Continuous Modular Strategic Planning

Photo courtesy of P. Blowfeld, SERUG

West of England Line Study 2020

Table of Contents

1.0 Executive Summary

We are pleased to present an assessment of some potential investment choices for the West of England Line from London Waterloo to Exeter St. David's via Basingstoke, Salisbury, Yeovil and Axminster.

This work has been completed as part of the Continuous Modular Strategic Planning (CMSP) approach adopted under the Long Term Planning Process. Industry partners, stakeholders and user/ passenger groups have participated in this study as part of the working group. This collaborative approach has helped to identify potential interventions to improve performance, accommodate growth and improve journey times. These interventions were identified by answering seven strategic questions:

1. What are the key markets that the West of England Line serves or needs to serve?
2. Based on the demand analysis, how is capacity best provided and managed on the West of England Line?
3. Where are the stakeholder priorities for improved journey times and by how much?
4. How can the West of England Line best support local and market growth opportunities?
5. What are the potential opportunities for onward connectivity from locations on the West of England Line?
6. What does the rail freight industry require of the West of England Line?
7. What is the extent of poor resilience and performance on the West of England Line, how can this be addressed and how can the West of England Line support the resilience of other lines?

1.1 West of England Line: The problem

The West of England line serves a number of functions, principally business and commuter flows in and out of London and Exeter, as well as Salisbury (and onwards to Southampton) and Basingstoke. It is also an important rail line for leisure and educational travel to London, Salisbury and Exeter in particular. The use of the line as a diversionary route for freight in the east and passenger and freight services in the west highlights the importance of the line beyond the regular services that operate on it. The line therefore has a complex mix of passenger uses and multiple periods throughout the day when larger volumes of passengers are travelling on different sections of the line.

There is currently an hourly service from London Waterloo to Exeter St. David's with an additional train each hour from London Waterloo to Salisbury and some additional peak services in the Exeter area. The Salisbury – London Waterloo services are extended to and from Yeovil Junction in the peaks in the "peak direction" resulting in one train per hour in one direction and two trains per hour in the opposite direction.

Peak services to London Waterloo are usually overcrowded with some standing on services when they leave Andover. Some peak services into Exeter stations in the AM peak and out again in the PM peak are also overcrowded. The services in the AM peak arrive at less than ideal times for commuting passengers. This high level of crowding is also seen in the peaks at locations including Salisbury and Basingstoke, as well as at various times in the day relating to leisure and business travel.

Performance and service reliability is often poor and small delays can rapidly escalate in part owing to the large number of single line sections and passing loops dating back to the Beeching cuts of the 1960s when the former London and South Western Railway main line was downgraded to a secondary route. At the time of this study, the Moving Annual Average (MAA) for the Public Performance Measure (PPM) is 74.9 against a target of 84.3 %. The significant poor performance during the summer-autumn in 2018 and 2019 has kept the MAA consistently low.

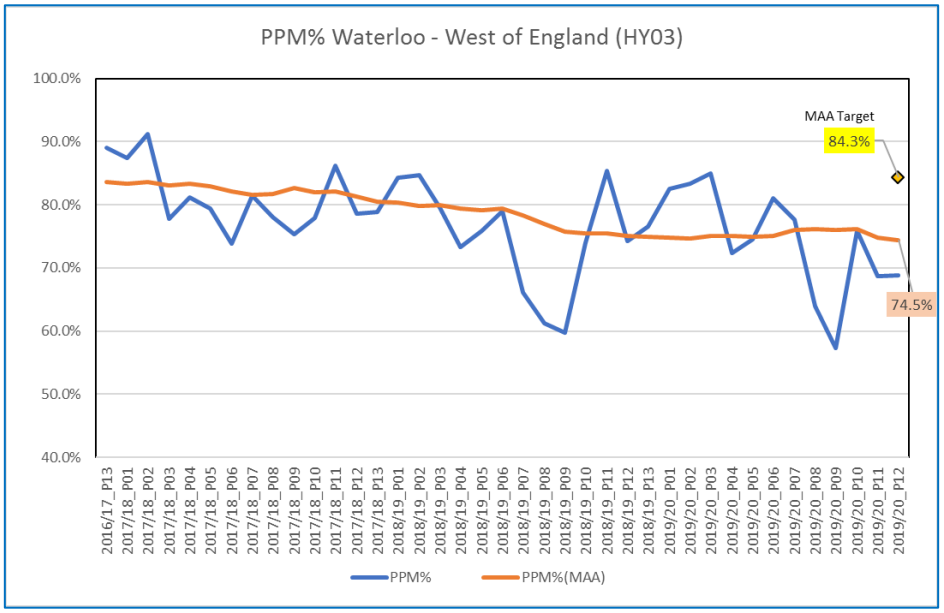


Figure 1: PPM %

The significant proportion of single track sections west of Salisbury (75.5 % of track is single) is a major performance and resilience challenge. If there is an issue, whatever the cause, it is difficult to recover the timetable without impacting on other services (both on and off the Wessex Route) or creating lengthy gaps by turning services short of their destination. At times of perturbation, West of England line services normally terminate at Basingstoke instead of going through to London Waterloo.

The impact that poor performance and a lack of reliability has should not be underestimated. Services on the West of England Line have seen a reduction in localised patronage at several stations over the last few years that coincides with the record of poor performance. It is likely that this is a key component of a passenger's decision not to travel by train in combination with the Waterloo blockade in Summer 2017, poor car parking capacity and the subsequent strikes.

In addition to this, the knock on impact that performance issues on the West of England Line can have on other services such as CrossCountry services through Basingstoke, other Main Line services on the SWML and GWR services at Exeter and Salisbury could be considerable. Any future development of a scheme should assess these impacts carefully.

Despite this localised reduction in patronage at some stations the longer term overall trend has been towards increased growth on the line as a result of housing and employment growth, leisure travel and the concentration of Devon's sixth forms and other educational facilities in Exeter. Part of the growth has been stimulated by the current and previous franchisees' investment in additional services, making maximum use

of the existing fleet of diesel trains, with some extensions of services to destinations away from the West of England such as to Weymouth, on summer Saturdays, Yeovil Pen Mill, Reading and Bristol Temple Meads.

Considerable housing growth is expected at locations such as Exeter, East Devon, Gillingham, Salisbury, Andover and Basingstoke over the next 20 years meaning that demand for rail travel is set to increase.

The timetable structure is very tightly fixed owing to the availability of paths between London Waterloo and Basingstoke which makes it difficult to provide additional, robust and reliable services into London over and above the current two trains per hour. The Woking Area Capacity Enhancement (WACE) project, currently awaiting a funding decision, is critical to supporting future Main Line capacity growth into London Waterloo.

West of Salisbury the current long single track sections mean that effectively no additional services can operate without investment in track, signalling, and the associated depots, stabling and extra rolling stock. In essence this means a restriction in capacity and the accommodation of future growth. It is impossible to deliver a reliable "on time" railway that has a resilient timetable without reducing the amount of single track on this line.

The rail industry faces major challenges trying to cater for forecast demand with the constraints imposed by the current infrastructure, the need for additional rolling stock to operate any additional services, and an ageing fleet of diesel trains that do not meet aspirations for improvements to the carbon impact of the railways.

Through this CMSP module, Network Rail has worked collaboratively with industry and wider stakeholder partners to identify potential infrastructure interventions that facilitate service change. These changes will improve performance, increase capacity, reduce journey times and allow for a reliable and robust service to be operated all year round.

The challenges affecting the West of England line are greater than simply developing solutions to alleviate overcrowding. Whilst additional rolling stock may deliver some modest supplementary benefits including slightly shorter dwell times at stations during the peak periods, a more comprehensive package of interventions is required.

The functionality of the infrastructure at key locations such as Exeter St. David's where access to platforms is constrained or Salisbury where platform capacity could become a problem as more services are introduced, are all constraints that need to be looked at as part of any future scheme on the West of England Line. However, they should not be seen as preventing any of the service changes suggested through this CMSP module from being progressed at this early stage of development.

1.2 The West of England Line: The solution

As a starting point for discussions with potential funders, this CMSP module has proposed a concept train plan for testing scenarios that could address the problems experienced by the West of England Line as detailed above. This concept train plan comprised the following:

- An hourly London Waterloo to Exeter St. David's service (this was considered both as a service calling at all stations between Basingstoke and Yeovil Junction and a

limited stop service to assess potential journey time improvements as well as frequency increases)

- An hourly London Waterloo to Salisbury and Yeovil Junction service calling at all stations between Basingstoke and Yeovil Junction
- An hourly Axminster to Exeter St. David's Devon Metro service calling at all stations which could be extended to another location in the South West rather than terminating at Exeter e.g. Barnstaple.
- An hourly Great Western diversionary service between Castle Cary and Exeter St. David's via Yeovil Junction when required (it is assumed that diverted freight will operate as required via this route)

It should be noted that this concept train plan was for demonstration purposes only and is not the only possible "timetable" that could be delivered in the future. For instance, timetable analysis iterations as part of the future development of a scheme could include services to alternative locations such as Reading, the far South West and the South Coast, either through direct services or improved interchange at locations such as Salisbury. The concept train plan analysed here would enable the following:

- Reliability and punctuality improvements to provide a more consistent and reliable service
- Faster end to end journey times between London Waterloo and East Devon
- Increased seating capacity between Salisbury and Yeovil Junction
- Better service frequencies between Yeovil Junction and Salisbury for journeys to and from London Waterloo
- Improved service frequencies for stations between Axminster and Exeter St. David's to meet planned housing and employment growth in the greater Exeter area and achieve a further stage of the Devon Metro strategy
- Improved diversionary capability for GWR Paddington – Exeter services from a current two hourly to a 1tph diversionary frequency (plus freight as appropriate)

The infrastructure interventions required to achieve the above concept train plan are:

- Extension of Tisbury Loop and an additional platform at Tisbury – required for performance, journey time and capacity improvements
- Extension of Gillingham Loop westwards – required for performance and journey time improvements
- Extension of the double track section at Yeovil Junction westwards – required for improved diversionary capability
- Extension of the Axminster Loop eastwards – required for improved diversionary capability
- Extension of the Honiton Loop westwards – required for performance and to enable an optimum timetable for additional Devon Metro services
- A new loop in the Whimple/ Cranbrook area including an additional platform at Cranbrook – required for improved performance, capacity and diversionary capability

In addition to these infrastructure solutions, additional capacity could be achieved through the lengthening of some services to ease crowding and standing; this cannot be achieved using the current rolling stock fleet currently in operation; which are coming to end of life. Therefore, in the medium term, the opportunity to introduce new, potentially bi-mode, rolling stock capable of achieving faster journey times and providing more capacity should be considered. New rolling stock provision should be linked to potential investment in additional or upgraded depot and stabling facilities in the Salisbury, Yeovil and Exeter areas (current facilities are not sufficient for growth in fleet size), as well as improvements to stations, accessibility/ inclusivity and car parking as appropriate. The outputs of the joint Network Rail and RSSB work investigating decarbonisation will be essential in understanding the type of future rolling stock that could be required for the West of England Line.

The emerging strategic advice that has resulted from this CMSP module suggests that the proposed interventions could be grouped into packages to deliver the benefits of performance, reliability, capacity and journey times. These could be delivered sequentially or in combination, but it should be noted that their impacts are cumulative. Suggested packages are:

Package No.	Sub-package	Interventions	Benefit
Package 1	Package 1a	• A new loop in the Whimple/ Cranbrook area • Extension of the Honiton Loop	• Performance and resilience • Additional capacity (2tph to most stations between Exeter St. David's and Axminster • Incremental journey time improvements

	Package 1b	• Extension of Tisbury Loop (westwards and/ eastwards)	• Performance and resilience
			• Additional capacity between Salisbury and Yeovil Junction
			  ○ Eastwards extension will allow 2tph to all stations
			  ○ Westwards extension will allow 2tph to some stations
			• Incremental journey time improvements

Package 2	-	• Extension of the double track section at Yeovil Junction • Extension of the Axminster Loop	In combination with Package 1a: • Improved diversionary capability (1tph in each direction) • Small improvements in performance and resilience
Package 3	-	• Extension of Gillingham Loop	In combination with Package 1b: • Performance and resilience • Significant journey time improvements (up to 14 minutes) to services between London Waterloo and Exeter St. David's

Table 1: Potential intervention packages

This study notes that the Exeter area is likely to cause an issue when seeking to operate the 1tph diversionary GWR service. For the proposed Devon Metro service, the working assumption is that by running the current Barnstaple to Exeter service through to Axminister the operational and capacity issues will be lessened and no changes to infrastructure in the Exeter area will be required. This should be investigated further, in more detail, as part of any future development of a Devon Metro scheme and through the Western Route's Bristol to Exeter CMSP module.

In addition to these packages, it is recognised that demand on the eastern end of the West of England Line may require an additional London Waterloo to Salisbury services to address overcrowding. There is potential for this to be provided by one of the services unlocked by the WACE project in the Woking area, subject to a funding decision. To take advantage of the WACE scheme there will be the need for further investigation of the interactions at Salisbury as there may be platform capacity constraints when terminating another service at Salisbury. Alternatively, to the third service to Salisbury, the implementation of new rolling stock through the next franchise offers the opportunity to lengthen some services that cannot be extended using the current fleet.

The provision of new rolling stock to replace the nearing end of life and unreliable fleet currently in operation is essential. The service changes that have been modelled through this CMSP cannot be achieved in a robust and resilient way without a change in rolling stock. Rolling stock that has improved acceleration and deceleration characteristics, more efficient, more reliable, has improved accommodation/ capacity and a lower carbon impact should be included in any solution to improvements on the West of England Line.

Further development of schemes on the West of England Line provide an opportunity to seek alternative funding streams to deliver facilities at stations that could be improved to integrate other transport modes, particularly in relation to "green" modes such as bus turning circles, electric charging points and cycle storage. There is also the opportunity to provide improved access and inclusion to make the railways attractive and usable by all, including those with reduced mobility.

1.3 Emerging Strategic Advice

It is important to stress that the recommendations that this CMSP module has developed are not only about providing improvements to West of England Line services in the future, but also seeking to address current problems, such as poor performance, that are experienced now.

This study recommends that in the short-term the Package 1 outputs should be progressed through the current Railway Network Enhancement Pipeline (RNEP) to initiate a Strategic Outline Business Case (SOBC). This could be coupled with Package 2 if full diversionary capability is seen as a priority.

This process will allow for other service patterns, performance modelling, analysis of sensitivities relating to new rolling stock, possible electrification, new stations, alternative stopping patterns and additional stakeholder aspirations to be investigated as part of the development of the scheme. There is also an opportunity to investigate synergies with other rail programmes, including renewals, to delivery efficiencies in cost, disruption and construction.

The need for a change in rolling stock as well as potential renewals, such as track and signalling, in Control Period 7 (CP7) offers an opportunity to take these enhancements forward into development in Control Period 6 (CP6) at a time when a holistic, whole industry approach can be taken to improving the West of England Line.

The key recommendations from this CMSP module are:

1. Submit a Decision to Initiate through the RNEP process to progress an agreed combination of infrastructure interventions as discussed above

2. Progress the Woking Area Capacity Enhancement (WACE) scheme to unlock the potential for a future service to operate between London Waterloo and Salisbury (destinations to be agreed)

3. To understand the impact of a third train at Salisbury and potential enhancements at Exeter St. David's related to diversionary capability

4. Implement new, greener, rolling stock and improved depot capability on the West of England Line to enable the lengthening of services to ease overcrowding and improve performance and resilience

2.0 Continuous Modular Strategic Planning (CMSP)

Greater devolution of economic planning, transport planning and decision-making means that the strategic assessment of the railway involves a greater level of complexity when compared with strategies produced in the past. Network Rail's Long-Term Planning Process is called Continuous Modular Strategic Planning or CMSP. This has replaced the Route Utilisation Strategy (RUS) and Route Study processes that preceded it.

The CMSP process has been developed following a series of reviews of Network Rail, including the Hendy, Bowe and Shaw reviews. These reviews proposed some recommendations for improved enhancement planning, which can be summarised as follows:

- More support for the needs of devolved Route businesses with Route-based plans
- Explicit focus on the needs of customers (passengers and freight end-users)
- Improved engagement with train and freight operators as the voice of these customers
- Move away from Control Period funding to a more continuous enhancements pipeline

With these recommendations in mind, the CMSP process has moved away from the traditional large Route Studies, aligned to Control Periods, towards an ongoing process of continuous planning that addresses more focussed "modules". These modules mean that we can examine the transport needs of smaller geographical areas or address specific strategic questions through closer engagement with stakeholders including Local Authorities, Local Enterprise Partnerships and Passenger/ User Groups.

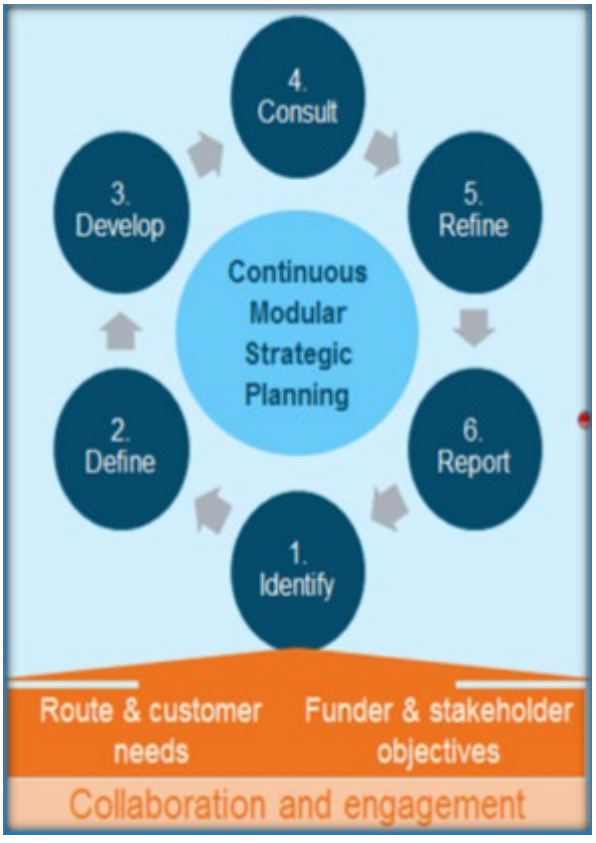


Figure 2: The CMSP Process

The process diagram on the left shows how through collaboration with our funders and stakeholders we seek to identify and define a specific strategic need or issue (a module).

A Working Group is established with members of our stakeholder, passenger and funding groups as members. It is this group that develops, consults and refines any solution until agreement is reached.

A report or study document is then produced that answers the specific strategic need or issue. This is shared on the Network Rail website and forms the basis of a strategy for the geographical focus of the module and informs funding conversations with our funders.

