Appendix A: Primary research methods

Full details on the research activities undertaken to support the early impact evaluation are set out below.

On-train survey

The on-train survey consisted of a 15-minute face-to-face survey, administered on-train and at Okehampton and Crediton train stations.

Interviewers approached passengers for interview, sought their consent to participate and then shared a QR code linking to an online questionnaire. Interviewers also had tablets available to complete questionnaires with passengers, and a few printout questionnaires were also available for those without online access. Passengers were incentivised to complete the survey through a £500 prize draw.

Fieldwork took place between 11th September – 8th October 2023, including a soft launch, and shifts were completed as follows:

- Weekday, between 7am and 12pm – 8 shifts.
- Weekday, between 12pm and 5pm – 10 shifts.
- Saturday, between 9am and 2pm – 4 shifts.
- Sunday, between 10am and 3pm – 3 shifts.

Passengers aged 16 years and over were in scope for the research and no additional screener questions or quotas were set. Overall, a total of 552 passengers completed the on-train survey. The demographics of the passenger sample were as follows:

- Four in ten (41%) of on-train survey respondents were 16-34 years old, a similar proportion (42%) were 35-64 years old, and 17% were 65 years or older.
- Half of respondents (50%) identified as female, a similar proportion identified as male (45%) and the remainder either preferred not to say (4%) or identified in another way (1%).
- Six in ten respondents (60%) reported living near the Dartmoor Line and just under a tenth reported studying near the Line or working near the Line (both 9%).
- Two thirds (63%) reported access to a car, van, motorbike or moped, as a driver.
- Half of respondents (48%) stated that they had been working as an employee in the last 7 days and 13% stated that they were self-employed or freelance.
- 16% reported an annual household income of £21,000 or less, and a similar proportion (20%) reported an income of between £21,001 and £41,000. A quarter of respondents (26%) reported earning an annual household income of £41,001 or

more. Two fifths of respondents (39%) declined to provide their total annual household income.

The survey structure was as follows:

- Introduction and data protection
- Using the Dartmoor Line
- Visitors to the Dartmoor Line (completed by visitors to the area only)
- Views on the Dartmoor Line
- Impacts of the Dartmoor Line
- Improvements to the Dartmoor Line
- Demographic data to understand the views, behaviours and needs of different groups of people

All cleaning and analysis of on-train survey data was undertaken in statistical analysis software, SPSS.

Frequencies were run for each question in the survey, and cross tabulations and chi-square tests of significance were run by key demographics

In some instances within the main report, significant variations from chi-square tests have been reported. These are described as follows: “This difference is statistically significant.”

Due to routing and passengers choosing not to provide some answers, the base size for questions may vary from the total sample size throughout this report. The base number for each question is provided. In addition, where percentages do not total 100%, this is due to rounding or the multiple response nature of the question. Where multiple responses to a question were possible, this is indicated throughout the report using ‘MRQ’ in the relevant Table or Figure headings.

Residents' survey

The residents' survey consisted of a 15-minute online survey, promoted via residential letter drop to 12,069 residences within a 15-minute car trip boundary around either Okehampton or Crediton train station. This boundary covered the following residential wards: Boniface, Lawrence, Newbrooke, Exbourne, Hatherleigh, South Tawton, Okehampton South, Bridestowe, Yeo and Okehampton North.

Any adult aged 16 or over who regarded the residence as their main residence was in-scope to complete the residents' survey. Data from the 2021 Census suggests that this comprises 29,704 residents.

Residents were instructed to access the survey via a weblink and QR code provided within the posted letter. Where more than one adult lived in the household, the letter asked that the adult with the next birthday complete the survey. This was to ensure a varied group of people complete the survey. A dedicated telephone line was also set up for residents who would prefer to complete the survey over the phone. Residents were incentivised to complete the survey through a £500 prize draw.

The survey took place between 30th October and 19th November 2023, with the majority of residents completing the survey online, and just 2% completing the survey via the dedicated telephone line.

The survey structure was as follows:

- Introduction and data protection
- Current travel behaviour
- Awareness of the Dartmoor Line
- Using the Dartmoor Line
- Impacts of the Dartmoor Line
- Improvements to the Dartmoor Line
- Demographic data to understand the views, behaviours and needs of different groups of people

Overall, a total of 1,429 residents aged 16 years and over completed the residents' survey. This sample size provides a maximum confidence interval of +/-2.5%, meaning if 50% of the sample said they were satisfied with the Dartmoor Line, you could be sure the true value lies within 47.5%-52.5%.

The table below provides comparisons between the achieved unweighted residents' survey sample, the population of the wards promotional letters were sent to, and the national population.

