	-£ 4,578
Subtotal	-£ 8,571	(3)			-£ 8,571	£ -	£ -	£ -
Other business impacts								
Developer contributions	£ -	(4)						
NET BUSINESS IMPACT	£ 31,137	(5) = (2) + (3) + (4)						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£ 252,704	(6) = (1a) + (1b) + (5)

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Public Accounts £'000s

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL		INFRASTRUCTURE			
Revenue	-£ 4,578					-4578
Operating Costs	£ 298					298
Investment Costs	£ -					
Developer and Other Contributions	£ -					
Grant/Subsidy Payments	£ -					
NET IMPACT	-£ 4,280	(7)	£ -	£ -	£ -	£ -
Central Government Funding: Transport						
Revenue	-£ 128,891				-£ 128,891	
Operating costs	£ 85,597				£ 85,597	
Investment Costs	£ 145,474		-£ 686		£ 146,160	
Developer and Other Contributions	£ -				£ -	
Grant/Subsidy Payments	£ -				£ -	
Revenue Transfer	£ -					
NET IMPACT	£ 102,180	(8)	-£ 686	£ -	£ -	£ -
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£ 20,188	(9)	£ 2,309		£ 17,879	
TOTALS						
Broad Transport Budget	£ 97,901	(10) = (7) + (8)				
Wider Public Finances	£ 20,188	(11) = (9)				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Analysis of Monetised Costs and Benefits £'000s

Noise	-£ 729	(12)
Local Air Quality	£ 71	(13)
Greenhouse Gases	-£ 2,254	(14)
Physical Activity		(15)
Accidents	£ 12,292	(16)
Economic Efficiency: Consumer Users (Commuting)	£ 146,966	(1a)
Economic Efficiency: Consumer Users (Other)	£ 74,601	(1b)
Economic Efficiency: Business Users and Providers	£ 31,137	(5)
Wider Public Finances (Indirect Taxation Revenues)	-£ 20,188	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Option Values		(17)
Present Value of Benefits (see notes) (PVB)	£ 241,895	(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)
Broad Transport Budget	£ 97,901	(10)
Present Value of Costs (see notes) (PVC)	£ 97,901	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	**£ 143,995**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**2.47**	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Option A1

NORTHUMBERLAND LINE RAIL STUDY - APPRAISAL MODEL - OPTION A1 AECOM

TEE TABLE

Economic Efficiency of the Transport System (TEE) £'000s

Non-business: Commuting	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	£ 177,192		£ 34,137		£ 143,055	
Vehicle operating costs	£ -					
User charges	£ -					
During Construction & Maintenance	£ -					
NET NON-BUSINESS BENEFITS: COMMUTING	£ 177,192	(1a)	£ 34,137	£ -	£ 143,055	£ -

Non-business: Other	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	£ 95,298		£ 44,882		£ 50,416	
Vehicle operating costs	£ -					
User charges	£ -					
During Construction & Maintenance	£ -					
NET NON-BUSINESS BENEFITS: OTHER	£ 95,298	(1b)	£ 44,882	£ -	£ 50,416	£ -

Business								
User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	£ 50,396			£ 18,146			£ 32,249	
Vehicle operating costs	£ -							
User charges	£ -							
During Construction & Maintenance	£ -							
Subtotal	£ 50,396	(2)	£ -	£ 18,146	£ -	£ -	£ 32,249	£ -
Private sector provider impacts						Freight	Passengers	
Revenue	£ 119,437				-£ 10,442		£ 70,446	£ 59,433
Operating costs	-£ 87,506						-£ 87,506	
Investment costs	£ -							
Grant/subsidy	£ -							
Revenue transfer	-£ 42,372						£ 17,060	-£ 59,433
Subtotal	-£ 10,442	(3)			-£ 10,442	£ -	£ -	£ -
Other business impacts								
Developer contributions	£ -	(4)						
NET BUSINESS IMPACT	£ 39,954	(5) = (2) + (3) + (4)						

TOTAL

Present Value of Transport Economic Efficiency Benefits (TEE)	£ 312,443	(6) = (1a) + (1b) + (5)

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.