The specific module addressed can then lead on to or signpost to future strategic needs or issues, hence the continuous nature of the CMSP process.

2.1 CMSP Governance

To bring West of England Line stakeholders into the strategy development process it was decided that the *'West of England Line Strategy Group'* would form the Working Group for this CMSP module, with the inclusion of SERUG (Salisbury to Exeter Rail User Group) and TravelWatch SW as new members of the group. The inclusion of SERUG and TravelWatch SW has been a useful addition to the development of this CMSP in getting a passenger focussed opinion from the beginning.

The Working Group is the forum through which the rail industry consults with its stakeholders and funders to agree what the CMSP will seek to address/ answer (what strategic question/s) and then take forward the work required to complete the CMSP module. The Working Group also includes representation from Network Rail's Western Route as beyond Whimple the line is in the Western, not Wessex, Route.

Figure 3 shows the governance structure for the CMSP process for the Wessex Route.

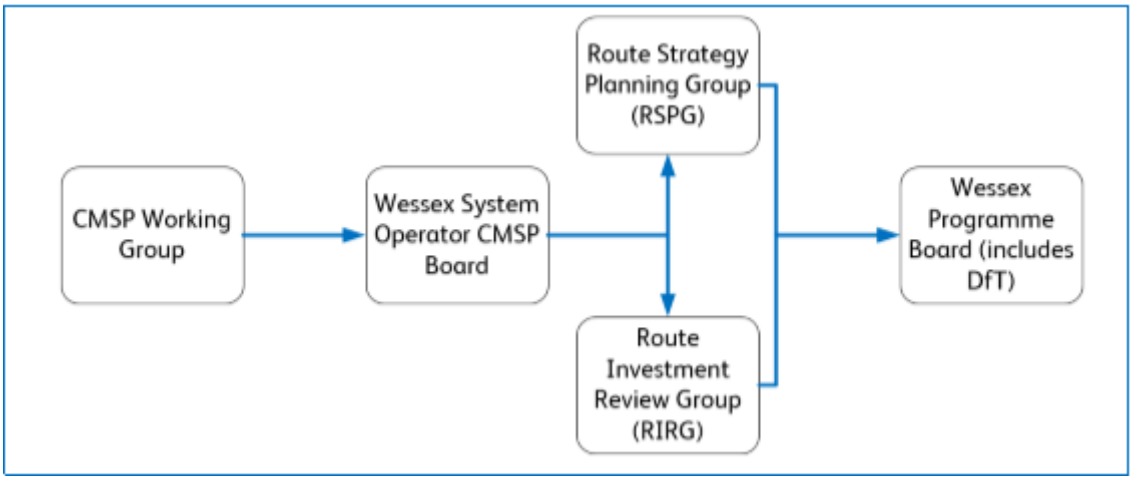


Figure 3: Governance Structure

The Wessex System Operator CMSP Board is the forum through which decisions made in the Working Group are agreed by the Head of Strategic Planning for the Wessex Route.

Route Strategy Planning Group (RSPG) is the strategy forum for Wessex System Operator to engage with Wessex Route (and other internal) colleagues.

Route Investment Review Group (RIRG) is the forum through which Wessex System Operator engages with rail industry partners such as train and freight operators and Rail Delivery Group (RDG).

RSPG and RIRG are updated and consulted on progress made on the CMSP module and will agree the final study document before it goes to Wessex Programme Board.

The final part of the governance structure is the Programme Board. This is chaired by DfT and provides the means for Network Rail to bring forward schemes into the Railway Network Enhancement Pipeline (RNEP), such as those suggested in a CMSP. The Programme Board is also updated and consulted on the CMSP module as it progresses. The decision on publication of the final CMSP document will be made through the Programme Board.

3.0 The West of England Line

3.1 Geographic scope

Geographically, the West of England Line is the railway between Worting Junction (to the west of Basingstoke) and Exeter. It is an important main line railway linking the City of Exeter, and the counties of Devon, Somerset, Wiltshire and Dorset with Salisbury, north Hampshire, Basingstoke and London Waterloo. This study does not seek to provide solutions to capacity and operational constraints in the Exeter area as this will be addressed through the Western Route's Bristol to Exeter CMSP module. However, reference will be made to where constraints in the Exeter area may prevent the operation of services changes suggested through this CMSP module.

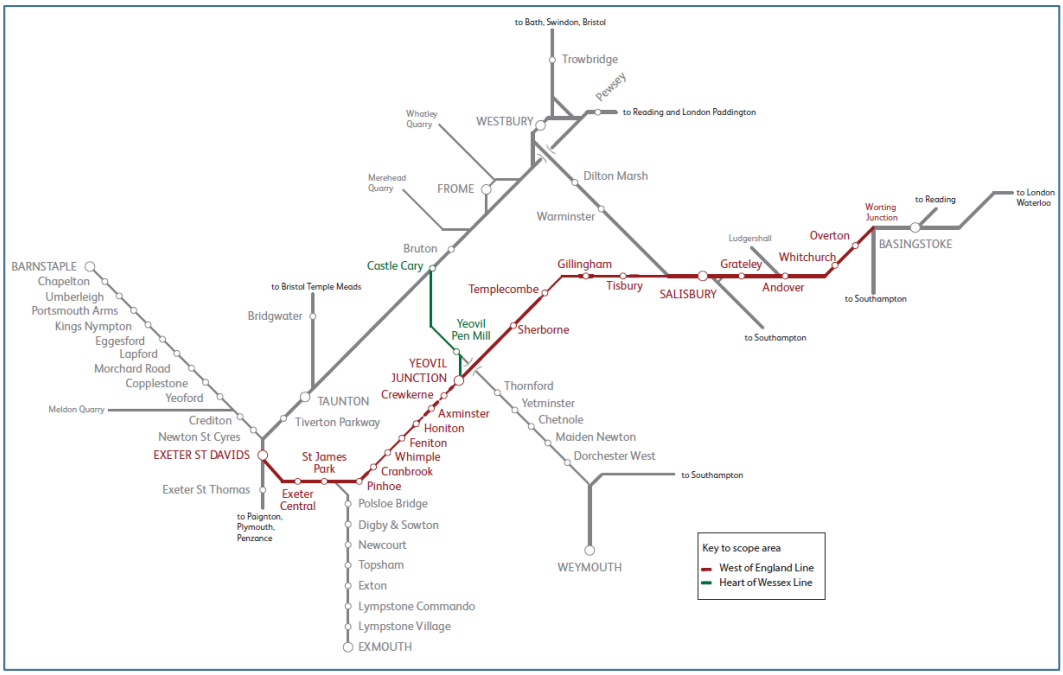


Figure 4: West of England Line CMSP Study—scope area

The West of England Line is connected to other lines along its route:

- Great Western Main Line (GWML), Paignton and Barnstaple Branch at Exeter St. David's, with services terminating in Exeter or continuing through to Exmouth, as well as services between Penzance and London Paddington
- The Heart of Wessex Line, via a chord at Yeovil Junction, with services operating predominately between Weymouth and Bristol, with some London Waterloo services using the line between Westbury and Yeovil Junction
- The Salisbury Branch, between Salisbury and Westbury, with services operating between Cardiff and Portsmouth as well as London Waterloo to Bristol and Yeovil services
- The Test Valley Line, between Salisbury and Romsey, Southampton and Eastleigh, with services operating from Salisbury to Romsey, Southampton and Eastleigh as well as the services between Cardiff and Portsmouth

- South West Main Line, at Worting Junction, with services operating via the South West Main Line to London Waterloo and Weymouth; as well connections at Basingstoke to Reading and beyond

The line has several long single track sections interspersed with loops and double track sections that make the line complex in terms of service operation. The double track sections and passing loops are: double track between Worting Junction and Wilton South Junction, a loop just to the east of Tisbury station, a loop at Gillingham station, double track from Templecombe to Yeovil Junction, a loop at the former Chard Junction, the Axminster Loop, a loop at Honiton station, and double track from Pinhoe to Exeter.

The traincare depot for the diesel fleet, operated by SWR, is located at Salisbury and a traincrew depot at Yeovil Junction.

Table 2 sets out the lengths of the single and double track sections west of Salisbury.

Start of Section	End of Section	Double/ Single	Length
Salisbury 83m 43ch	Wilton South Junction 86m 25ch	Double	2m 62ch
Wilton South Junction 86m 25ch	Tisbury loop 95m 53ch	Single	9m 28ch
Tisbury loop 95m 53ch	Tisbury loop 96m 00ch	Double	0m 27ch
Tisbury loop 96m 00ch	Gillingham East Junction 105 07ch	Single	9m 07ch
Gillingham East Junction 105 07ch	Gillingham West Junction 105m 36ch	Double	0m 29ch
Gillingham West Junction 105m 36ch	Templecombe 112m 08ch	Single	6m 52ch
Templecombe 112m 08ch	Yeovil Junction 122m 57ch	Double	10m 49ch
Yeovil Junction 122m 57ch	Chard Junction 139m 24ch	Single	16m 47ch
Chard Junction 139m 24ch	Chard Junction 139m 64ch	Double	0m 40ch
Chard Junction 139m 64ch	Axminster East Junction 143m 23ch	Single	3m 39ch
Axminster East Junction 143m 23ch	Axminster West Junction 146m 09ch	Double	2m 66ch
Axminster West Junction 146m 09ch	Honiton loop 154m 44ch	Single	8m 35ch
Honiton loop 154m 44ch	Honiton loop 154m 76ch	Double	0m 32ch
Honiton loop 154m 76ch	Pinhoe loop east end 168m 24ch	Single	13m 28ch
Pinhoe loop east end 168m 24ch	Exeter St. David's 172m 12ch	Double	3m 68ch
		Total Single	**66m 76ch (75.5%)**
		Total Double	**21m 53ch (24.5%)**

Table 2: West of England Line — single and double track sections west of Salisbury

3.2 Historic context

The historic context of the West of England Line is important in understanding how we have the railway we have today, how that has shaped the level of service that operates and why that means enhancement is potentially required.

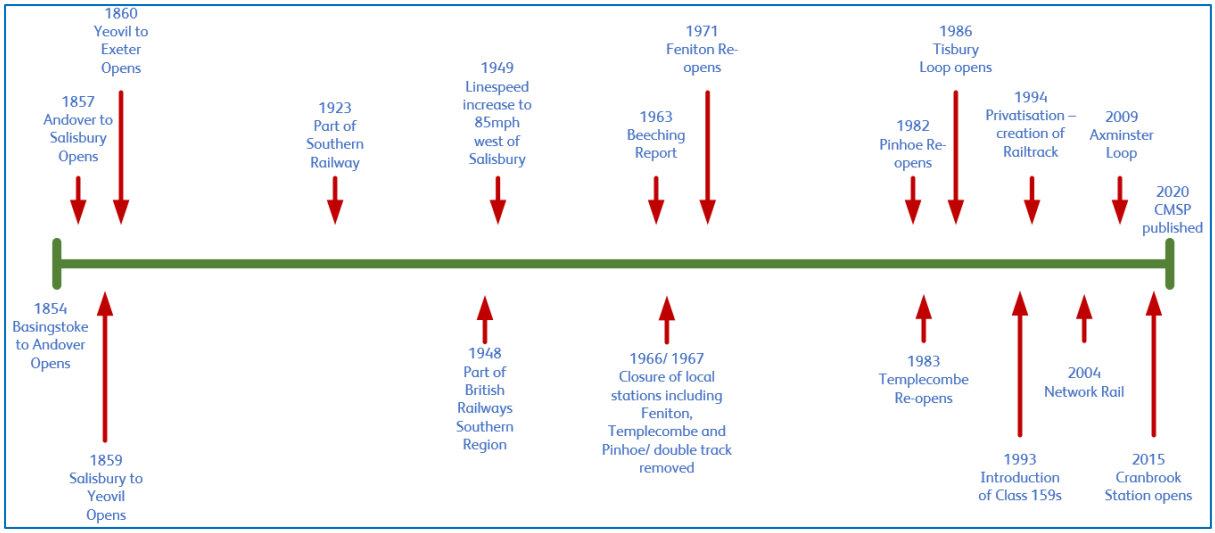


Figure 5: West of England Line — Historic Timeline

The West of England line was opened by the London and South Western Railway between 1854 and 1860. It was the main line from London Waterloo to Salisbury, Exeter and the West Country. In 1923 it became part of the Southern Railway, as part of the Grouping, and then part of the Southern Region of British Railways in 1948. Between the 1920s and the 1960s the line enjoyed a very successful period owing to the growing prosperity of Southern England in the inter-war years and the Southern Railway's efforts to boost Summer passenger traffic to the holiday resorts in Devon and the West Country.

After the Second World War passenger traffic quickly recovered and was boosted by the Southern Railway's investment in new coaches and streamlined locomotives together with an increase in line speeds west of Salisbury to 85mph in 1949. This reflected confidence in the line's future. The flagship service was the Atlantic Coast Express which continued beyond Exeter with portions to five different branch lines. However, the 1950s and 1960s saw increasing road traffic competition for both freight and passenger traffic.

The 1960s saw major changes to the line and its operations. The Beeching Report of 1963 and transfer of control of the line west of Salisbury from British Railways' Southern Region to the Western Region, led to the line being viewed as a duplicate secondary line rather than as an important main line. This reflected the fact that only 20 % of through journeys between London and Exeter were undertaken on the Southern Route rather than the Western line from London Paddington.

The idea was to operate diesel trains every 2 hours from London Waterloo to Exeter St. David's with many intermediate stations closed, and the remainder acting as railheads for the surrounding area. The through services to the west of Exeter were withdrawn and most of the branch lines served by the Atlantic Coast Express closed. West of Salisbury the track would be predominantly single track with passing places.

Originally, it was proposed that for most of Wilton South to Pinhoe except the 6 miles

between Templecombe and Sherborne and loops at Honiton, Chard Junction and Gillingham would be single track. However, experience showed this led to long delays so the 10.5 miles between Templecombe and Yeovil Junction was retained as double track.

It was envisaged that these changes would reduce the operating costs of the services and help transform the line's profitability. In 1967 many of the local stations closed, but Feniton (formerly Sidmouth Junction) re-opened in 1971, Templecombe re-opened in 1983, and Pinhoe near Exeter in 1982.

The single track sections have been reduced over the years in order to improve timekeeping and reduce the knock on effects of delays. To this end, Tisbury loop opened on 24 March 1986.

Between 1992 and 2009 some West of England line services ran beyond Exeter St. David's to Paignton and Plymouth, although this is no longer the case.

The line has never been electrified and therefore the third rail traction power ends at Worting Junction. The Class 159 rolling stock that is still in use today was introduced on to the West of England Line in 1993.

Investment was made in the West of England Line in 2009 to install the Axminster Loop and an additional platform at Axminster; this enabled the operation of the 1tph Exeter St. David's to London Waterloo that we have today.

A new station was opened at Cranbrook, between Pinhoe and Whimple, to serve the new community and business development being constructed at the East of Exeter Growth Point.

3.3 Passenger service levels and journey times

Services on the West of England Line, at the time of this study, are operated by South Western Railway (SWR) using Class 158 and 159 rolling stock, that has a maximum speed of 90mph. This rolling stock is diesel traction owing to the lack of electrification on the line.

The service that is achievable, and that is operated, on the line today is a direct result of the infrastructure that makes up the West of England Line. As described in the *Geographic Scope* and *Historic Context* sections of this document, there are long sections of single track punctuated by loops and double track sections. This constrains the level of service that it is possible to operate because trains travelling in opposite directions can only cross in the sections of double track.

In broad terms the current level of passenger service is:

- 1tph Exeter St. David's to London Waterloo (with additional peak services at the Exeter end)
- 1tph London Waterloo to Exeter St. David's (with additional peak services at the Exeter end)
- 1tph Salisbury to London Waterloo
- 1tph London Waterloo to Salisbury

Every two hours the Salisbury starting and terminating services are extended to Yeovil Junction meaning that there are three trains in every two hour period between Yeovil Junction and London Waterloo in each direction. It should be noted that two trains every hour in each direction is not achievable owing to the current infrastructure provision. Some services split and join at Salisbury to provide connectivity to Bristol Temple Meads and Yeovil Pen Mill via Westbury as well as interchange for services to Southampton, Romsey and Eastleigh.

The West of England Line services connect, through interchange, with other services at locations such as Clapham Junction and London Waterloo for destinations in the South East, Woking for destinations such as Guildford and Portsmouth, and Basingstoke for the Solent, Reading and destinations to the Midlands/ North.

Less regular services include:

- Summer Saturday services to Weymouth from the West of England Line via the Heart of Wessex Line
- Sunday services to Reading from Salisbury
- Diverted passenger (Great Western Railway — GWR) and freight services from the Great Western Main Line (GWML) to Exeter via Castle Cary using the Heart of Wessex Line and West of England Line

This level of service, as described above, is effectively at the limit of what the line can accommodate based on the infrastructure and rolling stock that is in place and available.

As previously mentioned, the West of England Line saw stations closed and track reduced to single sections in the 1960s as this was a line deemed to be in decline. The infrastructure that remained after these changes was thought to be sufficient for the level of service that was to be operated at the time, namely a two hourly service. By the mid-1970s journey times were increasing owing to the introduction of slower diesel locomotives. However, incremental improvements to journey times have been made since this mid-1970s low mark, not least through the introduction of Class 158/ 159 rolling stock in the 1990s.

Since the last major West of England Line infrastructure modification in the 1960s the service level operated has begun to increase considerably but the infrastructure has not kept pace with this. In other words, we are squeezing more capacity out of much the same infrastructure. Although there have been some changes to infrastructure provision, such as additional loops at Axminster and Tisbury, that have facilitated specific service changes, there have not necessarily been increases in infrastructure relating to all incremental changes to service levels. For instance, the additional peak time Exeter St. David's services to/ from Axminster/ Honiton have used up available capacity but only by operating at less than ideal times and at the possible detriment to reliability.

This gradual, incremental "using up" of capacity without making significant changes to the infrastructure has knock on effects to service performance, maintenance regimes, asset management and the operation of a robust timetable.

Journey times on the West of England from Exeter into London Waterloo are slower than those via the GWML into London Paddington, but passengers are more likely to be

influenced to travel on the West of England by the location of a station in relation to their homes or place of work, ticket price, availability of parking or destination.

Table 3 shows the fastest journey times achievable on the West of England at the time of this study, both in the AM peak and the off-peak, into London Waterloo.