Demographics	Residents' Survey	2021 Census (local population)	2021 Census (national population)
16-34 years' old	12%	22%	24%
35-64 years' old	54%	48%	39%
65+ years' old	34%	30%	18%
Male	49%	49%	49%
Female	51%	51%	51%

Source: Residents' Survey and 2021 Census

Table 1 Residents' Survey achieved sample compared to the population

The achieved sample was very close to the local population in terms of age and gender. However, in order to ensure the results of the survey were representative of the local population, the data was weighted by age and gender.

Weighting factors between 0.71 and 2.30 were calculated in Excel and applied in SPSS, as follows:

- Using 2021 Census data for the in-scope wards, the interlocking proportions of residents within three age categories (16-34; 35-64; and 65+) and two gender categories (Male; Female) were identified;
- The 2021 Census proportions were multiplied with the total achieved sample for the resident's survey to create weighting factors;
- Weighting factors were applied in SPSS by creating a variable within the datafile that assigned the relevant weighting factor to each age x gender interlocking sub-sample. The WEIGHT command was then run ahead of full analysis.

The demographics of the residents' survey sample, following weighting, are as follows:

- A fifth (22%) of respondents were 16-34 years old, half (48%) were 35-64 years old, and 30% were 65 years or older.
- Half of respondents (50%) identified as female, a similar proportion identified as male (48%) and the remainder preferred not to say (2%).
- 13% of respondents reported travelling by train at least once a week, while a third (36%) reported travelling by train less than once a week, but at least once a month, and two fifths (44%) reported travelling by train less than once a month. The remainder reported never travelling by train (7%).
- The majority of respondents (90%) reported having access to a car or van, as a driver, while 3% reported having access to a motorbike or moped, as a driver, and a tenth (10%) reported not having access to any of these transport modes, as a driver.

- Around half of respondents (45%) stated that they had been working as an employee in the last 7 days and around a fifth (16%) stated that they were self-employed or freelance.

- A tenth (12%) reported an annual household income of £21,000 or less, and a quarter (24%) reported an income of between £21,001 and £41,000. A third of respondents (35%) reported earning an annual household income of £41,001 or more. Under a third of respondents (29%) declined to provide their total annual household income.

All cleaning and analysis of residents' survey data was undertaken in statistical analysis software, SPSS, using the weighted dataset.

Frequencies were run for each question in the survey, and cross tabulations and chi-square tests of significance were run by key demographics.

In some instances within the main report, significant variations from chi-square tests have been reported. These are described as follows: "This difference is statistically significant."

Due to routing and residents' choosing not to provide some answers, the base size for questions may vary from the total sample size throughout this report. The base number for each question is provided. In addition, where percentages do not total 100%, this is due to rounding or the multiple response nature of the question. Where multiple responses to a question were possible, this is indicated throughout the report using 'MRQ' in the relevant Table or Figure headings.

Stakeholder and Business interviews

Interviews were completed with stakeholders and businesses using Microsoft (MS) Teams, with each interview lasting up to 60 minutes. Stakeholders and businesses were defined as follows:

- Stakeholders – those who had a role in the delivery of the Dartmoor Line.
- Businesses – businesses local to the Dartmoor Line.

Potential interviewees were contacted via phone call or e-mail to invite them to participate in the research. Overall, a total of 7 stakeholders and 3 businesses completed interviews.

Each interview followed a semi-structured topic guide which guided the discussion through the following topic areas:

Stakeholder interview topic guide structure	**Businesses interview topic guide structure**
▪ Stakeholder role ▪ Observations on delivery ▪ Observations on performance and impact	▪ Business overview ▪ Observations on performance and impact

All discussions were recorded with participant consent, ensuring detailed write-ups could be completed by the moderator. The data underwent thematic analysis wherein each write-up was read several times and emergent core messages were clustered together to devise higher order themes.

Appendix B: Secondary data analysis

Full details of the secondary data sources used and how they have been analysed to inform the early impact evaluation are set out in Table 2 below. This is done by area of assessment.