All entries are discounted present values, in 2010 prices and values

Public Accounts £'000s

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL		INFRASTRUCTURE			
Revenue	-£ 59,433					-59433
Operating Costs	£ 298					298
Investment Costs	£ -					
Developer and Other Contributions	£ -					
Grant/Subsidy Payments	£ -					
NET IMPACT	-£ 59,135	(7)	£ -	£ -	£ -	£ -
Central Government Funding: Transport						
Revenue	-£ 70,446				-£ 70,446	
Operating costs	£ 87,506				£ 87,506	
Investment Costs	£ 157,771		-£ 846		£ 158,616	
Developer and Other Contributions	£ -				£ -	
Grant/Subsidy Payments	£ -				£ -	
Revenue Transfer	£ -					
NET IMPACT	£ 174,831	(8)	-£ 846	£ -	£ -	£ -
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£ 21,234	(9)	£ 2,836		£ 18,398	
TOTALS						
Broad Transport Budget	£ 115,696	(10) = (7) + (8)				
Wider Public Finances	£ 21,234	(11) = (9)				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Analysis of Monetised Costs and Benefits £'000s

Noise	-£ 529	(12)
Local Air Quality	£ 87	(13)
Greenhouse Gases	£ 2,785	(14)
Physical Activity		(15)
Accidents	£ 15,140	(16)
Economic Efficiency: Consumer Users (Commuting)	£ 177,192	(1a)
Economic Efficiency: Consumer Users (Other)	£ 95,298	(1b)
Economic Efficiency: Business Users and Providers	£ 39,954	(5)
Wider Public Finances (Indirect Taxation Revenues)	-£ 21,234	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Option Values		(17)
Present Value of Benefits (see notes) (PVB)	£ 308,692	(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)
Broad Transport Budget	£ 115,696	(10)
Present Value of Costs (see notes) (PVC)	£ 115,696	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	**£ 192,996**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**2.67**	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Option T2

NORTHUMBERLAND LINE RAIL STUDY - Option T2 AECOM

TEE TABLE

Economic Efficiency of the Transport System (TEE) £'000s

Non-business: Commuting	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	£ 212,061		£ 38,579		£ 173,482	
Vehicle operating costs	£ -					
User charges	£ -					
During Construction & Maintenance	£ -					
NET NON-BUSINESS BENEFITS: COMMUTING	£ 212,061	(1a)	£ 38,579	£ -	£ 173,482	£ -

Non-business: Other	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	£ 116,256		£ 54,357		£ 61,898	
Vehicle operating costs	£ -					
User charges	£ -					
During Construction & Maintenance	£ -					
NET NON-BUSINESS BENEFITS: OTHER	£ 116,256	(1b)	£ 54,357	£ -	£ 61,898	£ -

Business			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
User benefits								
Travel time	£ 61,610			£ 21,938			£ 39,672	
Vehicle operating costs	£ -							
User charges	£ -							
During Construction & Maintenance	£ -							
Subtotal	£ 61,610	(2)	£ -	£ 21,938	£ -	£ -	£ 39,672	£ -
Private sector provider impacts						Freight	Passengers	
Revenue	£ 184,127				-£ 12,157		£ 189,091	£ 7,192
Operating costs	-£ 116,541						-£ 116,541	
Investment costs	£ -							
Grant/subsidy	£ -							
Revenue transfer	-£ 79,743						-£ 72,551	-£ 7,192
Subtotal	-£ 12,157	(3)			-£ 12,157	£ -	£ -	£ -
Other business impacts								
Developer contributions	£ -	(4)						
NET BUSINESS IMPACT	£ 49,453	(5) = (2) + (3) + (4)						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£ 377,769	(6) = (1a) + (1b) + (5)

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.

All entries are discounted present values, in 2010 prices and values

Public Accounts £'000s

Local Government Funding	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Revenue	-£ 7,192					-7192
Operating Costs	£ 279					279
Investment Costs	£ -					
Developer and Other Contributions	£ -					
Grant/Subsidy Payments	£ -					
NET IMPACT	-£ 6,913	(7)	£ -	£ -	£ -	£ -

Central Government Funding: Transport	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Revenue	-£ 189,091				-£ 189,091	
Operating costs	£ 116,541				£ 116,541	
Investment Costs	£ 174,065		-£ 1,025		£ 175,091	
Developer and Other Contributions	£ -				£ -	
Grant/Subsidy Payments	£ -				£ -	
Revenue Transfer	£ -					
NET IMPACT	£ 101,515	(8)	-£ 1,025	£ -	£ 102,540	£ -

Central Government Funding: Non-Transport	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Indirect Tax Revenues	£ 29,153	(9)	£ 2,853		£ 26,299	

TOTALS		
Broad Transport Budget	£ 94,601	(10) = (7) + (8)
Wider Public Finances	£ 29,153	(11) = (9)

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Analysis of Monetised Costs and Benefits £'000s