Station	Typical Journey: AM peak	Typical journey: off-peak
Basingstoke	0h 42m	0h 49m
Overton	0h 53m	0h 59m
Whitchurch	0h 59m	1h 05m
Andover	1h 07m	1h 11m
Grateley	1h 15m	1h 20m
Salisbury	1h 27m	1h 28m
Tisbury	1h 48m	1h 42m
Gillingham	2h 00m	1h 58m
Templecombe	2h 08m	2h 01m
Sherborne	2h 16m	2h 09m
Yeovil Junction	2h 22m	2h 15m
Crewkerne	2h 41m	2h 25m
Axminster	2h 54m	2h 38m
Honiton	3h 05m	2h 54m
Feniton	3h 12m	2h 57m
Whimple	3h 18m	3h 01m
Cranbrook	3h 21m	3h 10m
Pinhoe	3h 27m	3h 14m
Exeter Central	3h 32m	3h 19m
Exeter St. David's	3h 34m	3h 24m

Table 3: West of England Line — fastest journey times to London Waterloo

Journey times on the West of England are dependent on the mix of single and double sections that characterise the line. The need to cross trains in the double track sections mean that "pathing time" is often added to regulate the service, which extends the journey. In addition, the complexity of service operation at both London Waterloo and Exeter St. David's, as well as junction stations such as Salisbury, where services split and join, and Basingstoke, mean that improving journey times can be challenging.

This complexity of service also means that platform capacity could become more challenging at locations such as Salisbury, where aspirations for a TransWilts service (between Swindon to Salisbury) could require additional platform capacity. Also, the track layout at Exeter St. David's can be challenging when trying to provide the optimum platform utilisation for current and future services as some platforms are not accessible from the West of England Line.

Journey times to London Waterloo from west of Gillingham are assumed to be a fairly significant inhibitor to the London day trip/ business trip markets because journey times are above two hours and as high as three hours from Honiton. Depending on where passengers are located in relation to a station some may find it more convenient and

quicker to use the Great Western Main Line from the East Devon area, but for many passengers the West of England Line is still the fastest and most convenient route for accessing London.

3.3.1 West of England Line patronage trends

In the 1980s patronage on the West of England Line was limited, with poor service reliability and unattractive locomotive hauled trains. With the introduction of new rolling stock, the class 159 units, in the early 1990s, patronage started to grow, and in the last 20 years passenger numbers on the line have more than doubled. *Table 4* shows the throughput (entries and exits) at stations on the West pf England Line, as recorded in the ORR data. Only intermediate stations have been included, as data for hub stations such as Basingstoke, Salisbury, Exeter Central and Exeter St David's does not relate solely to travel on this route.

Station	1997/98	2007/08	2012/13	2014/15	2016/17	2017/18	2018/19
Overton	64	129	177	193	194	196	210
Whitchurch	117	227	253	288	285	287	302
Andover	588	1041	1123	1178	1226	1199	1232
Grateley	86	171	237	251	279	264	265
Tisbury	135	211	225	242	239	227	222
Gillingham	243	395	408	423	434	395	378
Templecombe	50	99	109	114	127	114	108
Sherborne	123	185	203	216	234	221	210
Yeovil Junction	134	209	198	215	239	224	210
Crewkerne	77	99	123	142	162	165	164
Axminster	208	206	346	386	395	399	384
Honiton	209	284	379	392	390	377	359
Feniton	56	62	67	71	69	72	64
Whimple	30	54	66	69	62	60	56
Cranbrook	-	-	-	-	90	105	107
Pinhoe	6	29	52	89	94	116	117
Total	2126	3401	3966	4269	4519	4420	4388

Table 4: Station patronage in thousands per annum – West of England Line (Source: ORR Estimates of Station Usage: https://dataportal.orr.gov.uk/statistics/usage/estimates-of-station-usage/)

While the overall trend is of significant growth (more than doubling) over the period of 20 years, it is notable that whereas the trend was almost universal in the first 10-year period, it has been more focused during the last 10 years.

The growth picture over the last decade could reflect the following:

- Strong continued growth from the stations between Salisbury and Basingstoke. This is probably a reflection of additional commuting to London, leisure travel and housing growth (particularly in Andover). It is worth noting that car parking capacity at Andover was increased in 2016/17 and significant additional station car parking was introduced at Grateley during 2008/09
- Limited growth emanating from the stations between Yeovil and Salisbury over the past 10 years, with year-on-year declines since a peak in 2016/17
- Strong growth at Axminster and Honiton, probably related to the improved service frequency enabled by the Axminster loop in 2009 (although this has faltered since 2014/15). There has also been continued growth of housing at Axminster, and concentration of further education facilities at Exeter
- Stable picture at Feniton and Whimple, probably reflecting the fact that there has been less improvement in the train service offered to these communities beyond the changes enabled by the Axminster Loop works in 2009
- Strong and continuing growth at Pinhoe and Cranbrook, reflecting the improved access to the rail network at these two locations and the significant housing development East of Exeter which sees Cranbrook, in particular, being used as a railhead for the area

In 2006/ 2007 additional Class 159 units were released from the Trans-Pennine Express route, along with some Class 158 units, to bolster the fleet operated on the West of England. Since then there have been no other significant increases in the capacity of the train fleet operated on the Waterloo to Exeter Line over this period. Although the introduction of the Class 159 and Class 158 fleet in 2006/7 improved on-train capacity, trains are now well loaded with some standing, particularly between Salisbury, Basingstoke and London Waterloo, throughout the day, and not just at peak periods, as will be seen later in this document. Trains into and out of Exeter St. David's are also well loaded with some standing, particularly in the peak periods.

The West of England Line has had a number of service disruptors since 2017, primarily the Waterloo blockade in the summer of 2017 and the fairly continual strike action that has been experienced since then. Whilst not as extensive as on the Berks and Hants, there have been a number of major engineering works too, e.g. at Axminster for the flood mitigation works and the impact of a number of GWR diversions. These disruptors, as well as recent issues with infrastructure and rolling stock reliability, are likely to have had a detrimental effect on passenger numbers as seen

Car park provision, or a lack of adequate provision, is a limiting factor for patronage across West of England Line locations. Stations on the West of England Line are accessed from a wide area, meaning that the appropriate level of car parking facilities is essential. A lack of car parking combined with low service frequency or poor infrastructure and service reliability could contribute to passengers using other lines, such as the Berks & Hants. This is likely to be an issue both for business and leisure travel markets, with the off-peak/ inter-peak market suffering as a result of car parks filling up in the AM peak. In some locations it is likely that the commuter market is also impacted by a lack of car park capacity.

Changes in passenger travel patterns, with more commuters working at home for some proportion of the week will also influence patronage, particularly when combined with other factors such as reliability of infrastructure and service.

3.4 Freight services

The West of England Line has an important role to play for freight customers; both in terms of freight commodities regularly operating along parts of the line and at times of perturbation when other freight services are diverted on to the route.

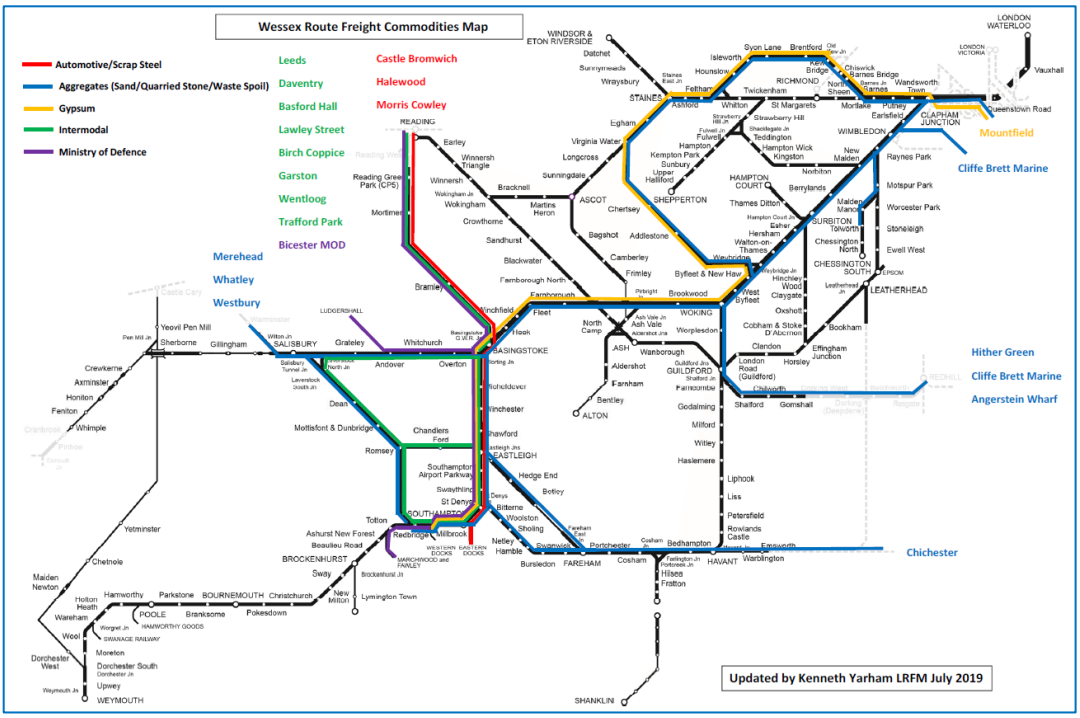
This is particularly the case at the east end of the line where there are aggregate freight flows (sand, quarried stone and waste spoil) from locations on Network Rail's Western Route. There is also some intermodal (container) freight traffic from Southampton Docks and occasional Ministry of Defence (MoD) traffic from Ludgershall. *Figure 3* shows how the various freight commodities are moved across and through the Wessex Route.

In terms of using the West of England Line as a diversionary route, it has already been noted in this document that when passenger services on the GWML cannot use the line through Taunton they are diverted via Castle Cary and Yeovil Junction. This is also the case for freight traffic using the GWML via Taunton.

When freight services are unable to operate via Winchester to Basingstoke (and beyond), on the SWML, then the West of England Line via Andover becomes an important diversionary route in keeping freight customers moving. This means that this part of the line provides and important strategic freight role.

Use of the line west of Salisbury (towards Exeter) for regular freight is not currently an active consideration owing to the extent of single track which makes accommodating both freight and passenger services on the West of England Line extremely challenging, based on the infrastructure and timetable available at the time of this study.

Figure 6: Wessex Route freight commodities map



There are expected additional freight flows to transport spoil from the delivery of High

Speed 2 (HS2) to the old Quidhampton Quarry in Salisbury, which is accessed via the line to Westbury.

3.5 Operational Resilience and Performance

3.5.1 Infrastructure and operations

The existing signalling system in the Salisbury area is reaching end of lifespan. The planned rollout of European Train Control System (ETCS) signalling may make it opportune to plan the provision of any infrastructure interventions that this study may identify in conjunction with the re-signalling rather than being undertaken separately. This offers greater efficiencies in terms of additional possessions required and potentially reduced disruption for passengers. Any future development of ETCS in the Salisbury area should take account of stakeholder aspirations for the proposed TransWilts (Swindon to Salisbury) service and the potential new station at Wilton.

At Salisbury, an additional platform may be required to facilitate the proposed TransWilts service or a potential third train per hour to Salisbury that would be unlocked by Woking Area Capacity Enhancement (WACE). Salisbury's role as an interchange station means that the importance of trains arriving on time from West of England Line locations is essential to ensuring that passengers make their connections for onwards travel by rail.

Any major works in the Salisbury area can have a big impact on regional connectivity and service operation because of the mix of services that pass through the station, both long distance and local, as well as the location of the depot and how that would need to be operated during such work.

The turnout speeds from the various loops along the line are relatively slow, which contributes to longer journey times. Where appropriate, improvements to line speeds should always be considered, although any potential changes would need to be carefully assessed against the timetable owing to the single and double track sections that comprise the West of England Line.

The layout at Exeter St. David's station is a major issue with a total of six platforms, of which only two are accessible from London Waterloo, though there are aspirations for new crossovers to give greater flexibility there. At present all services to/ from the West of England Line terminate or start at Exeter St. David's, either in platforms 1 or 3. The Great Western Railway services between Exmouth and Paignton, and between Barnstaple and St James' Park, also use Platforms 1 and 3; this involves reversal of direction in the case of the Exmouth to Paignton services. These operations have a major impact on the capacity of Exeter St. David's as well as the routes to/ from Exeter Central. No trains can depart Exeter Central towards Exeter St. David's until the platform they are running into is cleared of all trains.

The Exmouth Junction signal box controls all trains between Exeter Central and Cranbrook/ Exmouth and fringes onto Exeter and Basingstoke Panels to allow access into its control area. Since the box was re-controlled by British Rail, an electronic panel has been in place and has seen a number of additions, such as three new stations, an increased frequency of services and new fringe arrangements. This means that any changes on this part of the railway will have to consider the re-control of the area controlled by Exmouth Junction. The need for more services whether to/ from Honiton or

Topsham or Exeter Central will require a review of signal spacing, track layout and operational requirements to inform future renewal plans. This is currently being assessed through work looking at Exmouth Junction.

3.5.2 Rolling Stock and depot capability

The existing rolling stock used by SWR are Classes 158 and 159 which are nearly 30 years old and approaching life expiry. The existing fleet consists of:

- 10 x 2 car Class 158
- 30 x 3 car Class 159

The existing fleet is fully utilised and there is no spare rolling stock on lease to operate any additional services. If this CMSP suggests solutions that lead to the operation of additional services, then it is assumed that this will require either additional trains to be provided (possibly Class 158s cascaded from other train operators) or a brand new fleet of rolling stock. Any future rolling stock changes will need to consider the potential impact on platform lengths at stations along the West of England Line and on level crossing, particularly those at the end of platforms.

It should be noted that the Class 15x fleet, which includes the Class 158s and 159s, is the next major fleet to require replacement on a network wide level following the replacement of Class 142 and 144 Pacer units. The performance of the 15x fleet is likely to become worse the longer they stay in operation.

Decarbonisation is now a key issue for all sectors of the UK economy following the Government's decision to establish a "net-zero" greenhouse gas emissions target by 2050 into legislation. A brand new fleet of rolling stock would allow for the removal of the existing diesel services, with these trains replaced by electric, battery or hydrogen trains. New rolling stock would also improve service efficiency, improve facilities for passengers, provide opportunity to increase seat numbers and provide a quieter ambiance. Network Rail are currently undertaking a "Traction Decarbonisation Network Strategy" to determine the most appropriate technologies to deploy on the remaining areas of the unelectrified rail network. This work will provide recommendations during 2020.

These changes would require consideration of depots and stabling. Currently the existing fleet is maintained at Salisbury and there are plans for additional stabling facilities to be provided at Yeovil Junction. The existing depot at Salisbury is at capacity, and there is a complicated reversal manoeuvre required for movements between Salisbury station and the depot itself. Discussions about a masterplan for the redevelopment of land in and around Salisbury station are underway. A masterplan would seek to improve the operational efficiency of the railway, enhance passenger facilities and regenerate currently derelict land. This may lead to the relocation of the depot to a brand new site in the Salisbury area or an additional depot site. Any increase in the size of the fleet that may result from train lengthening or new services such as the aspired to TransWilts would make the need for increased depot capacity essential.

3.5.3 Performance and resilience

Performance, in terms of the Public Performance Measure (PPM), has been in decline on the West of England Line over the last few years. *Figure 7* shows the achieved Moving Annual Average PPM. It clearly shows that at Period 12 of the 2019/20 financial year a PPM of 74.5 % was achieved against a target of 84.3 % .

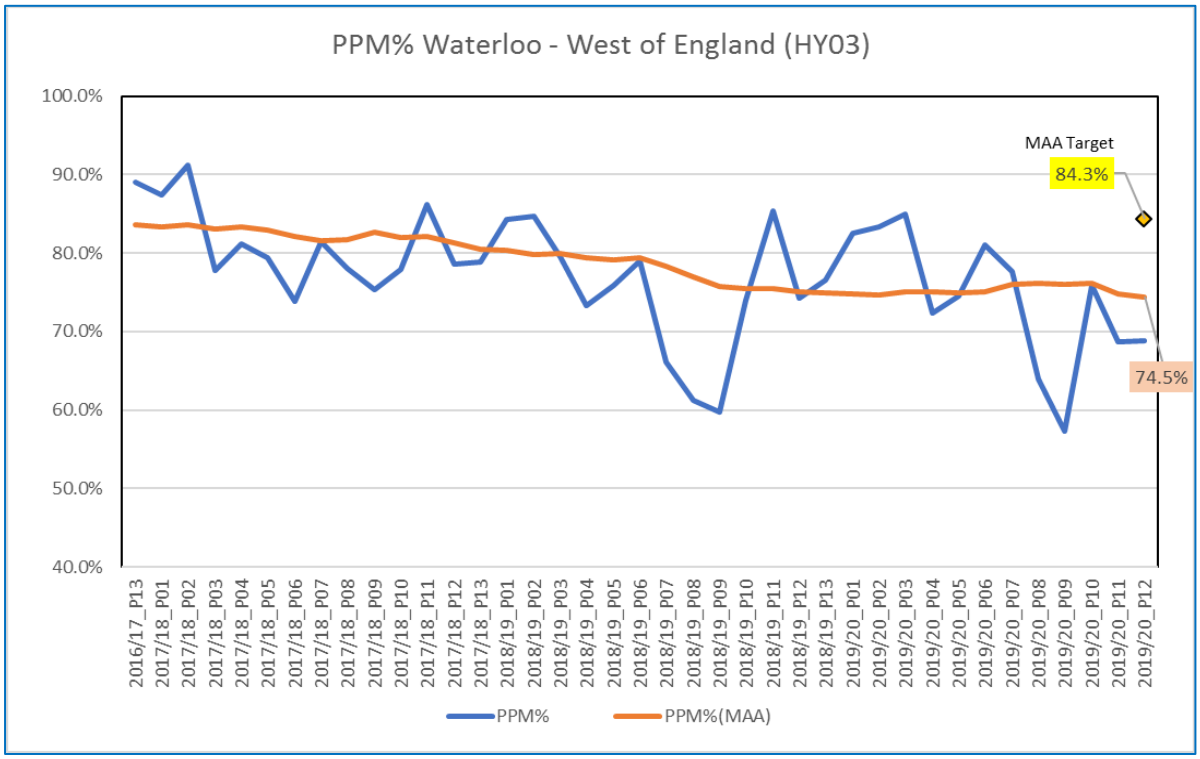


Figure 7: PPM % London Waterloo to West of England Line

Two of the biggest delay incidents on the line were as a result of severe weather; this highlights the importance of building resilience into any future timetable and infrastructure provision.