Area of assessment	Element	Data sources	Analysis undertaken
Improved route capacity	Rail capacity	▪ GWR Dartmoor Line weekday timetable[1] (May to December 2023) ▪ MOIRA2	▪ Calculation of number of trains and seats in each direction on the Dartmoor Line on a weekday according to: - number of trains running by time period on a weekday (according to the timetable) - seating capacity of Dartmoor Line trains (according to MOIRA2 based on Class 150 trains)
Reduced journey time	Number of interchanges	▪ GWR Dartmoor Line weekday timetable (May to December 2023)[1] ▪ Stagecoach route 6A bus timetable (September 2023)[2]	▪ Comparison of the number of interchanges by rail and bus between Okehampton and Exeter according to timetable information
	In-vehicle journey times	▪ GWR Dartmoor Line weekday timetable (May to December 2023)[1] ▪ Stagecoach route 6A bus timetable (September 2023)[2]	▪ Calculation of rail and bus in-vehicle journey times between Okehampton and Exeter according to timetable departure and arrival times
	Door-to-door public transport journey times	▪ TRACC	▪ Assessment of how door-to-door journey times by public transport have changed following the Dartmoor Line reopening. TRACC uses actual public transport timetables to calculate accurate journey times. From multiple origins to multiple destinations, TRACC then analyses how many origins can access each destination within specified time ranges, creating travel time contours.
Increased accessibility of public transport	Population within walking distance of	▪ GIS software	▪ Creation of walking time isochrones (a line on a map connecting places from which it takes the same time to travel to a certain point) from

[1] gwr.com/travel-information/train-times
[2] stagecoachbus.com/routes/south-west/6a/okehampton-exeter/xdbo006a.o

	Okehampton railway station	▪ 2021 Census population data (Lower Super Output Area level)[3]	Okehampton station in 5-minute bands using GIS software ▪ Calculation of population within each isochrone using Census population data
Reduced generalised cost of travel	Comparison of generalised cost of travel	▪ GWR Dartmoor Line weekday timetable (May to December 2023)[1] ▪ GWR fares data[4] ▪ PDFH v6 ticket type to journey purpose mapping factors (Table B1.6 – Non London, under 25 miles) ▪ Stagecoach route 6A bus timetable (September 2023)[2] ▪ Stagecoach fares data[5] ▪ Transport Analysis Guidance (TAG) values of time[6]	▪ Calculation of the generalised cost of travel by rail and bus using fare data and converting journey times to monetary values using values of time from TAG (see worked example below)
Increased use of rail services	Rail demand data	▪ LENNON rail demand (period 9 2022 to period 4 2024)	▪ Calculation of demand to/from Dartmoor Line stations (Okehampton, Crediton, Exeter Central and Exeter St David's) by rail period ▪ Calculation of demand wholly on Dartmoor Line by rail period i.e. between Okehampton and any of the other three Dartmoor Line stations ▪ Calculation of demand between Okehampton and a non-Dartmoor Line station by rail period i.e. involving an interchange at Crediton, Exeter St David's or Exeter Central
Journey purpose	Mapping of rail demand data to journey purpose	▪ LENNON rail demand (period 9 2022 to period 4 2024) ▪ PDFH v6 ticket type to journey purpose mapping factors (Table B1.6 – Non London, under 25 miles)	▪ Mapping of LENNON demand data by ticket type (Full, Reduced, Season) to journey purpose (Commute, Business, Leisure) using PDFH factors

[3] ons.gov.uk/census
[4] gwr.com/
[5] stagecoachbus.com/tickets
[6] TAG Databook November 2023 v1.22, A 1.3.1

Reduced bus usage	Local bus patronage	▪ Annual Stagecoach bus demand by route (Okehampton – Exeter, Sidmouth – Exeter) 2017/18 to 2022/23	▪ Calculation of % change in bus demand by route between 2017/18 and 2022/23
Reduced car dependency and usage	Local road traffic counts	▪ Annual average daily traffic (AADT) by route, 2019 to 2023 (National Highways traffic counts[7])	▪ Calculation of % change in AADT between 2019 and 2023 by route
Cost-effectiveness of the Dartmoor Line	Annual operating costs	▪ Annual operating costs incurred by GWR for 2023/24 split by cost type	▪ Collation of total annual operating costs
	Annual revenue generated	▪ LENNON rail revenue (period 1 2024 to period 13 2024)	▪ Level of revenue generated at new stations (Okehampton) and additional revenue generated at existing stations (Crediton, Exeter) ▪ Okehampton station car parking revenue
Project delivery	Project cost Project timescales	▪ Final Business Case (FBC) ▪ Cost validation point data	▪ Comparison of outturn capital costs and project timescales against what was forecast in the FBC

Table 2: Secondary data sources and analysis undertaken by area of assessment

[7] webtris.highwaysengland.co.uk/

Generalised cost worked example

A worked example to illustrate the calculation of generalised cost is set out below based on a single trip between Okehampton and Exeter.