Noise	-£ 1,673	(12)
Local Air Quality	£ 77	(13)
Greenhouse Gases	-£ 3,649	(14)
Physical Activity		(15)
Accidents	£ 17,884	(16)
Economic Efficiency: Consumer Users (Commuting)	£ 212,061	(1a)
Economic Efficiency: Consumer Users (Other)	£ 116,256	(1b)
Economic Efficiency: Business Users and Providers	£ 49,453	(5)
Wider Public Finances (Indirect Taxation Revenues)	-£ 29,153	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Option Values		(17)
Present Value of Benefits (see notes) (PVB)	£ 361,256	(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)
Broad Transport Budget	£ 94,601	(10)
Present Value of Costs (see notes) (PVC)	£ 94,601	(PVC) = (10)

OVERALL IMPACTS

Net Present Value (NPV)	**£ 266,655**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**3.82**	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Option A2

NORTHUMBERLAND LINE RAIL STUDY Option A2 — AECOM

TEE TABLE

Economic Efficiency of the Transport System (TEE) £'000s

Non-business: Commuting	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	£ 260,704		£ 47,085		£ 213,619	
Vehicle operating costs	£ -					
User charges	£ -					
During Construction & Maintenance	£ -					
NET NON-BUSINESS BENEFITS: COMMUTING	£ 260,704	(1a)	£ 47,085	£ -	£ 213,619	£ -

Non-business: Other	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	£ 151,043		£ 69,397		£ 81,646	
Vehicle operating costs	£ -					
User charges	£ -					
During Construction & Maintenance	£ -					
NET NON-BUSINESS BENEFITS: OTHER	£ 151,043	(1b)	£ 69,397	£ -	£ 81,646	£ -

Business			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
User benefits								
Travel time	£ 79,607			£ 27,780			£ 51,827	
Vehicle operating costs	£ -							
User charges	£ -							
During Construction & Maintenance	£ -							
Subtotal	£ 79,607	(2)	£ -	£ 27,780	£ -	£ -	£ 51,827	£ -
Private sector provider impacts						Freight	Passengers	
Revenue	£ 177,017				-£ 14,955		£ 108,074	£ 83,898
Operating costs	-£ 120,245						-£ 120,245	
Investment costs	£ -							
Grant/subsidy	£ -							
Revenue transfer	-£ 71,727						£ 12,171	-£ 83,898
Subtotal	-£ 14,955	(3)			-£ 14,955	£ -	£ -	£ -
Other business impacts								
Developer contributions	£ -	(4)						
NET BUSINESS IMPACT	£ 64,652	(5) = (2) + (3) + (4)						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£ 476,399	(6) = (1a) + (1b) + (5)

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Public Accounts £'000s

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Local Government Funding						
Revenue	-£ 83,898					-83898
Operating Costs	£ 279					279
Investment Costs	£ -					
Developer and Other Contributions	£ -					
Grant/Subsidy Payments	£ -					
NET IMPACT	-£ 83,619	(7)	£ -	£ -	£ -	£ -
Central Government Funding: Transport						
Revenue	-£ 108,074				-£ 108,074	
Operating costs	£ 120,245				£ 120,245	
Investment Costs	£ 185,683		-£ 1,288		£ 186,971	
Developer and Other Contributions	£ -				£ -	
Grant/Subsidy Payments	£ -				£ -	
Revenue Transfer	£ -					
NET IMPACT	£ 197,854	(8)	-£ 1,288	£ -	£ 199,142	£ -
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£ 30,778	(9)	£ 3,577		£ 27,202	
TOTALS						
Broad Transport Budget	£ 114,236	(10) = (7) + (8)				
Wider Public Finances	£ 30,778	(11) = (9)				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Analysis of Monetised Costs and Benefits £'000s

Noise	-£ 1,352	(12)
Local Air Quality	£ 97	(13)
Greenhouse Gases	£ 3,966	(14)
Physical Activity		(15)
Accidents	£ 22,459	(16)
Economic Efficiency: Consumer Users (Commuting)	£ 260,704	(1a)
Economic Efficiency: Consumer Users (Other)	£ 151,043	(1b)
Economic Efficiency: Business Users and Providers	£ 64,652	(5)
Wider Public Finances (Indirect Taxation Revenues)	-£ 30,778	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Option Values		(17)
Present Value of Benefits (see notes) (PVB)	£ 470,790	(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)
Broad Transport Budget	£ 114,236	(10)
Present Value of Costs (see notes) (PVC)	£ 114,236	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	**£ 356,555**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**4.12**	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

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