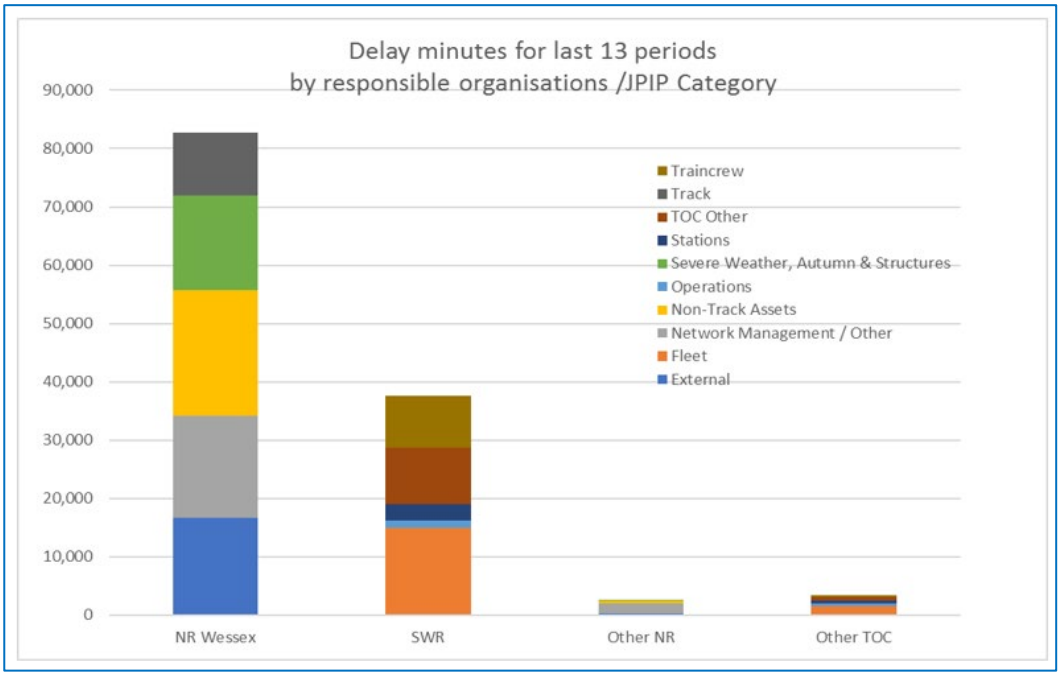


Figure 8: Delay minutes by responsible organisation and JPIP category

Figure 8 shows how delay minutes over the last 13 periods have been attributed by responsible organisation, across a series of categories that are used by the rail industry's Joint Performance Improvement Programme (JPIP). It is worth noting that Network Rail take responsibility for all weather related and trespass/ fatality incidents that may be out of Network Rail's control.

When looked at in terms of how delay minutes are spread across the JPIP categories it is clear from *Figure 9* that the five highest delay minutes are :

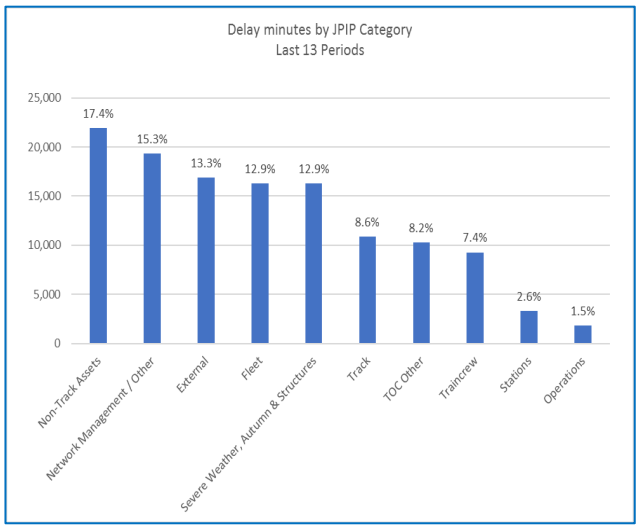


Figure 9: Delay minutes by JPIP category

- Non-track assets – this includes points failures, signalling system failures, track circuit failures, level crossing failures
- Network Management – this includes possession over-run, vegetation management, Network Rail Operations
- External – this includes bridge strike, fatalities and trespass, vandalism/ theft
- Fleet – this includes all technical and non-technical rolling stock delays
- Severe weather, Autumn & Structures – this includes civil engineering structures, earthworks and buildings, severe weather, leaf fall

When looking at the Salisbury to Yeovil Junction section of the line, the May 2019 timetable change brought the service operated much closer to that tested in this CMSP module. This means that there are now two trains in one direction at a time for much of the day whereas there were more hours with one train in each direction before that.

The impact of the additional off-peak trains introduced in the May 2019 timetable can be seen more so at Pinhoe, even though the additional trains were generally east of Yeovil Junction. It is likely that this is owing to the potential for an increased number of trains to create more delays at more locations with a greater knock on effect across an infrastructure constrained route (the high level of single track sections). In some four week periods up to 25 % of trains can be more than three minutes delayed in the Up direction (towards London) through Pinhoe and in the Down direction (towards Exeter) through Tisbury.

The bad weather at the end of 2019 / early 2020 will have had a detrimental impact on performance. The impacts of the bad weather included, the landslips/ speed restrictions at Templecombe and Gillingham and flooding in the Axminster area.

The significant proportion of single track sections west of Salisbury is a major challenge. Trains end up waiting to cross at single line sections of the West of England Line, this means that if there is an issue, whatever the cause, it is difficult to recover the timetable without impacting on other services or creating lengthy gaps by turning services short of their destination.

At times of perturbation, West of England line services normally terminate at Basingstoke

instead of going through to London Waterloo. This is partly because of lengthy turnaround times for these services at London Waterloo. This effectively takes a platform out of service which could be of greater use for turning around services with shorter turnaround times. This CMSP module is not seeking to resolve this issue but it is the intention that performance and operational resilience forms part of any interventions that are suggested.

Although on occasions it is possible to divert SWR West of England line services via alternative routes, there are issues concerning train crew knowledge.

Rail replacement buses are very difficult to provide and are unattractive because the road system layout and design does not allow buses to easily replicate rail journeys in terms of station to station journeys with lengthy detours off main roads required.

Network Rail maintenance staff are based a significant distance from parts of the line which makes it difficult to respond to infrastructure failures quickly with typical call out times from Salisbury depot of 40 minutes as opposed to 20 minutes for staff based at Wimbledon. It has been suggested that a joint Western and Wessex maintenance team and more maintenance staff in the Yeovil area could assist service recovery with staff having to travel shorter distances to any incident.

As the West of England line is relatively self-contained, the impact of any delays on other routes can be much lower than on other routes on the network. However, there is a potential knock-on impact on GWR services from Exeter St. David's if SWR services are delayed, owing to the restrictive track layout at Exeter St. David's station.

The overall conclusion to made from looking at current performance and resilience issues on the West of England Line is that the capability of infrastructure on the West of England Line struggles to support the recent timetable enhancements. Additional services mean that any delay is magnified and transmitted up and down the line with less margin for recovery. Infrastructure interventions suggested by this CMSP module need to be able to provide significant performance benefits. This must be balanced by the pressure to increase the frequency of train services, particularly through the Tisbury and Pinhoe areas where the impacts of recent improvements to frequency have had the most impact.

4.0 Strategic Context

4.1 Why this study?

The Wessex Route Study, published August 2015, focussed on the unlocking of capacity between Woking and London Waterloo as this is the major barrier to meeting future demand for passenger services into London on the Wessex Route. At a lesser level of detail, the Route Study suggested that overhead electrification between Worting Junction and Exeter St. David's could facilitate approximately 14 minutes of journey time saving. This would, in part, be achieved by the improved acceleration and deceleration of AC traction.

The Wessex Route Study also suggested, in line with the Western Route Study, an additional hourly service between Exeter St. David's and Axminster. This additional service formed part of the Devon Metro concept being promoted by Devon County Council.

Finally, both the Wessex and Western Route Studies suggested improvements to the diversion capabilities of the West of England Line for passenger and freight services. This diversionary capability proposal was initially developed to GRIP 2 ("feasibility" in Network Rail's project management governance structure) by Network Rail's Western Route but had not been funded beyond this point. It should be noted that this work was specific to the part of the line that is used for diversionary services and did not take full account of other parts of the line (eastwards of Yeovil Junction).

Following the publication of the two Route Studies a steering group was set up, the '*West of England Line Strategy Group*', with core members taken from potential funding organisations: Devon County Council, Dorset Council, Dorset LEP, Enterprise M3 LEP, GWR, Hampshire County Council, Heart of the SW LEP, Network Rail, Somerset County Council, South Somerset District Council, SWR and Wiltshire Council (the Salisbury to Exeter Line Rail User Group — SERUG — and TravelWatch South West have subsequently become members). The aim of this group was to develop a strategy for enhancing and improving services on the West of England Line for the benefit of passengers. The group funded a piece of timetable analysis looking at some aspects of capacity and journey time improvements on the line.

The resultant timetable analysis suggested a number of infrastructure interventions for journey time and capacity benefit, but also showed that owing to the complex nature of the line any study should look at the entirety of the West of England Line and not just an isolated area (the study had only looked at Salisbury to Yeovil Junction).

There are some large scale renewals planned for the West of England Line, that are expected to be progressed in Control Period 7 (CP7 - 2024 to 2029); this may include the proposed introduction of digital signalling technology in the Salisbury signalling area. In addition, the current rolling stock fleet is reaching life expiry, meaning that the next franchise will see the introduction of a new rolling stock fleet. These proposed changes provide the opportunity for a joined up, cross industry approach to improving the service offered to passengers on the West of England Line.

Previous work, proposed renewals, the need for new rolling stock, political will (interest from passenger groups and MPs) and the rail industry's recognition that the Wessex Route Study had a focus that had not allowed Network Rail to develop a strategy for the West of England Line, has led to the line being one of the first CMSP modules taken forward for the Wessex Route.

4.2 Rail Strategy

4.2.1 Wessex Main Line Strategy

The West of England forms an important part of the Main Line service group (longer distance services into London Waterloo) on the Wessex Route and is therefore subject to the wider strategy for providing capacity into London Waterloo.

The Main Line strategy for meeting long-term demand and growth (including current overcrowding) involves a series of linked, significant enhancements over the next 15/ 20 years to provide an additional 13tph in the high peak hour (arrivals at London Waterloo between 08:00 and 08:59). These enhancements can be split into core and supporting schemes.

The core schemes, as currently stated in the Wessex Route Study, are:

- Woking Area Capacity Enhancement (WACE) – this involves the grade separation of Woking Junction by "lifting up" the line from Guildford (in the London direction) so that trains travelling on the South West Main Line to and from the Basingstoke direction can continue to operate without the need to slow down or stop. In addition, the scheme proposes converting the current bay Platform 6 into a through Down direction platform to increase platform capacity at Woking station itself
- Digital signalling technology – the implementation of European Train Control System (ETCS) signalling technology in the Wimbledon signalling area (which includes London Waterloo)
- Crossrail 2 – this major scheme is to provide suburban connectivity across London through a tunnel portal at Wimbledon. The scheme includes two additional tracks between New Malden and Wimbledon that will allow some suburban services that currently use the Fast lines to be moved off of the Fast lines and therefore additional Main Line services can be operated in their place

The WACE project is the key to unlocking future capacity for longer distance services into London Waterloo, including any that might be required in the future from West of England Line locations. Once WACE has been implemented the full Main Line benefits of digital signalling technology and Crossrail 2 for Main Line service improvements will be realised as all additional services will be able to operate to/ from locations beyond Woking where the demand and growth is expected. A range of supporting schemes may then be required at specific location. Depending on where the additional trains originate from, these supporting schemes could include one or more of:

- Basingstoke Area Capacity Area (BACE)
- Southampton Central Platform Capacity
- Guildford Platform Capacity
- Track Capacity between Basingstoke and Southampton Central
- Capacity on the Portsmouth Direct Line

This Main Line strategy is in the process of being refreshed and re-evaluated as part of a 2020/21 CMSP module looking at the South West Main Line strategy. The WACE scheme will continue to form a key part of any future strategy for the Main Line. A decision on where the services released by WACE will operate to has not yet been made.

Current assumptions in this CMSP are that if a third train released by WACE is operated between London Waterloo and Salisbury then it would not require any additional infrastructure intervention on the West of England Line; although, interactions at Salisbury may require further investigation to understand whether there is sufficient platform capacity for an additional terminating service.

4.3 Wider Context

The West of England Line runs through Hampshire, Wiltshire, Dorset, Somerset and Devon. This means that there are potentially differing requirements that the railway needs to serve. Following a high-level review of documentation produced by local Passenger/ User Groups, Local Authorities, Local Enterprise Partnerships (LEP) and Sub-National Transport Bodies there were some themes that are repeated by multiple stakeholders:

1. Train and infrastructure reliability (service resilience)
2. Overcrowding and capacity
3. Journey times to London
4. Use of the line for the diversion of other services

4.3.1 Train and infrastructure reliability (service resilience)

As described in *sections 3.2* and *3.3*, of this document, the West of England Line has seen significant changes to its infrastructure as services were reduced following a decline in rail patronage. Over the last 20 years this decline has been reversed and the line has seen increased patronage and an increase in service levels, but on infrastructure that has not kept pace with those changes (both on the West of England Line and across the Wessex network).

The *'Greater Connected'* document, published in 2014, by the Heart of the SW LEP, in collaboration with four other LEPs in the West, referenced the impact that resilience and

reliability can have on economic growth. The document recommended investment in diversionary capability, drainage, flood prevention, signalling equipment, embankments and cuttings, and more flexible track infrastructure (less single track).

4.3.2 Overcrowding and capacity

As will be discussed in *section 6.0*, of this document, the West of England Line has overcrowding issues towards London Waterloo and towards Exeter St. David's. This has a direct, negative impact on our passengers and the experience they have on West of England Line services.

The *'Dorset Passenger Transport Strategy'* document, published in 2016, by the then Dorset County Council in collaboration with other Dorset area Councils, recognised the need for additional capacity on the West of England Line. This was echoed in the *'Local Transport Plan 3 Devon and Torbay Strategy 2011-2026'*, published by Devon County Council and Torbay Council. Hampshire County Council also noted the need for capacity on the east end of the line in their *'Hampshire Local Transport Plan 2011 - 2031'*.

Passenger groups such as TravelWatch South West and the Salisbury to Exeter Rail Users Group (SERUG) have also actively lobbied for improvements in capacity to ease overcrowding and provide for the needs of passengers using the line.

4.3.3 Journey times

As will be discussed in *section 6.0*, of this document, the West of England Line is a line of two halves when considering journey time improvements. It is important to recognise the importance of journey time improvements for commuting and other reasons such as business and leisure travel.

The 'Swindon and Wiltshire Rail Study', published in July 2019, by Swindon and Wiltshire LEP noted improvements to journey times from Salisbury to London Waterloo as one of their three key recommendations; thus, recognising the importance of quick, reliable links to the Capital. In their *'Somerset Growth Plan 2017-2030'*, Somerset County Council identified journey times to London Waterloo (and London Paddington) as being important in bringing businesses 'closer together' and enabling businesses to access their labour force and employees to access more opportunities.

As can be seen in *section 4.3.5* of this CMSP, the Peninsula Rail Taskforce has also highlighted the need for, and economic impact of, improvements to journey times from across the area covered by the West of England Line.

4.3.4 Diversionary capability

Several documents reviewed in this high-level literature review recognised the importance of the West of England Line for providing a diversionary route for access to the West at times of disruption.

The '*South West Spine*' document, published in 2013, by a consortium of Local Authorities, noted the need to improve the diversionary capability of the West of England Line to maintain connectivity into and out of the West during disruption events. This was also seen as a key issue in the *'Greater Connected'* document, published in 2014, by the Heart of the SW LEP, in collaboration with four other LEPs in the West.

This is a recognised need across all Passenger/ User Groups, Local Authorities, LEPs and rail industry stakeholders.

4.3.5 Other strategies and policies

There are a number of strategies, task forces and policies within the rail industry and more widely that will influence the subsequent development of any schemes/ interventions identified through this CMSP. Some of these are detailed below:

A focus on passengers

Transport Focus, the independent watchdog for transport users, has carried out research that emphasises the following:

- the importance of the 'core product'
- effective management of disruption
- value for money

The results of Transport Focus's research on priorities[1] and passenger satisfaction[2] continually emphasise the importance of an affordable, punctual, reliable, frequent service on which you can get a seat or, at the very least, stand in comfort.

These form the 'core product' that passengers want to see improved. How well the industry delivers these core attributes goes a very long way in passenger satisfaction and also underpins the extent to which passengers 'trust' the railway[3].

In 2017 Transport Focus asked passengers to rank 31 station and on train attributes in order of their priority for improvement. The top 10 are shown below:

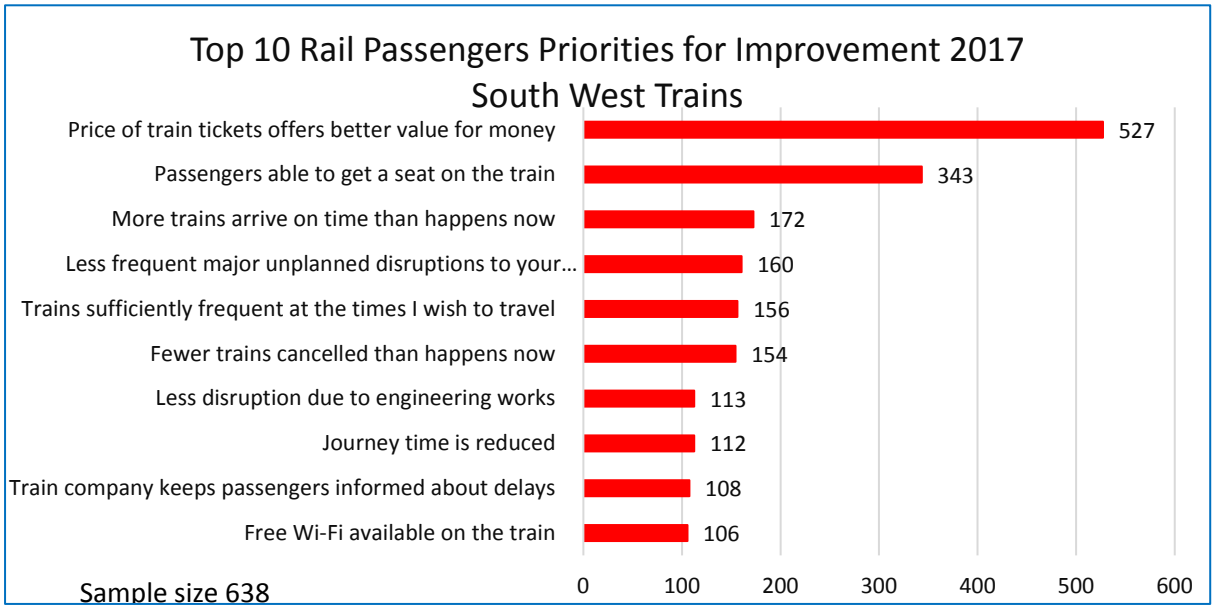


Figure 10: Top 10 Rail Passenger Priorities

The priorities are shown as an index averaged on 100. An index of 300 is three times as important as the average and an index score of 50 is half as important as the average. So, for SWT passengers, the top priority of 'the price of train tickets offers better value for money' is over five times as important as the average. 'Trains sufficiently frequent at times I wish to travel' is more than one and half times as important as the average. 'Passengers always able to get a seat on the train' is over three times more important

[1] Rail Passengers' Priorities for improvement. Transport Focus. November 2017
[2] National Rail Passenger Survey. Transport Focus. June 2019
[3] Williams Rail Review – Trust in train operators. Transport Focus. June 2019

than the average.