Rail generalised cost

Step 1: Calculate rail fare by journey purpose by mapping rail fares by ticket type using PDFH factors (see Table 2).

i. Rail fares by ticket type (source: GWR fares data[4])

Rail fares (one-way Okehampton – Exeter)	**Full**	**Reduced**	**Season**
	£4.20	£4.20*	£2.98^

*There are no off-peak fares on the Dartmoor Line therefore the Reduced fare is the same price as the Full

^Single Season fare calculated as the monthly Season (£134) divided by 45 (assumed number of monthly trips for Season ticket holders)

ii. Ticket type to journey purpose mapping factors (derived from PDFH v6, Table B1.6)

Non-London, < 25 miles	**Full**	**Reduced**	**Season**	**Total**
Commute	32.0%	16.2%	51.8%	**100.0%**
Business	55.6%	44.4%	0.0%	**100.0%**
Leisure	43.3%	40.2%	16.4%	**100.0%**
Total	**39.2%**	**31.0%**	**29.7%**	**100.0%**

iii. Rail fares by journey purpose

Rail fares (one-way Okehampton – Exeter)	**Commute**	**Business**	**Leisure**
	(32.0% x £4.20) + (16.2% x £4.20) + (51.8% x £2.98) = **£3.57**	(55.6% x £4.20) + (44.4% x £4.20) + (0.0% x £2.98) = **£4.20**	(43.3% x £4.20) + (40.2% x £4.20) + (16.4% x £2.98) = **£4.00**

Step 2: Calculate total rail journey time

The total rail journey time consists of two elements:

- in-vehicle time
- wait time at the station.

The wait time element and how closely passengers can time their departure or arrival to their ideal requirements is determined by train service frequencies. The recommended forecasting method in the PDFH is to convert the time between services (service interval) to an equivalent journey time value using a service interval penalty. The PDFH provides recommended service interval penalties.

i. Okehampton – Exeter in-vehicle rail journey time (source: GWR Dartmoor Line weekday timetable[1]): **40 minutes**

ii. Service interval penalty based on a service interval of 60 minutes i.e.1 train per hour (source: PDFH v6, Table B4.11): **35 minutes**

iii. Total rail journey time: **75 minutes (1.25 hours)**

Step 3: Convert rail journey time into monetary value using values of time

i. Values of time by journey purpose (source: TAG[6])

Values of time £ per hour (market prices)	**Commute**	**Business**	**Leisure**
	£9.95/hr	£19.27/hr*	£4.54/hr

*Based on average of all working persons

ii. Convert rail journey time to monetary values by journey purpose

Monetary value of rail journey time	**Commute**	**Business**	**Leisure**
	(1.25 hr x £9.95/hr) = **£12.44**	(1.25 hr x £19.27/hr) = **£24.09**	(1.25 hr x £4.54/hr) = **£5.68**

Step 4: Calculate rail generalised cost (fare + monetised journey time)

Rail generalised cost	**Commute**	**Business**	**Leisure**
	(£3.57 + £12.44) = **£16.01**	(£4.20 + £24.09) = **£28.29**	(£4.00 + £5.68) = **£9.68**

Bus generalised cost

Step 1: Calculate bus fare by journey purpose

An all-day flat fare of £3.00 is currently payable between Okehampton and Exeter on Stagecoach bus route 6A. The bus fare for all journey purposes is therefore £3.00.

Bus fares (one-way Okehampton – Exeter)	**Commute**	**Business**	**Leisure**
	£3.00	£3.00	£3.00

Step 2: Calculate total bus journey time

For this comparative exercise, it is deemed appropriate to use the same approach for rail applied above to calculate bus wait time (this assumes rail and bus users have the same perception of time):

i. Okehampton – Exeter in-vehicle bus journey time (source: Stagecoach route 6A bus timetable[2]): **73 minutes**

ii. Service interval penalty based on a service interval of 60 minutes i.e.1 bus per hour (source: PDFH v6, Table B4.11): **35 minutes**

iii. Total bus journey time: **108 minutes (1.80 hours)**

Step 3: Convert bus journey time into monetary value using values of time

iii. Values of time by journey purpose (source: TAG[6])

Values of time £ per hour (market prices)	Commute	Business	Leisure
	£9.95/hr	£19.27/hr*	£4.54/hr

*Based on average of all working persons

iv. Convert bus journey time to monetary values by journey purpose

Monetary value of bus journey time	Commute	Business	Leisure
	(1.80 hr x £9.95/hr) = **£17.91**	(1.80 hr x £19.27/hr) = **£34.69**	(1.80 hr x £4.54/hr) = **£8.17**

Step 4: Calculate bus generalised cost (fare + monetised journey time)

Bus generalised cost	Commute	Business	Leisure
	(£3.00 + £17.91) = **£20.91**	(£3.00 + £34.69) = **£37.69**	(£3.00 + £8.17) = **£11.17**

Comparison of rail and bus generalised cost

Generalised cost	Commute	Business	Leisure
Rail	£16.01	£28.29	£9.68
Bus	£20.91	£37.69	£11.17
Difference (rail – bus)	**-£4.90**	**-£9.40**	**-£1.49**

Appendix C: Level of Dartmoor Line usage compared to forecasts

Analysis shows that the estimated actual demand on the Dartmoor Line to date has been 17% higher than forecast overall to date (November 2024). The difference was most pronounced during the first two years of operations when actual demand was 47% higher. However, since November 2023 actual demand by period has typically been lower than forecast

Whilst the conclusions that can be drawn are limited at this early stage, one of the main reasons for the variance is the assumption of how demand would ramp-up following opening of the Line in the forecasting: this was lower than rail industry-recommended guidance and has likely contributed to the under-estimate.

Definitive conclusions will only be possible when a comparison between actual and forecast demand can be made over a longer time period when the demand has reached its full potential and the impact of the forecast ramp-up factors has diminished.

Introduction

KEQ 1.1 is concerned with how the level of usage for the Dartmoor Line compares to forecasts and understanding the drivers for any observed differences.

To understand the level of usage compared to the demand forecasts for the Dartmoor Line, actual demand by station on the Dartmoor Line from LENNON data has been analysed and compared to the forecasts contained in the business case for the Line (prepared in 2020). To understand the drivers of any observed differences, the forecasting methodology and assumptions have been reviewed and discussed with Network Rail, the body responsible for creating the demand forecasts.

Comparison of forecast and actual demand

As set out in section 5.8 of the report, the actual level of demand generated at the new Dartmoor Line station (Okehampton) and the change in demand at existing stations on the Line (Crediton, Exeter) due to the reopening of the Line has been estimated using rail demand data from LENNON. As noted, at this stage this analysis has not accounted for the following potential impacts:

- demand abstraction of trips from other routes e.g. trips previously London to/from Exeter stations may now be to/from Okehampton
- split ticketing (when passengers split their train journey into multiple tickets instead of buying a single ticket)
- strike action.

The demand forecasts have been obtained from the Dartmoor Line Full Business Case (FBC) and associated modelling. The forecasts were developed over a 60-year appraisal period. A demand lag profile was applied which reflects the fact that it can take considerable time before demand at a new station or on a new service reaches its full potential. This was assumed to be as follows:

- year 1: 25%
- year 2: 50%
- year 3: 75%
- year 4: 100%.

The comparison between actual and forecast demand has been split according to the periods during where the rail frequency was one train every two hours at the start of operations hours (rail periods 2022/09 to 2023/02) and when the frequency increased to an hourly service (from rail period 2023/02 which corresponds to May 2022) as shown in Table 3.

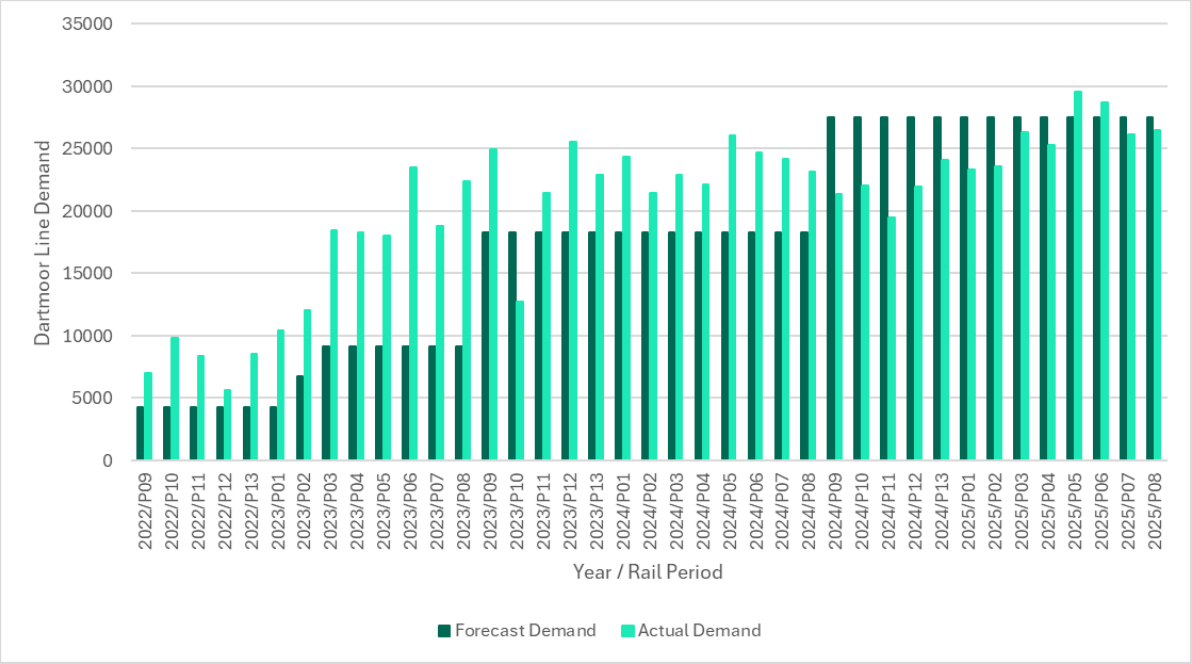
Rail Periods (inclusive)	Rail frequency (trains per hour)	Route	Actual demand	Forecast demand	Absolute difference	% Difference
2022/P09 to 2023/P02	0.5	Okehampton from/to Exeter	39,533	11,265	28,268	251%
		Okehampton from/to Crediton	2,791	17,775	-1,428	-8%
		Okehampton from/to other stations	13,556			
		Sub-total	**55,880**	**29,040**	**26,840**	**92%**
2023/P02 to 2025/P08	1	Okehampton from/to Exeter	383,719	254,951	128,768	51%
		Okehampton from/to Crediton	29,561	398,769	-42,103	-11%