The next group of important priority factors also feature what can be regarded as core elements of service. Passengers want improvements in punctuality and reliability, fewer disruptions or cancellations and good information about their services.

These service elements also impact on value for money assessments. Research suggests that this is a balance between the price of the ticket, punctuality and crowding of the service provided[4].

Accessibility and inclusion

Access to the railway and the importance of not excluding anyone from accessing the railway is a key concern for the railway industry. The Access for All programme (AfA), which is a rolling enhancements fund for step-free access from street to platform at railway stations, does not currently have any funding allocated to West of England Line stations in the most recent round of funding.

https://www.networkrail.co.uk/communities/passengers/station-improvements/access-for-all-improving-accessibility-at-railway-stations-nationwide/

However, stations on the West of England Line were identified as potential AfA schemes, such as Yeovil Junction and Pinhoe, so it is important that in future AfA funding competitions the West of England Line is not forgotten. Any new stations or stations that require additional platforms will need to be compliant with access legislation and policy.

The Department for Transport's (DfT) Inclusive Transport Strategy plans to make the wider transport system more inclusive, and to make travel easier for disabled people. While it is focused on the inclusion of disabled people, many of the suggested improvements would also benefit other passengers and users of the railway.

The Government's ambition, as set out in this strategy, is for disabled people to have the same access to transport as everyone else, and to be able to travel confidently, easily and without extra cost. By 2030 it is envisaged that there will be equal access for disabled people using the transport system, with assistance if physical infrastructure remains a barrier.

https://www.gov.uk/government/publications/inclusive-transport-strategy

The Strategy's five main themes are important in any consideration of new railway infrastructure and rolling stock change; they are:

1. Awareness and enforcement of passenger rights - raising awareness of the obligations on transport operators, the processes for raising concerns or complaints and working with regulators to hold operators to account
2. Staff training - ensuring that transport staff (frontline and managerial) understand the needs of disabled people with physical, mental, cognitive or sensory impairments, and can provide better assistance
3. Improving information - ensuring that transport operators provide travel information in formats that all passengers can easily access and understand, before and during a journey
4. Improving physical infrastructure - ensuring that vehicles, stations and streetscapes are designed, built and operated so that they are easy to use for all

[4] Fares and Ticketing Study – Appendix A – Understanding drivers of satisfaction. Transport Focus. 2009

5. The future of inclusive transport - ensuring that technological advances and new business models provide opportunities for all, and that disabled people are involved from the outset in their design

The ORR's guidance for operators on Accessible Travel Policies, had a major update in 2019. This document is an important consideration for both Network Rail and Train Operators to ensure the needs of all passengers are met and no inadvertent discrimination is imparted.

https://orr.gov.uk/rail/licensing/licensing-the-railway/accessible-travel-policy

Decarbonisation

In response to the international Paris Climate Agreement in 2015, which saw global commitment to limit average temperature rise to well below 2°C with aspirations to limit the rise to below 1.5°C, the UK government has legislated for the UK economy achieve net-zero greenhouse gas emissions by 2050. This requires all sectors of the economy to act immediately along the "road to zero". Supplementary to this, then Rail Minister, Jo Johnson in 2018, identified an aspiration to remove all diesel only trains from the network by 2040. In response to this the rail industry convened the Decarbonisation Taskforce which concluded that this aspiration was possible for passenger services through deployment of trains powered by battery, electric or hydrogen but for freight, removal of diesel only trains required significant further deployment of overhead line electrification. A brief timeline of these events is summarised in *Figure 11*.

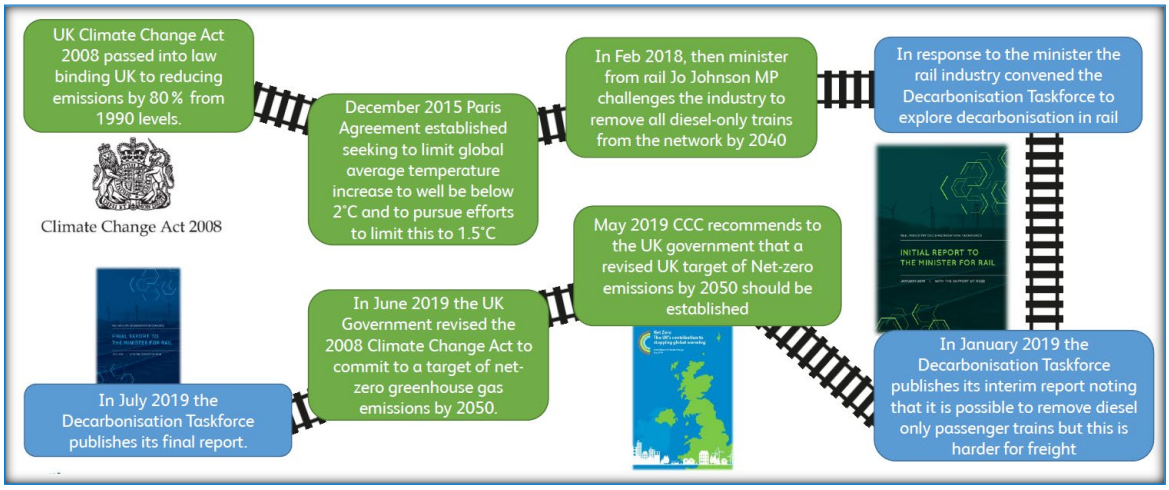


Figure 11: Summary of rail industry's response to decarbonisation agenda

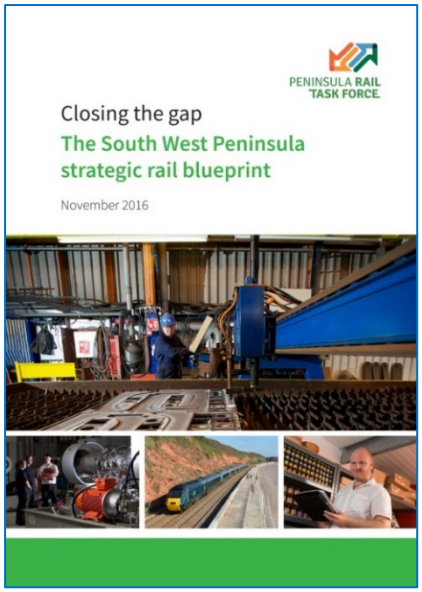
Network Rail, building on the work of the decarbonisation taskforce, has commenced the Traction Decarbonisation Network Strategy. This work is determining the extent to which further electrification, battery technology and hydrogen technology could be deployed across the GB rail network to achieve zero emissions from rail traction. Overall, rail as a whole contributes around 3 $MtCO_2e$ per year (Mega tonnes of Carbon Dioxide equivalents per year). This represents a very small amount of the total UK emissions (less than 1 %) with rail one of the lowest emitting transport mode in the UK (from a total transport emissions perspective). Overall due to the substantial 3rd rail electrification found in the wider Southern region the overall contribution to rail emissions from this region is relatively small. Nonetheless the West of England line remains one of the few

main line railway routes into a London Terminal which remains unelectrified and removal of diesel traction would assist in the Southern rail network ceasing its contribution to overall national emissions as well as providing a long term solution to air quality improvements in Waterloo, Basingstoke and Exeter St David's as well as other stations along the route.

The necessity to provide diversionary routes for long-distance high speed services and freight may require some or all of the West of England line to be electrified using 25kV Overhead Line if diesel traction is to be fully removed from the network. The Traction Decarbonisation Network Strategy will evaluate this and provide initial recommendations around the solutions to deploy. This work will be provided in several publications made between July and December 2020.

The Peninsula Rail Task Force

Following the catastrophic rail network closures in 2012 and 2014 caused by flooding of the Somerset levels and Cowley Bridge, Exeter, and storm induced destruction of the main line at Dawlish, the Peninsula Rail Task Force (PRTF) was invited by the then Prime Minister to prepare a 20 year rail strategy for the South West.



This strategy "Closing the Gap" was presented to Government in November 2016, and it highlighted three key priorities for the rail network serving the South West:

- Resilience and reliability
- Journey time reductions
- Capacity and quality of service

Each of these key priorities included requirements for improvements on the London Waterloo to Exeter route.

With regards to resilience, the PRTF strategy noted that there is a need to accommodate diverted Great Western services at times when the Western route from Exeter to Paddington via Taunton is unavailable (either as a consequence of flooding or planned maintenance). The strategy recognised that additional infrastructure would be required between Exeter St. David's and Yeovil Junction in order to accommodate diverted services without disruption of the Waterloo to Exeter services.

The PRTF strategy work included an economic assessment of the impact of reduced journey times, on both of the routes from London to the South West. On the London Waterloo to Exeter St. David's route, this showed that there would be a benefit of £677m over a 60 year appraisal period if it were possible to reduce the journey time between Waterloo and Exeter by 36 minutes. It is likely that achieving this sort of journey time reduction would require considerable re-doubling and electrification of the West of England Line.

Capacity and quality of service the PRTF strategy highlighted the need for capacity upgrades between Exeter St. David's, Yeovil Junction and Castle Cary, both in order to accommodate diverted trains (resilience) and to support the Devon Metro need for additional services between Exeter St. David's and Axminster. The strategy also includes

the need for additional double track/ passing loops between Salisbury and Yeovil Junction, to deliver both capacity upgrades and reductions in journey times.

In the Government response to the strategy, the DfT Rail Minister stated: "*Providing diversionary capability is an essential element of the resilience programme. As part of our planning process for Control Period 6, we will start development work for a package of infrastructure enhancements to deliver greater capacity for diversions between Castle Cary and Exeter along the West of England main line through Yeovil. We are prioritising the development of a plan for a new passing loop at Whimple, to enable early delivery of more frequent local train services between Axminster and Exeter. "*

4.3.6 Summary

This high-level review of published documentation, in conjunction with consultation through the Working Group of this CMSP, clearly shows the agreement voiced by both the rail industry and our stakeholders to improving rail service provision on the West of England Line.

Addressing poor reliability/ resilience, capacity and overcrowding, journey time improvements and keeping the West open for business at times of disruption are stated again and again as key outcomes that stakeholders want to see delivered.

Added to this, the lack of satisfaction with services on the Wessex Route from passengers via the Transport Focus survey, it is clear that improvements are being asked for from passengers too.

Development of any schemes identified by this CMSP must be mindful and take account of other wider strategies and policies such as decarbonisation, accessibility and inclusion. These strategies and policies will help to inform the solutions we take forward.

Working collaboratively through this CMSP module is an essential first step in the process towards achieving demonstrable improvements for passengers and rail freight customers, to unlock economic growth across the area covered by the West of England Line.

5.0 Strategic Questions

In consultation with the CMSP Working Group, seven strategic questions were proposed and then agreed through the governance structure, see *section 2.1*. By answering these questions, a strategy for capacity and journey time improvements on the West of England Line will be developed. The seven strategic questions, in no particular order, are:

1. What are the key markets that the West of England Line serves or needs to serve?
2. Based on the demand analysis, how is capacity best provided and managed on the West of England Line?
3. Where are the stakeholder priorities for improved journey times and by how much?
4. How can the West of England Line best support local and market growth opportunities?
5. What are the potential opportunities for onward connectivity from locations on the West of England Line?
6. What does the rail freight industry require of the West of England Line?
7. What is the extent of poor resilience and performance on the West of England Line, how can this be addressed and how can the West of England Line support the resilience of other lines?

The strategic questions were designed to enable a picture to be developed of who does and doesn't use rail in the scope area, what is constraining more people from using rail and what demand is expected to be realised over the next 20 to 30 years' time. This allowed us, in consultation with stakeholders through the Working Group, to identify the issues that need to be solved.

Once the markets and future demand were understood, then rail service changes could be tested to identify what could be achieved on current railway infrastructure and where timetable and/ or infrastructure interventions would be required to achieve a service change that meets the requirements of passengers and, where appropriate, freight users of the West of England Line.

This forms the main part of the analysis around capacity and journey time, that has been conducted through this CMSP. In addition to this it was agreed that an understanding of current resilience issues on the line as well as the use of the line as a diversionary route should be documented as they would be important considerations for any resultant schemes seeking funding.

6.0 Markets and Demand

Understanding who uses a rail service, when they use it, why they use it, and how that usage might change over time is essential in suggesting service options that will meet the changing needs of passenger and freight customers.

6.1 Market analysis

Commuter travel corresponds to about 50 % of all rail travel across the day on the West of England Line (based on SWR market surveys), with the other 50 % made up from the wider market for leisure and business travel. At locations, such as Salisbury the business and leisure markets are of particular importance. This demonstrates that the West of England Line must meet the needs of markets that can sometimes have conflicting priorities.

It is worth noting that overall in the U.K., there has been a trend towards less five day a week commuting into offices, less full time work, and a trend towards more working from home. There is a currently a study underway by ARUP, commissioned by Network Rail, that is looking into the impact of work trends on rail growth. The preliminary results of this work indicate that there is a clear and noticeable trend towards less office work, and less full time work. The impact of these trends on rail growth has been found to be ~0.1 % reduced growth p.a. Overall, this implies a noticeable, but not significant, reduction in rail demand due to changing travel behaviours.

However, on the West of England Line there is already a tradition of commuting for less than five days a week, particularly in the London-bound direction west of Salisbury, and any slight reduction in growth associated with this trend may be outweighed by growth related to population and development.

Commuter travel, across all transport modes, is primarily to the major employment centres of London, Basingstoke, Exeter and Salisbury. Yeovil, Andover and Axminster also show significant levels of employment for commuters within the West of England Line catchment. It is not always the case that rail is the first choice for commuters to get to some of these locations; which points to an opportunity for improvements to rail that could increase modal share and contribute to the decarbonisation agenda.

Commuter travel to London Waterloo makes up the largest part of commuter journeys. The need to provide additional capacity to enable these journeys and accommodate growth is apparent owing to the standing already seen from Andover into London Waterloo on some peak services.

Railway stations along the West of England Line often act as a focus for rail travel across quite a wide, often rural area. A lack of adequate station car parking or means of accessing the railway via other modes can stifle growth in rail travel; conversely, improvements can make rail much more attractive. Locations such as Gillingham and Grateley are examples of where a lack of adequate car parking may prevent further growth on the railway from the surrounding area. Improvements to the “first/ last mile” are key to realising any opportunities to expand rail’s share of journeys.

Table 5 identifies the rail markets across the West of England Line, using selected stations, and the impacting factors that could trigger change in those markets.

Station	Key rail markets	Potential market impacting factors
Basingstoke	Employment (incoming and outgoing); Education (incoming)	Manydown housing and commercial development; Leisure/ retail park development; Basing View commercial development
Andover	Employment (incoming and outgoing); Education (incoming and outgoing)	Housing growth; Expansion of town centre employment; Expansion of business park employment
Salisbury	Employment (incoming and outgoing); Leisure/ Tourism; Education (incoming)	Housing growth Potential new TransWilts service A303 road enhancements Station car parking Regeneration schemes – station area (hub), Fisherton Street and Maltings
Gillingham	Employment (outgoing);	Housing growth; A303 road enhancements; Station car parking Service frequency
Yeovil Junction	Employment (outgoing);	Housing growth Service frequency
Axminster	Employment (incoming and outgoing); Education (outgoing)	Housing growth; Travel to/ from Exeter College Station car parking
Honiton	Employment (incoming and outgoing); Education (outgoing)	Employment growth east of Exeter; Travel to/ from Exeter College
Cranbrook	Employment (incoming and outgoing); Education (outgoing)	Housing growth (new town); Employment growth at Skypark and Airport; Travel to/ from Exeter College
Pinhoe	Employment (incoming and outgoing); Education (outgoing)	Housing growth; Exeter Science Park; Exeter Business Park / Met Office Sowton Industrial Estate; Travel to/ from Exeter College
Exeter stations	Employment (incoming and outgoing); Education (outgoing); Leisure/ Tourism	Expansion of Exeter employment market; Travel to/ from Exeter College and Exeter University; Leisure travel growth Housing growth Planned Marsh Barton station Platform capacity at Exeter St. David's and Central Devon Metro (connecting services) and other increased frequency connections from St. David's e.g. Cross Country to Bristol Impact of wider service improvements i.e. Tarka Line

Table 5: Market impacting factors at some key stations

6.2 Journey time analysis

West of England Line rail journey times, in terms of actual in-vehicle time, are currently very competitive on journeys between stations on the West of England Line. These rail journeys are all faster than car journeys and are still faster or equivalent to car journeys when a 10 minute access/egress 'last mile' figure is included.

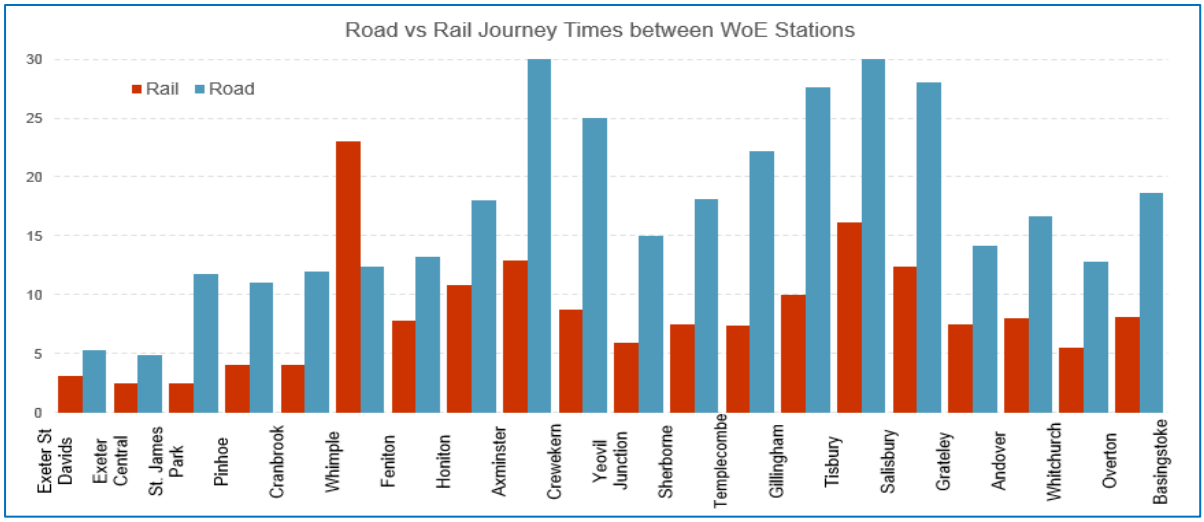


Figure 12: Comparison of journey times between adjacent West of England Line stations (road and rail)

The analysis shows that rail service frequency is generally good for journeys into the major employment centres on the eastern section of the line; for instance, journeys between Salisbury and Basingstoke and onwards to London Waterloo have a 2tph service. However, frequency is poorer for journeys west of Salisbury and towards Exeter as a result of the way the timetable is structured to take account of the single track sections of the line.