		Okehampton from/to other stations	327,105			
		Sub-total	**740,385**	**653,720**	**86,665**	**13%**
Grand total (2022/P09 to 2025/P08)			**796,265**	**682,760**	**113,505**	**17%**

Source: LENNON (actual demand); Dartmoor Line FBC and associated modelling (forecast demand)

Table 3: Dartmoor Line actual and forecast demand by route

The comparison between actual and forecast demand by rail period is shown in Figure 1.



Source: LENNON (actual demand); Dartmoor Line FBC and associated modelling (forecast demand)

Figure 1: Dartmoor Line actual and forecast demand by rail period

The comparison indicates that overall since the Line reopened, actual demand has been 17% higher than forecast overall. The variance is more apparent in the first year of operations when actual demand was typically around double the forecast. The variance however narrowed in year 2 and the forecast in year 3 actually exceeds actual demand.

A further difference is noted in the demand by route:

- Actual demand between Okehampton and Exeter was significantly higher than forecast at the start of operations, but this difference has reduced in years 2 and 3.
- Conversely, actual demand between Okehampton and destinations other than Exeter is marginally lower than forecast but again this difference has receded more recently.

Explanation of differences

To explain the differences between the actual and forecast demand, the forecasting methodology and assumptions have been reviewed. Whilst given the uncertainty in the actual demand (as set out above and in the main report), the differences cannot be fully explained. The review has however focussed on the two main likely sources of difference in line with the TAG unit covering forecasting and uncertainty[8]:

- uncertainty in the inputs
- model parameters and specification.

Uncertainty in the inputs

Overall, the sources used to derive the forecasting model data inputs (LENNON, MOIRA 2[9] and the Passenger Demand Forecasting Handbook, PDFH) are appropriate and in line with modelling best practice. However, the following differences in inputs have been noted which may have contributed to the observed differences:

- The forecasts did not explicitly take into account any increase in demand at Crediton station where the rail frequency doubled on opening of the Line. As demonstrated in the section 5.8 of the report, demand at Crediton grew faster than the comparator station in the first year of operations suggesting that the Dartmoor Line generated demand at Crediton. It is noted however that journey time and crowding benefits at Crediton were modelled in MOIRA2 and the results were used to calculate user benefits in the business case. This is likely to have under-estimated demand.
- The forecast model only directly estimated demand between Okehampton and Exeter; for other routes, an uplift factor was applied to the Okehampton – Exeter market. This was based on analysis of the six Tarka Line stations (Newton St Cryes, Crediton, Yeoford, Copplestone, Eggesford and Barnstaple) which shows the proportion of Exeter trips from these stations was 39% of total trips. However, actual demand shows that demand between Okehampton and Exeter represents 46% of total demand. This is likely to have over-estimated the non-Exeter demand and this may explain why the actual non-Exeter demand is lower than forecast in Table 3.
- A yield of £2.68 was assumed for Okehampton to Exeter in the forecast model (based on the average yield from Yeoford to Exeter), whereas the outturn yield is on average £3.08[10] (15% higher). This is likely to have over-estimated demand.

Model parameters and specification

The review of model parameters and specification has focussed on two elements: assumptions and methodology.

Assumptions. All assumptions are well-documented in the FBC and are in line with modelling best practice. One notable difference however is the demand lag profile used which reflects the fact that it can take considerable time before demand at a new station or

[8] TAG Unit M4 – Forecasting and Uncertainty, DfT, 2023

[9] MOIRA 2 is a rail timetable model which calculates generalised journey times and can compare the demand and revenue impacts of different rail timetables. It can also be used to model crowding and calculate economic benefits.

[10] Average value between 2022/P09 and 2024/P05 in LENNON.

on a new service reaches its full potential. The demand lag profile recommended by the PDFH is found to be more aggressive (i.e. demand is assumed to materialise at a faster rate) than the profile assumed in the modelling, with significant differences in the first two years of the Line's operation e.g. in years 1 and 2, the PDFH-recommended ramp-up factor is 28% higher than the FBC assumption. It is likely this difference is one of the main reasons contributing to the differences between actual and forecast demand. As demand matures and reaches its full potential, the variance between actual and forecast demand would be expected to reduce.

Methodology. The summary methodology provided in the FBC and associated spreadsheets have been reviewed with the following observations made:

- A trip rate model[11] was used as the basis for the demand forecasting over alternative modelling approaches e.g. gravity, elasticity, trip end, mode choice and four-stage approaches. This approach was based on budget and proportionality grounds. The trip rate approach can be used for new stations and estimates trip rates of residents living within a particular station catchment area. However, there are no demand figures for new stations, so it relies on estimating trip rates based on comparable stations with similar catchment areas and demographics. As per guidance in the PDFH and TAG, this approach is typically more suitable for early assessment. Alternatively, gravity modelling can be used when a large demand change is expected such as opening stations or introducing new services between two stations that were not linked by rail previously. This type of model needs to be calibrated to replicate existing demand after which new stations can be introduced and changes in demand calculated. This approach may be advisable for any further assessments of the Dartmoor Line e.g. new stations on the Line although it is noted gravity modelling is more complex and costly.
- The modelling did not account for regional bus connections to the Dartmoor Line that could facilitate rail use, especially for passengers without a car e.g. two local bus services serve Okehampton station (the 118 route between Tavistock and Okehampton and the 306 route between Launceston and Okehampton). This is likely to have under-estimated demand.
- The bus generalised cost from travel to Yeoford station was set to zero in the modelling because there were no bus services. However, a very high bus generalised cost should have been used to reflect the absence of a bus option which would in effect exclude this option. Whilst this issue may have resulted in under-estimating rail demand, it is not considered to have significantly impacted the model estimation.
- The regression model used to inform the trip rate analysis only contained six observations from stations similar to Okehampton and the model estimated five parameters. Using a smaller sample of comparator stations may result in less reliable and robust forecasts. It may therefore have been beneficial to consider additional stations with the same regional characteristics by expanding the catchment area if available.
- The information on the distribution of the parameters (i.e. 95% confidence interval) is shown in the modelling. However, the regression model outputs show a low significance of the F-test[12] and the model coefficients are not statistically significant at 95% confidence level. Some less important demand drivers of the model (e.g. bus

[11] A trip rate model does not consider current travel patterns from the location concerned but instead looks at demographic and economic characteristics of the location

[12] The F-test evaluates whether or not the correlation between the independent variables and dependent variable in the model is statistically significant i.e. overall goodness of fit

mode) could have been excluded to get better model performance and more robust estimates.

- Diagnosis of the residuals is shown in the modelling spreadsheet but there is no further analysis of forecast errors. This information could have been used to assist with assessing the robustness of the forecasts.

Evidence summary

The comparison of actual and forecast demand on the Dartmoor Line to date shows that the forecasts under-estimated demand with overall demand to date 17% higher than forecast. This is mainly attributed to actual demand being significantly higher than forecast in the first year of operations. The difference has however reduced since then and the most recent rail periods show forecast to be higher than actual.

A review of the forecasting methodology and assumptions to understand the drivers of the differences has shown that the modelling approach, input data and model parameters are appropriate and generally in line with modelling best practice. However, there are several factors which could have contributed to the variance. The most significant of these is the assumption of how demand would build up following opening of the Line; this is lower than rail industry guidance and has likely contributed to the under-estimate, particularly in the first two years.

As the demand reaches its full potential, the impact of the forecast ramp-up factors will become less relevant, and this is already seen with recent demand data trending more in line with the forecast. It is therefore recommended that the comparison of actual and forecast demand is revisited in future evaluations of the Dartmoor Line at which point the data can be analysed over a longer time period to provide more certainty and confidence in the conclusions.

Appendix D: Operating costs and revenue of Dartmoor Line usage compared to forecasts

A limited analysis of actual Dartmoor Line operating costs in 2023/24 shows these to be lower than forecast in the FBC. This is primarily due to lower-than-expected staff and rolling stock lease costs.

The actual revenue generated by the Line in 2023/24 is over £1m higher than forecast. This is primarily attributed to a higher average yield due to greater than forecast levels of demand to/from longer distance destinations particularly London (via interchange at Exeter).