Frequency, as a component of Generalised Journey Time (GJT), is a key factor in a potential passenger's decision to use rail for their journey. An increase in frequency reduces the GJT for a journey and can therefore increase the likelihood that rail will provide a competitive option. In addition to poor frequency and actual time spent on the train, the time at which a train arrives at is destination can also be key; for instance, services into Exeter in the AM peak arrive at less than ideal times for passengers to commute to work in Exeter.

The ability for passengers to access the railway is shown to be a limiting factor for journeys along the West of England Line, as the time taken to get to the departure station from a potentially wide catchment may be too large to make it worth continuing the journey via rail. This is particularly the case when frequency of service is poor or onward travel via an interchange means a long wait between trains. This shows the importance of collaboration between all modes to provide the best and most efficient means for passengers to access the railway.

Broadly, there are good journey times provided when looking at journeys into the main employment centres, such as Basingstoke, Salisbury and Exeter. Journey times from Salisbury, and stations eastwards, towards London Waterloo are reasonable, but journey times from stations west of Salisbury are not deemed to be quite as competitive. Any improvements to journey times to/ from London Waterloo or other major centres, such as

Exeter, are likely to have a strong business case, but it should be recognised that journey time benefits may not translate across the whole of the line and some passengers may not benefit from a reduction in journey time at all.

West of Yeovil Junction the journey times for commuting to London are potentially prohibitive and passengers may choose to access the railway via the Great Western route into London Paddington instead. This does not mean that journey times improvements to London Waterloo from west of Yeovil Junction should not be pursued, but it does suggest that the emphasis should be towards interventions eastward of Yeovil Junction because they will benefit a larger number of users of the line. Therefore, it is suggested that improving journey times on the West of England Line should focus on where interventions eastward of Yeovil Junction can deliver improvements to the whole line. This does not negate the need for incremental improvements to journey times elsewhere on the West of England Line; in fact, these should be sought as a matter of course in any future infrastructure intervention that is taken forward through this CMSP module.

The analysis therefore recommends that improvements to journey times to Exeter and London Waterloo are desirable, both from an economic and stakeholder aspiration perspective, and that the focus for this study should be on achieving journey time savings through interventions eastwards of Yeovil Junction. Should an intervention identified through this CMSP be taken forward for funding, it is important that potential changes to rolling stock and changes in traction, to facilitate decarbonisation benefits, are also considered.

6.3 Future passenger demand

Analysis was conducted to provide an understanding of how overcrowded or well utilised current services are and how we expect this to change over time as demand for the railway increases. Although the patronage figures in *section 3.3.1* show some recent reductions at some stations, possibly related to declining performance, the overall expectation is for increased demand over the next 20+ years.

Based on the ORR patronage figures, the growth picture over the last decade could reflect the following:

- Strong continued growth from the stations between Salisbury and Basingstoke. This is probably a reflection of additional commuting to London, leisure travel and housing growth (particularly in Andover). It is worth noting that car parking capacity at Andover was increased in 2016/17 and significant additional station car parking was introduced at Grateley during 2008/09
- Limited growth emanating from the stations between Yeovil and Salisbury over the past 10 years, with year-on-year declines since a peak in 2016/17, possibly related to poor performance and resilience
- Strong growth at Axminster and Honiton, probably related to the improved service frequency enabled by the Axminster loop in 2009 (although this has faltered since 2014/15). There has also been continued growth of housing at Axminster, and concentration of further education facilities at Exeter
- Stable picture at Feniton and Whimple, probably reflecting the fact that there has been no improvement in the train service offered to these communities

- Strong and continuing growth at Pinhoe and Cranbrook, reflecting the improved access to the rail network at these two locations and the significant housing development east of Exeter

It should also be noted that there has not been an increase in the capacity of the train fleet operated on the West of England Line over this period, and therefore the same trains are carrying more than twice as many passengers as they were 20 years ago. As a consequence, trains are well loaded, particularly between Salisbury, Basingstoke and Waterloo, throughout the day, and not just at peak periods.

The West of England Line has had a number of service disruptors since 2017, primarily the Waterloo blockade in the summer of 2017 and the fairly continual strike action that has been experienced since then. Whilst not as extensive as on the Berks and Hants, there have been a number of major engineering works too, e.g. at Axminster for the flood mitigation works and the impact of a number of GWR diversions. These disruptors, as well as recent issues with infrastructure and rolling stock reliability, are likely to have had a detrimental effect on passenger numbers.

6.3.1 The current picture

The graph, in *Figure 13*, shows the passenger load on train departures from West of England line stations across the whole day, in 15-minute portions, represented by the coloured dots. The lines show a moving average. Orange represents data from May 2018 counts, and blue represents data from December 2018 counts.

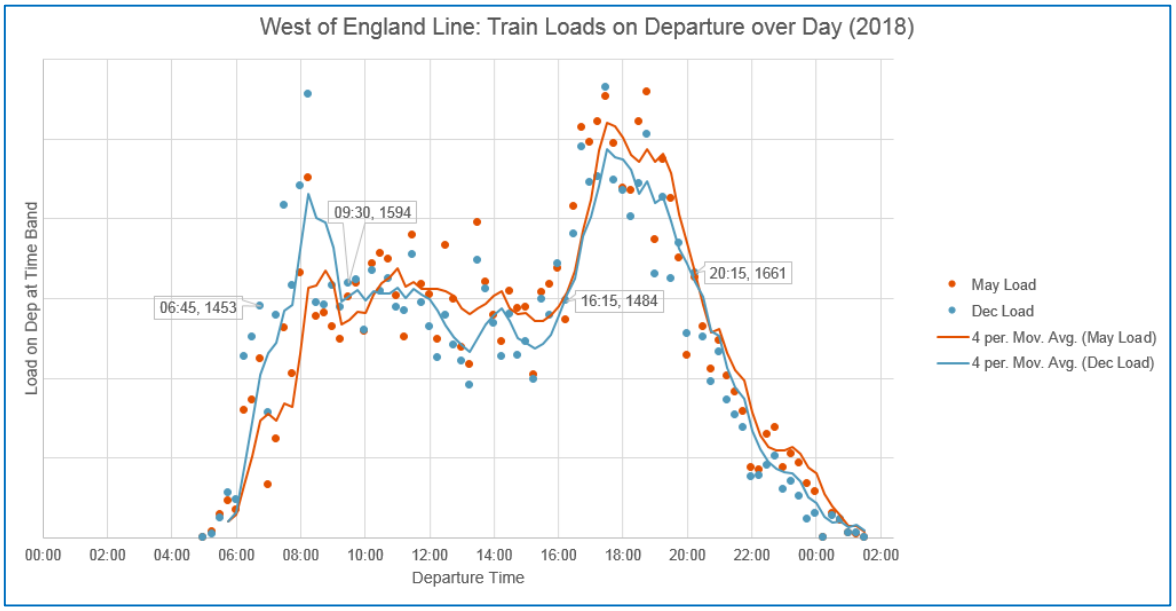


Figure 13: Loads on departure over a day period

The distribution of demand shows that the evening peak is larger than the morning peak, and that inter-peak demand is not much lower than morning peak demand. An important exception is the blue dot in the top left of the graph, at 08:15, representing high levels of demand and crowding on West of England line services into Basingstoke during the morning peak.

Demand into Exeter is especially seasonal, with passenger demand varying more than 50 % between some of the May 2018 and December 2018 counts. Services into Exeter in

the AM three hour peak and out again in the PM three hour peak experience overcrowding and standing on some services.

Table 6 shows the proportion of daily demand on the line by time of day, using the traditional time definitions for the morning and evening peak periods for clarity. The demand is an average of May 2018 and December 2018 counts.

Description	From	To	% of Total Demand on the WoE line in this Period (Up)	% of Total Demand on the WoE line in this Period (Down)
Pre-peak	00:00	06:59	8 %	1 %
AM 3 hour Peak	07:00	09:59	27 %	9 %
Interpeak	10:00	15:59	35 %	32 %
PM 3 hour Peak	16:00	18:59	19 %	32 %
Post Peak	19:00	23:59	11 %	26 %

Table 6: West of England Line peak and interpeak/ off-peak periods

A higher proportion of up demand than down demand takes place in the pre-peak and AM three hour peak, capturing commuters travelling in the up direction towards London. The same can been seen for the down direction in the PM three hour peak and post-peak, capturing the return journeys for these commuters.

The other notable trend is a high level of loading during the interpeak period, which implies there are a lot of leisure journeys being made on the West of England Line.

6.3.2 The future picture

The analysis carried out for this CMSP module was carried on two growth scenarios:

- Standard Growth Scenario – using EDGE, which contains the DfT-calculated demand growth rates. EDGE looks at housing and employment development committed to by Local Authorities in local area plans, along with national growth forecasts, and calculates expected growth in rail demand using standard transport industry methodology
- Aspirational Growth Scenario – starts off by assuming the demand growth in the Standard Growth Scenario, this is then overlaid with an additional growth rate calculated from the unpublished housing growth plans provided by local authority members of the Working Group

The Compound Annual Growth Rate (CAGR) has been calculated for six of the key destinations for travel from West of England Line locations; these have been calculated for both the standard and aspirational growth scenarios; see *Table 7* and *Table 8*.

	Andover	Axminster	Basingstoke	Exeter	London	Salisbury
2018 - 2026	1.7%	1.5%	2.1%	1.9%	2.3%	1.5%
2026 – 2031	2.5%	2.5%	3.0%	2.9%	2.6%	2.3%
2031 - 2041	1.4%	1.5%	1.8%	1.8%	2.3%	1.4%

Table 7: Average rail growth per year under the Standard Growth Scenario

	Andover	Axminster	Basingstoke	Exeter	London	Salisbury
2018 - 2026	1.9%	2.5%	2.4%	2.2%	2.4%	1.7%
2026 - 2031	2.9%	2.7%	3.5%	3.1%	3.9%	2.9%
2031 - 2041	1.9%	1.7%	2.6%	2.1%	2.7%	1.9%

Table 8: Average rail growth per year under the Aspirational Growth Scenario

As previously noted, there are incidence of overcrowding at the east and west ends of the line as well as "heavy" crowding in other locations. The following figures show graphically how crowded services are or will become over time (2018, 2026, 2031 and 2041) should no interventions be taken forward to meet demand and growth on the West of England Line, both in the Standard and Aspirational growth scenarios.

The colours relate to different levels of seat occupancy and standing density. It is important to interpret the crowding results in the context of what is appropriate for the type of route and service, alongside knowledge of the impact of averaging.

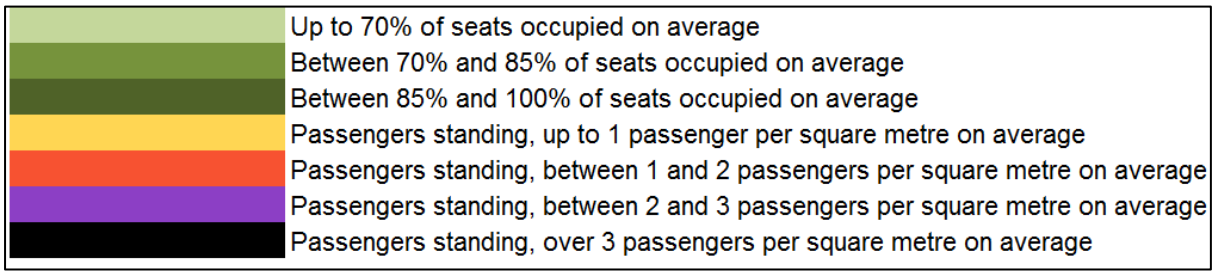


Figure 13: Seat occupancy and standing density

The reported crowding is calculated by comparing the total demand over the peak period with the total capacity; it is not calculated on a train-by-train basis (it is averaged). This means that some services will be busier than the crowding level shown, and some quieter, because passengers don't spread out across different services to make the most efficient use of capacity across the whole period.

Passengers also don't evenly spread out across services, for example they may choose to stand in a certain section of the train to facilitate their onward journey. So even if crowding was calculated for an individual train at 85 % seating occupancy, there may be parts of the train where standing occurs.

Figure 14: Crowding forecast – Up (towards London), Standard Growth Scenario, AM Peak period

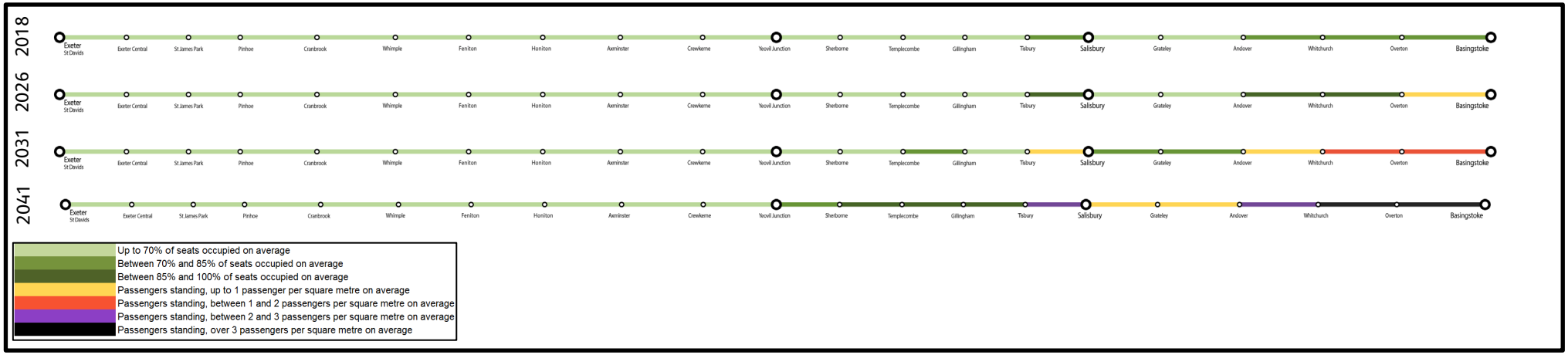


Figure 15: Crowding forecast – Up (towards London), Aspirational Growth Scenario, AM Peak period

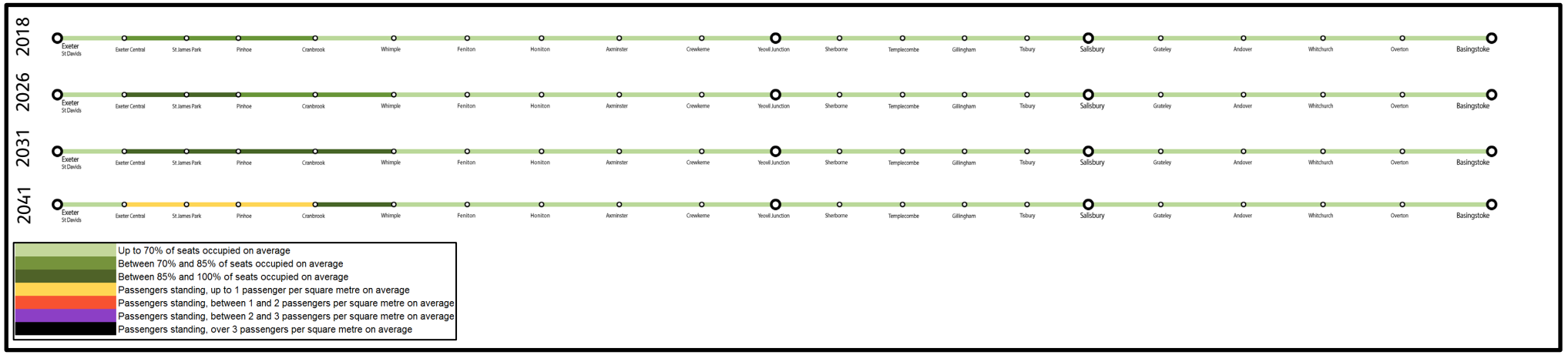


Figure 16: Crowding forecast – Down (towards Exeter), Standard Growth Scenario, AM Peak period

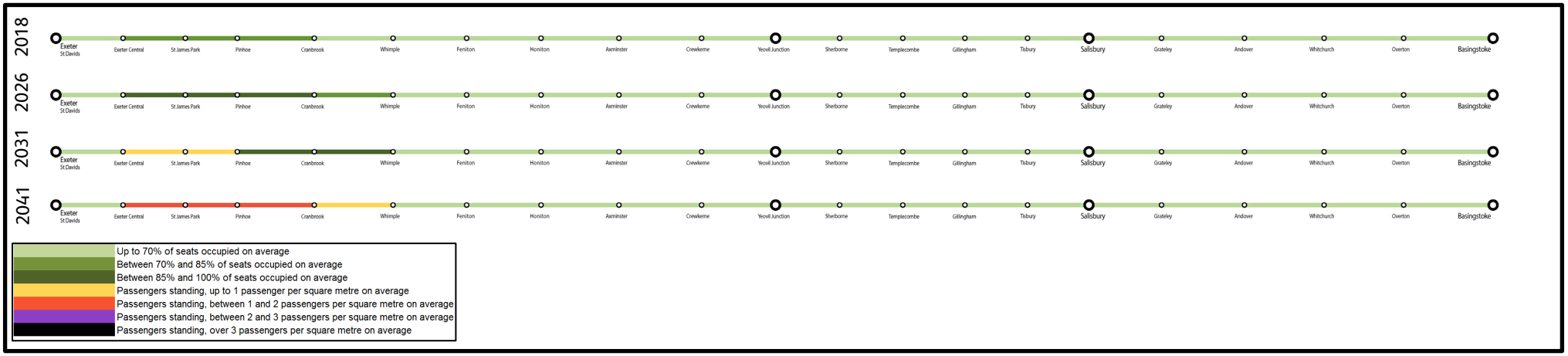


Figure 17: Crowding forecast – Down (towards Exeter), Aspirational Growth Scenario, AM Peak period

Up direction (towards London)

Figure 14 and *Figure 15* show the crowding situation in the Up direction, towards London, in the AM peak period, both under the standard and aspirational growth scenarios. It should be noted that the analysis of the morning peak demand arriving into Basingstoke from the west shows that approximately 10 % of passengers are travelling to Basingstoke, with the remaining 90 % heading towards London Waterloo.