As with demand, the conclusions that can be drawn on a comparison of actual and forecast operating costs and revenue are limited at this stage. A fuller picture will only be possible when the costs and revenue associated with the Line can be assessed over an extended time period and the demand has fully matured.

Introduction

KEQ 3.3 is concerned with how the operating costs and revenues associated with the Dartmoor Line compare to those forecast in the business case.

To address this:

- The estimated Dartmoor operating costs in 2023/24 (as set out in section 9.3 of the main report) have been compared to equivalent costs estimated in the FBC where available.
- The estimated revenue generated by the Dartmoor Line in 2023/24 (as set out in section 9.3 of the main report) has been compared to the revenue forecast in 2023/24. The latter has been derived by applying the average yield assumed to the demand forecast in 2023/24.

Comparison of operating costs

Due to limited data availability, a comprehensive comparison of all operating costs has not been possible. Instead a comparison has been undertaken of actual costs against the following equivalent cost items identified in the FBC:

- staff
- rolling stock lease
- fuel
- VTAC.

A comparison has therefore not been undertaken against costs which are not explicitly identified in the FBC such as station and train cleaning.

The forecast operating costs provided in the FBC are the present value of costs (PVC) in 2010 prices over the 60-year appraisal period. The actual annual operating costs in 2023/24 shown in section 9.3 have therefore been converted into the PVC in 2010 prices over a 60-year period using standard TAG deflator and discount values. For simplicity, it has been assumed that operating costs are fixed in real terms over the entire appraisal period which may not necessarily be the case.

The comparison of the costs in Table 3 shows that both fuel and VTAC actual costs are in line with the forecasts. However, both staff and rolling stock lease costs are less than 50% of the forecast. The lower staff cost is attributed to fewer additional train crew required due to more efficient train crew diagrams[13] (albeit offset by inflationary impacts). The difference in the rolling stock lease cost is linked to the additional train units required for the Dartmoor Line being partly sourced from spare capacity within the GWR fleet reducing the need for leasing of new units.

Cost element	Actual operating costs (PVC £m)	Forecast operating costs (PVC £m)	Difference £m	% Difference
Staff	8	17	-9	-53%
Rolling stock lease	5	12	-7	-58%
Fuel	5	5	-	-
VTAC	1	1	-	-

Source: GWR (actual costs); Dartmoor Line FBC (forecast costs)

Table 4: Comparison of actual and forecast operating costs. All costs are present values in 2010 prices over 60 years. Forecast costs assume the leasing of two 2-car train units which is consistent with the actual costs.

Comparison of revenue

As set out in section 9.3, the actual revenue generated by the Dartmoor Line in 2023/24 is estimated to be £2.76m. This has been derived by analysing LENNON data.

The forecast revenue in 2023/24 has been estimated by applying the assumed average yield in the FBC to the forecast demand (see Figure 1 in Appendix C). The assumed average yield was largely based on the expected Okehampton – Exeter fare and was valued at £5.87 per journey (adjusted to reflect fare rises).

The comparison between actual and forecast revenue in 2023/24 by rail period is shown in Table 5. This indicates actual revenue is 65% (£1.1m) higher than forecast.

[13] Diagrams are statements of work for train crew setting out all work activities to be undertaken during a shift.

Period	Estimated actual revenue generated £k	Estimated forecast revenue generated £k	Difference £k	% Difference
2023/24	2,757	1,667	**1,090**	**65%**

Source: LENNON (actual revenue); Dartmoor Line FBC and associated modelling (forecast revenue)

Table 5: Estimated actual and forecast revenue generated by Dartmoor Line, 2023/24

The difference in revenue is attributed to two reasons. Most significant is the actual average yield of £9.26 per journey in 2023/24 being higher than the forecast of £5.87 per journey. This is attributed to the greater than forecast levels of demand to/from longer distance destinations particularly London (via interchange at Exeter). A further factor is actual demand being marginally (5%) higher than forecast – the reasons for this are discussed in Appendix C.

Evidence summary

The comparison of actual and forecast operating costs on the Dartmoor Line in 2023/24 indicates that both staff and rolling stock lease costs are estimated to be less than 50% of the forecast. This is attributable to using fewer additional train crew than expected and making use of existing GWR fleet rather than leasing new units respectively. Other costs including fuel and VTAC are in line with the forecasts.

On the revenue side, the actual revenue generated by the Dartmoor Line in 2023/24 is estimated to be 65% higher than forecast (over £1m). This is primarily linked to a higher-than-expected average yield resulting from greater levels of longer-distance travel including to/from London.

Conclusions on the accuracy of the forecasts are however limited at this early stage with the analysis based on a single year of data. A fuller picture will only be possible when operating costs and revenue can be compared over a longer time period.