By far the worst crowding forecast on the West of England Line is on the section from Andover to Basingstoke, with standing from Andover to London Waterloo in the AM Peak from 2031 and extending back to Tisbury by 2041. This is the case in both the standard and aspirational growth scenarios. Crowding on this section is significantly higher in the aspirational scenario than under the standard growth scenario owing to Basingstoke and Wiltshire Council's higher aspirational housing growth, with more than 3 passengers standing per m^2 from Basingstoke by 2041. This would be likely to prevent passengers joining the train at stations between Basingstoke and London Waterloo from using the West of England Line services to London Waterloo during the peak periods.

Evidence suggests that standing is not just a future problem but that there are already some peak services in the Up direction that have standing from Andover in the AM peak. As more housing is delivered, such as at Andover and Basingstoke, the problem with standing on services into London Waterloo is set to become more of an issue in the short-term.

The section from Yeovil Junction to Salisbury has some crowding going into Salisbury during the AM Peak. There is also crowding during the interpeak period from 2026 and standing by 2041, both in the standard and aspirational growth scenarios.

This clearly demonstrates the need for additional capacity on the West of England Line on the Salisbury to Basingstoke (and onwards to London Waterloo) section of the line in the shorter term; and from the Yeovil Junction to Salisbury section in the medium to longer term.

Down direction (towards Exeter)

Figure 16 and *Figure 17* show the crowding situation in the Down direction, towards Exeter, in the AM peak period, both under the standard and aspirational growth scenarios.

As would be expected there are no crowding issues in the Down direction at the eastern end of the line as most passengers are travelling toward London Waterloo in the AM peak. Whilst the graphs do not show any standing into Exeter St. David's when averaged over the whole AM peak, there is standing on the most crowded train in the AM peak by 2041. However, this most crowded service currently has standing during the Winter period, and by 2041 crowding during the most heavily loaded season will be severe. With more housing growth expected in the East Devon area the crowding and standing is set to worsen.

There can also be incidence of crowding and standing related to leisure travel, particularly in the summer season in a westbound direction, when passengers place luggage on adjacent seats or demand is high on a particular service.

This clearly demonstrates the need for additional capacity on the West of England Line between Whimple and Exeter St. David's in the AM peak in the shorter term. This aligns

with aspirations for an additional service between Axminster and Exeter St. David's as part of the Devon Metro concept.

The section from Salisbury to Yeovil Junction has some crowding coming out of Salisbury during the interpeak and PM peak under the standard growth scenario in the Down direction. Standing is expected under the aspirational growth scenario as more housing is targeted for delivery.

6.4 Freight markets

Rail freight carries more than £30bn of goods around Britain each year. Each freight train that operates takes about 76 HGVs off of the roads, which translates to 1.66 billion fewer HGV kilometres a year; a not insubstantial impact on CO_2 emissions.

As explained in *section 3.4* of this document, there are no freight services that operate along the full length of the West of England Line. The portion of the line from Laverstock North Junction to Worting Junction is used by intermodal (container), aggregate and MoD freight services and there are some flows through the Exeter area, including services diverted via Castle Cary and Yeovil Junction at times of disruption.

Through consultation with the freight industry, in relation to this CMSP, there are some headlines that it is worth noting in terms of the market for freight traffic and the constraints to freight growth on the West of England Line.

6.4.1 Freight growth areas

The real growth area for freight traffic is aggregates, both in terms of providing aggregates for large construction projects, such as a new motorway or rail line, and removing spoil; as in the case of Quidhampton, near Salisbury, which will take High Speed 2 (HS2) spoil.

There is the potential for growth in the movement of food and drink freight for large retail companies, such as supermarkets. This type of freight is currently operated in the Midlands, North and Scotland. Operating this type of freight by rail could support the decarbonisation agenda by taking vehicles off the road for longer distance journeys.

Non-commercial freight, such as that operated by Network Rail to maintain and monitor the railway, is an area of increasing importance. Making informed maintenance decisions based on real data, moving materials and equipment required for maintaining, renewing and enhancing the railway, and keeping the railway moving through seasonal change, all require the operation of specific non-commercial freight.

6.4.2 Constraints to freight growth

As in the case for passenger services, the extent of single track on the West of England Line limits the ability for current railway infrastructure to accommodate freight traffic on the line. From a freight industry perspective, it is this lack of available capacity that can make the West of England Line unattractive as a freight route.

The current loading gauge of the West of England Line west of Laverstock North Junction is W6 or W7; this is a big constraint to future freight growth from and towards the West using the West of England Line. The section of the line between Laverstock North

Junction and Worting Junction was cleared for W10 and W12 loading gauge; this allows intermodal traffic to be operated via this section, but this is not the case on the rest of the line. Future infrastructure changes should assess how incremental changes to gauge can be achieved as part of any scheme.

Operating both freight and passenger services on a line with the infrastructure constraints that the West of England has can be challenging. This becomes apparent when freight service are diverted from the GWML via Castle Cary and Yeovil Junction to Exeter. On some occasions passenger services that would otherwise run through from London Waterloo to Exeter are terminated at Yeovil Junction.

In addition to this, the difficulty of recovering a service at times of perturbation, because of the extent of single track and current capability of infrastructure, does not lend itself to freight operation; where the impacts of late running can impact across more than one Route or Region.

There are competing pressures for the use of railway land as the need for housing in close proximity to a railway station increases. The potential requirement for new freight terminal sites to accommodate future freight growth and open up new freight markets should not be forgotten in the land disposal process.

6.4.3 Freight impact on this CMSP module

Although this CMSP module is not seeking to find solutions for increasing freight capacity on the West of England Line it is important that the potential for freight growth is not forgotten.

Improving the resilience and the capability of infrastructure on the West of England for passenger services, through the recommendations of this CMSP, could provide an opportunity for stimulating long-term growth in freight flows to and from the West. This in turn will impact on maintenance regimes, maintenance access requirements and renewal rates on the West of England Line; all of which should be considered alongside any enhancements.

Any additional track infrastructure (loops or double track extensions) recommended by this CMSP module that is taken forward through to a funded scheme for development, then consideration should be given to how these interventions can also provide freight capability. This could be by making sure that all loops or double track sections are capable of accepting full length (775m) freight trains, with entry and exit speeds across switches and crossings (S&C) of at least 40mph.

As and when any infrastructure interventions are taken forward from the recommendations of this CMSP module, then subsequent train planning and timetable analysis should take account of the changing freight picture to identify how the requirements of passenger and freight growth can both be accommodated. This is particularly important when considering diversionary passenger and freight services.

7.0 Timetable Analysis

The economic analysis discussed in section 6.0 of this document shows that demand for travel across the West of England Line is increasing both for London and non-London travel. It also shows that overcrowding is a current and future problem for passengers using the West of England Line. There are opportunities to improve rail's share of local commuting journeys, and improvements to journey times from Yeovil Junction/ Salisbury could make rail more attractive for those journeys. Understanding this has enabled timetable analysis to be undertaken which has looked at how changes in service provision could provide some of the answers.

7.1 Train Service Specification Remit

The CMSP's geographical area is Basingstoke to Exeter St. David's but the timetable includes the pathing of services to and from London Waterloo. This has been split into three sections to aid timetable analysis. These are:

- Basingstoke to Yeovil Junction
- Axminster to Exeter St. David's
- Castle Cary to Exeter Diversionary Route for GWR Paddington – Exeter services

7.1.1 Basingstoke to Yeovil Junction

The timetable analysis work is split at Salisbury to enable a focus on the different service and infrastructure requirements east and west of that location. In all cases the service is mirrored in both directions to and from Waterloo.

Salisbury – Basingstoke – Waterloo / TransWilts

Separate work will be required to examine options to enhance capacity and improve journey times between Salisbury and Reading or Waterloo including the potential for a third train between these locations in some hours. This is however dependent on other capacity work between Basingstoke and Waterloo through the South West Mainline CMSP including the proposed additional capacity proposed by the WACE scheme at Woking. It will also potentially impact on platform capacity at Salisbury in conjunction with the proposed TransWilts services below.

There are stakeholder aspirations to introduce a through Southampton to Swindon 'TransWilts' service by combining the current SWR Salisbury – Romsey via Southampton and GWR Warminster / Westbury – Swindon services. Whilst not directly part of the West of England CMSP scope this service would have important implications for platform capacity at Salisbury which will need to be addressed by other CMSPs looking at services on the Swindon corridors and Bristol – South Coast Ports.

The timetable work in this study therefore assumes the current two trains per hour between London Waterloo and Salisbury with similar stopping patterns as the December 2019 timetable. This is because any additional services to London Waterloo require other infrastructure interventions outside of the remit of this CMSP, such as the Woking Area Capacity Enhancement (WACE).

Salisbury – Yeovil Junction

The current service pattern (December 2019) is based on an hourly Waterloo to Exeter St. David's service supplemented by extensions of the Waterloo – Salisbury hourly service to/from Yeovil Junction in some hours and further variations beyond this station to / from Exeter in the peak periods. It is assumed for the purposes of this work that the current extensions of services from Salisbury to Bristol Temple Meads and Yeovil Pen Mill / Junction via Westbury are maintained as now.

The proposed timetable options for the standard off-peak hour are:

- A half hourly frequency between Waterloo/ Salisbury and Yeovil Junction
    - One service per hour continuing to Exeter St. David's (calling only at Andover between Basingstoke and Salisbury)
    - One service per hour terminating at Yeovil Junction (calling at all stations west of Basingstoke)
    - As above but with the Exeter service calling only at Gillingham between Salisbury and Yeovil Junction

The timetable analysis does not specifically consider the extension of the Yeovil Junction service beyond this point (for example to Yeovil Pen Mill or Weymouth) even though some services do so on a limited basis in the December 2019 timetable and summer variants of it. This avoids importing infrastructure constraints on the Heart of Wessex line into the analysis alongside an unknown future timetable specification on this route. Options such as these are expected to be considered as part of the Dorset CMSP, work on which is due to start in spring 2020.

7.1.2 Axminster to Exeter St David's

This element examines the options to meet the Devon Metro aspiration of a half hourly frequency between Axminster or Honiton and Exeter throughout the day, incorporating the hourly service to / from Waterloo options noted above. The current December 2019 timetable provides a skip stop arrangement for Whimple and Feniton in the standard off-peak hour, providing each station with a two-hourly frequency. There are again variations to the service pattern in peak periods including two additional Exeter – Honiton / Axminster services in the evening peak. The specific options examined are:

- Hourly Axminster to Exeter St. David's calling at all stations
- Hourly Honiton to Exeter St. David's calling at all stations

As part of the stakeholder ambitions to improve Exeter / East Devon to Waterloo journey times and increase seating capacity to Honiton and Axminster, the option of omitting Feniton and Whimple calls from the Waterloo services has been included.

7.1.3 Castle Cary to Exeter Diversionary

This element examines the infrastructure and service pattern options to enable a regular Paddington to Exeter (with extensions to Plymouth and Penzance) service via Castle Cary and Yeovil Junction when circumstances mean that the line between Castle Cary and Exeter is closed. This might be due to engineering works, flooding or another incident. This diversion route is currently only achievable on a two-hourly basis at present (with additional pathing delays) whilst also causing significant disruption and extended journey times to SWR West of England services.

The core assumption for this diversion is an hourly Paddington to Exeter St David's service via Castle Cary and Yeovil Junction with no station stops specified between Castle Cary and Exeter St David's.

The two options examined were:

- Removing the additional 'Devon Metro' Exeter St. David's – Axminster service during a diversion leaving the hourly Waterloo – Exeter St. David's and Paddington – Exeter St David's services;
- Retaining the Devon Metro service resulting in three trains per hour in each direction.

7.1.4 New Stations

Stakeholder aspirations for new stations at Oakley (west of Worting Junction), Wilton (west of Salisbury), Porton (east of Salisbury) and a second station at Cranbrook are noted.

It was not feasible to incorporate timetable options for these stations within this study given the different stages of development each of them is at (including any new development associated with them), and the combined timetable interactions between them. Further strategic fit analysis will be required through the relevant Local Plans to examine the business case for these and understand their feasibility in terms of railway operations and delivery of a timetable.

7.1.5 Train Service Specification Summary

A summary of the standard train service specification is shown below in *Table 9*:

Ref	Origin	Destination	Calling Pattern in Study Area *(x) = request stops*	TPH *(each direction)*
Current				
Cur1	Waterloo	Exeter SD	….Basingstoke, Andover, Salisbury, Tisbury, Gillingham, Templecombe, Sherborne, Yeovil Jn, Crewkerne, Axminster, Honiton, Feniton or Whimple, Cranbrook, Pinhoe, Exeter Central, Exeter St. David's	1 tph
		Yeovil Jn	Stations to Yeovil Jn via Westbury and Yeovil PM	3 tpd
		Bristol TM	Stations to Bristol TM via Westbury	5 tpd
Cur2	Waterloo	Salisbury	….Basingstoke, Overton, Whitchurch, Andover, Grateley, Salisbury then either:	1 tph
		Yeovil Jn	Tisbury, Gillingham, Templecombe, Sherborne, Yeovil Jn	0.5 tph
B.01 Basingstoke to Yeovil Junction				
B.01A*	Waterloo	Exeter SD	Basingstoke, Andover, Salisbury, Front portion: Gillingham, Yeovil Jn, Crewkerne, Axminster, Honiton, Feniton or Whimple, Cranbrook, Pinhoe, Exeter Central, Exeter St Davids…. Rear Portion:	1 tph
		Yeovil Jn	Stations to Yeovil Jn via Westbury and Yeovil PM OR	X tpd**
		Bristol TM	Stations to Bristol TM via Westbury	X tpd**
B.01B	Waterloo	Yeovil Jn	….Basingstoke, Overton, Whitchurch, Andover, Grateley, Salisbury, Tisbury, Gillingham, Templecombe, Sherborne, Yeovil Jn	1 tph

* Service in current timings Yeovil Jn westwards ** Assumed that current service levels will be maintained but will need to be assessed at a later stage				
B.02 Basingstoke to Salisbury				
	Not looked at through this CMSP module. Any additional service to/ from London Waterloo will require WACE and other schemes to release capacity. Services to Reading may also need infrastructure interventions and Salisbury may require platform capacity.			
B.03 Basingstoke to west of Salisbury/ Yeovil Junction				
	Services continuing westwards beyond Yeovil Junction from the east were not looked at through this CMSP module.			
B.04 Axminster to Exeter St David's				
B.04A**	Waterloo	Exeter SD	….Basingstoke, Andover, Salisbury, Tisbury, Gillingham, Templecombe, Sherborne, Yeovil Jn, Crewkerne, Axminster, Honiton, Cranbrook, Pinhoe, Exeter Central, Exeter St. David's	1 tph
B.04B	Axminster	Barnstaple	….Axminster, Honiton, Feniton, Whimple, Cranbrook, Pinhoe, Exeter Central, Exeter St. David's….	1tph
**Service in current timings Honiton eastwards				
B.05 Yeovil Junction/ Axminster to Exeter St David's				
	Not looked at through this CMSP module.			
B.06 New stations				
	Not looked at through this CMSP module.			
B.07 Castle Cary to Exeter Diversionary				
B.07A***	Waterloo	Exeter SD	….Basingstoke, Andover, Salisbury, Tisbury, Gillingham, Templecombe, Sherborne, Yeovil Jn, Crewkerne, Axminster, Honiton, Cranbrook, Pinhoe, Exeter Central, Exeter St David's	1 tph
B.07B****	Axminster	Barnstaple	….Axminster, Honiton, Feniton, Whimple, Cranbrook, Pinhoe, Exeter Central, Exeter St. Davids….	1tph
B.07C	Paddington	Plymouth	….Castle Cary, Exeter St. David's….	1tph
*** Service in current timings Honiton eastwards **** Service may be amended during GWR diversions to terminate at Honiton or be broken in Exeter to facilitate maintenance of hourly stopping service in the timetable				

Table 9: Summary of train service specification

7.2 Timetable Outputs

The output of the timetable analysis consists of standard hour concept train plans for each option. Each standard hour train plan is the final output of a series of refinements and optioneering to optimise the balance between infrastructure requirement, performance and passenger benefits.

A matrix of conflicts and infrastructure requirements is contained in the conclusion. A full platforming exercise has not been undertaken for Exeter St. David's, albeit commentary on infrastructure requirements is given, as assessment of Exeter St. David's is the subject of a separate CMSP module by Network Rail's Western Route. As noted above, further work will also be required to determine optimal infrastructure requirements at Salisbury in conjunction with other, future strategic analysis looking at TransWilts and Bristol – South Coast services.

Industry standard software has been used to assess pathing, conflict detection and compliance checking.

Rolling stock assumptions are set out below. It is noted that the current 158/9 fleet on the West of England line is approaching 30 years old and will need replacement in the early part of the 20-year timeframe of this CMSP.

7.2.1 Assumptions

The following key assumptions have been adopted for the analysis:

- 2019 Timetable Planning Rules including minimum dwells, margins, turnaround, engineering and pathing allowances utilised.
- Class 159 sectional running times assumed for all services east of Pinhoe (Class 158s on Axminster services being identical to Class 159/1s) except for GWR diverted high speed services that utilise Class 802 sectional running times.
- Station dwells based on existing station dwells (where above minimum) except where they need to be extended for pathing reasons.

Rolling stock assumed as follows:

- Class 159s operating SWR Waterloo – Exeter St. David's/ Yeovil Jn services.
- Class 158s on GWR Barnstaple – Axminster services.
- Class 802s operating GWR diverted high speed services.

Infrastructures assumptions as follows:

- Base case infrastructure is as per 2019 Sectional Appendix.

New infrastructure is assumed where conflicts are detected albeit the concept train plan has been developed to minimise these and avoid areas where additional infrastructure unviable (e.g. redoubling through the single track M5 overbridge).

7.2.2 Timetable Study Findings

Basingstoke to Yeovil Junction

The current infrastructure layout restricts the service to two trains in one direction and one in the other each hour. This results in an ad-hoc pattern of services with additional trains included where capacity permits. The infrastructure in the current December 2019 timetable is now at full capacity and very susceptible to delays within and beyond this section of the route, particularly west of Salisbury.

Scenario: Two trains per hour in each direction stopping at all stations

Key Findings:

- It is possible to operate two trains per hour frequency between Salisbury and Yeovil Junction in both directions if additional infrastructure is provided
- The infrastructure required is an extension of the existing Tisbury loop in both eastern and western directions creating a loop of approximately three miles in length as a minimum
- The loop is anticipated to extend through Tisbury station which currently has a single platform as well as towards Dinton
- The signalling in the Salisbury area is due for renewal. Significant cost efficiencies could be gained by combining the design and implementation of the Tisbury loop extension with the signalling renewal, alongside any works required at Salisbury itself

This option maintains the London Waterloo – Exeter St. David's services in their current paths and overlays London Waterloo – Yeovil Junction services in each direction on an hourly basis compared to the mixed pattern that operates today (generally two-hourly off-peak).

It should be noted that additional rolling stock would be required to operate this service pattern. Further detail will be made available. As a result, there will be a need to review depot and stabling capacity at Salisbury and Yeovil Junction. It is recommended that all trains west of Salisbury are the equivalent of a six car 158/9 unit.

	Advantages	Disadvantages
Performance	Significant improvement in performance by minimising delays waiting for late services towards Waterloo at Tisbury loop (services can pass within longer loop including station stop at Tisbury).	
Journey Times / Frequency	Small reduction in journey times (4-5 mins) towards Yeovil Junction / Exeter St. David's by avoiding need to wait in Tisbury loop. Standard pattern each hour is likely to lead to modal shift. 2 tph achieved (1.5 tph today) from Yeovil eastwards - likely to lead to modal shift at stations between Salisbury and Yeovil. Ability to path peak services at timings closer to passenger needs rather than dictated by infrastructure capacity.	No significant reduction in journey times to / from Basingstoke and London for passengers from Gillingham, Yeovil and stations to / from Exeter St David's.
Seat Capacity	Consistent level of seat provision spread across all stations; overall increase compared to December 19 base.	Expected to be less seat capacity for key growth points of Gillingham, Yeovil Junction and stations to Exeter from Clapham Junction and Waterloo (seats may be used by passengers for other stations west of Salisbury).
Economic Growth / Connectivity	Consistent half hourly offer from Yeovil Junction eastwards. Potential to offer more lower price advance sales tickets.	No significant journey time reductions.

Table 10: Summary of Advantages and Disadvantages: 2 trains per hour (calling at all stations Salisbury to Yeovil Junction)

Scenario: Two trains per hour Limited Stop Service Salisbury – Yeovil Junction

Key Findings:

- It is possible to operate two trains per hour frequency between Salisbury and Yeovil Junction in both directions if additional infrastructure is provided;
- Journey time improvements of 11-14 mins can be achieved in both directions for stations Exeter St. David's to London Waterloo
- The infrastructure required is an extension of the existing Tisbury loop (as per the all stations scenario) and the extension of the existing loop at Gillingham towards but not through Gillingham tunnel
- The loop is anticipated to extend through Tisbury station which currently has a single platform
- The signalling in the Salisbury area is due for renewal. Significant cost efficiencies could be gained by combining the design and implementation of the Tisbury loop extension with the signalling renewal, alongside any works required at Salisbury itself

This scenario seeks to accelerate London Waterloo – Exeter St. David's services by operating limited stop between Salisbury and Yeovil Junction with the Yeovil Junction service maintaining the calls at the intermediate stations. It should be stressed that this is the standard off-peak hour and that calling patterns in peak hours are likely to be different.

As previously noted, paths west of Yeovil are fixed due to the constrained infrastructure between there and Exeter alongside the constrained paths through Exeter itself, even with the infrastructure improvements discussed in the Axminster – Exeter section that follows. As a result, timings from London Waterloo would need to be flexed to enable the limited stop paths west of Salisbury whilst retaining the half hourly pattern between London Waterloo and Salisbury. This could be varied in the future if a third train is introduced between Salisbury and London Waterloo in some hours. It would need to be carried out as part of a full refresh of the timetable of all Main Line services to/ from London Waterloo.

As with the all stations scenario, this pattern of service would require an increase in total fleet size to operate it.

	Advantages	Disadvantages
Performance	Further enhancement in performance benefits over and above the all stations option due to the addition of the Gillingham loop extension	
Journey Times / Frequency	14 minute saving for services from Waterloo giving journey times of: • Salisbury to Exeter St. David's 1hr41 mins vs 1hr 55 mins currently • Salisbury to Yeovil Junction 39mins vs 50 mins currently Journey time savings in the opposite direction are 3 mins less as there is no scheduled benefit from passing at Tisbury loop.	Passengers from some smaller intermediate stations (e.g. Tisbury and Templecombe) travelling to / from west of Yeovil Junction will need to change trains at the latter (approx. 15-20 min connection during the off-peak (peak may vary). Current through passenger numbers are however small. Less off-peak frequency for some stations.

	Advantages	Disadvantages
Seat Capacity	Overall increase in seat availability as per all stations option. Improved seat availability for key growth stations (Gillingham, Yeovil Junction and stations to Exeter St. David's) from Clapham Junction / Waterloo due to reduced stops elsewhere. This may be varied in peak periods.	Less off-peak capacity for some stations.
Economic Growth / Connectivity	More competitive journey times to / from Salisbury, Basingstoke and London from parts of Exeter, East Devon, Somerset and Dorset (especially key growth housing and employment areas). This will make certain day business and leisure trips more practical than currently. It will also make the route more competitive with the A303 route towards the South East once that is substantially upgraded to dual carriageway.	Small reduction in off-peak choice and through journey opportunities to / from some stations but not expected to have significant impact based on current passenger loadings.

Table 11: Summary of Advantages and Disadvantages: 2 trains per hour, one limited stop (Salisbury – Gillingham – Yeovil Junction)

Axminster to Exeter St David's

This section forms part of the Devon Metro network in the Exeter area promoted by local stakeholders including Devon County Council. Its core aim is for a half hourly local service frequency on the majority of routes into and through the Exeter. For the London Waterloo – Exeter route this scenario seeks to provide a two trains per hour frequency for principal stations in East Devon and Exeter, particularly the new town at Cranbrook.

Two scenarios have been considered over and above the existing hourly Exeter St David's – London Waterloo service:

- Hourly service between Axminster and Exeter St. David's
- Hourly service between Honiton and Exeter St. David's

Only the Axminster scenario has been taken forward for detailed timetable modelling. This has assumed that the Axminster – Exeter St. David's service calls at all stations except St James Park (served by Exmouth line services). The scenario modelled includes the option of removing the alternate off-peak Feniton and Whimple calls from the London Waterloo services to provide additional journey time savings over and above those that may be achieved on the other sections of route as well as increased seat capacity for longer distance journeys. As with all scenarios and sections of route, peak period calling patterns will vary but will still be able to take advantage of the greater infrastructure flexibility.

Key Findings:

- It is possible to operate two trains per hour frequency between Axminster and Exeter St. David's if additional loop capacity capability is provided;
- Capacity through Exeter means this is most efficiently delivered by extending an existing service
- Infrastructure required includes the extension of the existing Honiton Loop westwards towards Feniton and a new loop of minimum 3 miles in length between Whimple and Cranbrook
- Key signalling renewal and re-control decisions for the Exmouth Junction panel need to be made alongside design of the Whimple – Cranbrook Loop.
- The scenario that addressed only operating the Devon Metro service as far as Honiton was discounted as services had sufficient time to proceed onwards to Axminster and this scenario would not serve the growth in educational travel to Exeter

The capacity of the route between Exmouth Junction and Exeter St. David's is heavily constrained by the current signalling and track layout including:

- Exmouth Junction single chord to/ from Exmouth and single lines on key routes from Exmouth, East Devon and North Devon
- 1:36 bank between Exeter Central and Exeter St. David's
- Constrained signalling layout
- Platform capacity at Exeter St David's

The preferred timetable option modelled was therefore the extension of the current (December 2019) service between Barnstaple and St. James Park. The Waterloo service was assumed to continue to terminate at Exeter St. David's in the short -medium term but options to extend it to other destinations should be considered as part of the CMSPs noted below. This could help free up platform capacity at Exeter S.t David's as well as offer new through journey opportunities to / from employment and housing east of Exeter.

There may be greater flexibility in the Exeter area in the long term when capacity options are considered by the Exeter – Bristol (2020) and Exeter – Plymouth (2021) CMSPs. Linked to these are key decisions about the future of signalling in the Exeter area and in particular the future of the signalling currently controlled by Exmouth Junction box which is approaching life expiry and cannot be modified to accommodate the proposed Whimple – Cranbrook Loop.

The length of the Honiton Loop extension towards Feniton will depend on a balance between optimal passenger timings, performance benefits and the marginal costs of infrastructure options. Note that a small extension of this loop is in any case required to enable the diversion of 10 car Class 802 units to / from Paddington (see following section).

The combination of the Whimple – Cranbrook and Honiton Loop extensions enable the potential of a third path each hour between Honiton and Exeter Central, offering future growth capacity and timing flexibility during peak periods. This infrastructure plays a role in the diversion route for Paddington – Exeter services (see next section)

Subject to engineering and cost options the Whimple – Cranbrook loop should be sited as close to Pinhoe as possible to offer the maximum performance benefits, minimising the distance of the single line east of Pinhoe where trains will continue to pass each other and enabling two trains to call at Cranbrook station at the same time, managing platform capacity/ dwell time as demand continues to grow with the new town. This location is currently the source of significant poor performance and delay minutes on the route (alongside Tisbury) due to the length of the single line to the passing loop at Honiton (approx. 13 miles). Performance benefits would also be linked to the proposed extension of the Honiton Loop towards Feniton, closing the gap of the single line section to the new loop in the Whimple area.

A second new station at Cranbrook would have implications for the lengths of the extended and additional loops as well as platforming issues at Exeter Central and St David's. The preferred option for Cranbrook would be an additional platform at the current Cranbrook station.

	Advantages	Disadvantages
Performance	Significant performance improvements through a combination of the new Whimple – Cranbrook loop and extension of the Honiton loop. Pinhoe is currently a major source of delay.	
Journey Times / Frequency	Doubling of off-peak frequency between Axminster and Exeter and potential third path Honiton – Exeter Central during peak periods More suitable timings and increased frequency of peak period trains to meet passenger needs. Potential additional journey time savings of 3-5 mins (on top of those potentially achieved on other sections of route) by withdrawing Feniton and Whimple calls from Waterloo services. Helps make local Exeter journeys more competitive with A30 dual carriageway. Better spacing of peak hour journeys from Exeter Much reduced connection times into services at Exeter St David's / Central	Withdrawing Feniton / Whimple calls from Waterloo services makes journeys between these stations and those east of Axminster longer by requiring a change. This is however balanced by gaining an hourly off-peak frequency to / from Exeter compared to two hourly currently.
Seat Capacity	Substantial increase in seat capacity for stations between Axminster and Exeter, releasing seats on Waterloo services for more longer distance journeys, particularly in peak periods	
Economic Growth / Connectivity	Significantly more attractive service between Axminster, Honiton and Exeter that will improve access to the major employment growth area to the east of Exeter via Pinhoe and Cranbrook stations including the planned e-bike network. The through journeys of the proposed service from Barnstaple will also offer much improved access to these jobs from North Devon and Crediton, avoiding a difficult and congested road journey through the city. The increased service frequency will also offer much improved connections at Exeter St David's / Central into the rest of the Devon Metro network and longer distance services e.g. to Bristol and Plymouth. This includes services to the planned new station at Marsh Barton serving the major employment area there, making rail journeys there from East Devon practical for the first time.	

Table 12: Summary of Advantages and Disadvantages: hourly Devon Metro service

Castle Cary to Exeter Diversionary Route

The Castle Cary to Exeter via Yeovil diversionary route performs a vital role for both passenger and freight movements when the main GWR route between London, Somerset, Devon and Cornwall is not available between Castle Cary / Taunton and Exeter St. David's. This can be due to engineering works, flooding / landslips or other incidents such as train faults and passenger incidents. These are the only two routes to / from the West Country. Whilst recent infrastructure improvements have been made to reduce flooding incidents between Taunton and Exeter, continued climate change impacts will still make the route susceptible to disruption whilst there will continue to be other incidents and engineering works on one of only two lines to / from the West Country.

The aspiration is to divert one Paddington – Exeter service per hour via Yeovil Junction when required. Currently it is only possible to divert one Paddington train every two hours with significantly extended journey times and impacts on the Waterloo services. This service pattern is also very susceptible to poor performance during a diversion.

Two scenarios have been considered:

- Removes the hourly Devon Metro all stations Axminster – Exeter service when the diversion route is in operation, leaving two trains per hour between Exeter and Yeovil Junction (Exeter – Waterloo and Exeter – Paddington
- Retains the Exeter – Waterloo and part of the Barnstaple / Exeter – East Devon service, leaving three trains per hour on the Exeter – Yeovil Junction section

Further consideration of options on the Heart of Wessex line between Yeovil Junction/ Pen Mill to Castle Cary section will need to be reviewed as part of the Dorset CMSP due to start in spring 2020.

No specific timetabling of freight services during a diversion has been undertaken; these would need to be accommodated early and late in the day with the passenger service reduced to support this.

The most efficient use of infrastructure is achieved by flighting the service from Paddington behind the one from London Waterloo from Yeovil Junction and operating the service to Paddington broadly in the path of the proposed Barnstaple – Axminster service.

Key Findings:

- It is possible to operate an hourly Paddington – Exeter St. David's diverted service if additional loop capability is provided
- The local Exeter – East Devon service could be retained in a revised form, likely to be modified to a Honiton – Exeter Central pattern with modified timings; this may require the diverted GWR services to make a call at Axminster
- The Exeter – London Waterloo service would retain its hourly frequency, possibly with modified stopping patterns
- There are potential platforming conflicts at Exeter St. David's and Yeovil Junction

Infrastructure Requirements:

- Extension of Yeovil Junction loop westwards
- Extension of Axminster loop eastwards
- Extension of Honiton loop westwards*
- Loop between Whimple and Cranbrook*
- Enhancements to flexibility at Exeter St. David's

* Combined with requirements for the additional hourly Exeter – Axminster service

These enhancements negate the need to re-write the wider SWR timetable to facilitate the diversions.

The enhancements at Exeter St. David's would include the option of accessing Platform 4 from the London Waterloo lines. Currently a service cannot leave the platform at Exeter Central if Platforms 1 and 3 at Exeter St. David's are occupied. This will be considered as part of the Exeter – Bristol and Exeter – Plymouth CMSPs.

	Advantages	Disadvantages
Performance	Very significantly improved performance of both GWR and SWR services when GWR services are diverted Pathing of freight services during diversion more manageable	
Journey Times / Frequency	Service frequencies between Exeter and Yeovil Junction and Paddington and Exeter are significantly improved during diversions compared to the current situation	
Seat Capacity	Doubling of diverted Paddington – Exeter / Plymouth / Cornwall seating capacity compared to the current situation.	
Economic Growth / Connectivity	Connectivity between London / South East and the West Country is much improved during disruption / engineering works on the main Paddington route, supporting both resilience and long-term investor confidence.	

Table 13: Summary of Advantages and Disadvantages: 1tph diversionary service

7.3 Timetable Analysis Conclusions

The timetable study work has concluded that major capacity and journey time benefits can be achieved with relatively modest improvements to infrastructure. These can be summarised as:

Train Service	Infrastructure Required							
	Tisbury loop west extension	Tisbury loop east extension	Gillingham loop extension	Yeovil Jn double track extension	Axminster loop extension	Honiton loop extension	Whimple – Cranbrook new loop	Exeter SD Enh.
B.01 Basingstoke to Yeovil Junction								
1tph Waterloo – Exeter SD (current stopping pattern) 1tph Waterloo – Yeovil Jn (all stops between Salisbury and Yeovil Junction)	✓*	✓	✗	✗	✗	✗	✗	✗
1tph Waterloo – Exeter SD (limited stop) 1tph Waterloo – Yeovil Jn	✓	✗	✓	✗	✗	✗	✗	✗
B.04 Axminster to Exeter St David's								
1tph Waterloo – Exeter SD 1tph Barnstaple - Axminster	✗	✗	✗	✗	✗	✓	✓	✗
B.07 Castle Cary to Exeter Diversionary								
1tph Waterloo – Exeter SD 1tph Barnstaple - Axminster 1tph Paddington – Plymouth (Diversion)	✗	✗	✗	✓	✓	✓	✓	✓

Table 14: Summary of infrastructure requirements

**in the scenario where an eastwards extension of the Tisbury Loop is required to enable a 2tph service to all stations between Salisbury and Yeovil Junction there would still be the need for a westward extension through the station, but it is unlikely it would be of the same length as that required for the limited stop scenario.*

It is important to note that all the infrastructure enhancements will also contribute towards much improved performance on Exeter – London Waterloo services as well as then overall resilience of the rail network to/ from the West Country at times of disruption.

The recommended infrastructure could be introduced in packages and certain infrastructure schemes could be combined to give the most cost effective impacts. It is also critical to link the enhancement schemes with the renewals programme, particularly in the case of signalling.

Capacity enhancement and journey time improvements are equally important for the eastern end of the route between Salisbury and Basingstoke/ London Waterloo,

particularly as a result of the significant housing and employment growth anticipated along this section. They form part of the overall benefits package for the Exeter – London Waterloo route (e.g. further journey time reductions and capacity enhancements) and will also have implications for rolling stock requirements.

The economic study work carried out as part of this and associated CMSP modules is likely to support the potential for a third train between Salisbury and Waterloo or Reading in some hours. The key infrastructure between Woking and London Waterloo required to achieve this is outside the geographical scope of this CMSP, including the proposed WACE grade separation scheme at Woking.

Salisbury is a key hub for the West of England Line, both as a junction and interchange and also the main depot and stabling point for rolling stock, supported by Yeovil Junction. Should interventions be taken forward from this CMSP then further analysis will be required to understand the requirements at Salisbury in more detail, particularly in light of the various proposals for new stations and services that would interact at Salisbury. This would need to ensure that the infrastructure at this location, including depot capacity and stabling, meets the combined requirements. This should be aligned with the anticipated signalling renewal for the Salisbury area.

Whilst this section has focussed on the track enhancements required to achieve the proposed timetables, it is essential to note that other infrastructure and rolling stock investment will be required to achieve the timetable and an efficient and reliable train service. These include:

- Additional rolling stock, likely to be as part of a renewal of the SWR 158/9 fleet which is approaching life expiry
- Additional depot and stabling capacity, particularly at Salisbury
- Alignment of enhancement schemes with signalling renewal and other maintenance schemes
- Supporting infrastructure at stations to enhance access capacity (e.g. car parking / bus interchange / cycle infrastructure) and passenger facilities

8.0 Proposed interventions and solutions

The engineering feasibility work conducted on each of the identified infrastructure interventions includes an assessment of current track, signalling, and civil structures, and proposes alterations to that infrastructure to accommodate the proposed interventions.

8.1 Tisbury Loop

8.1.1 Description

This intervention is an extension of the current Tisbury Loop westward through Tisbury to enable a 5.5km loop with an additional platform at Tisbury station. This is required for performance/ resilience, capacity and journey time savings on SWR services.

8.1.2 Overview

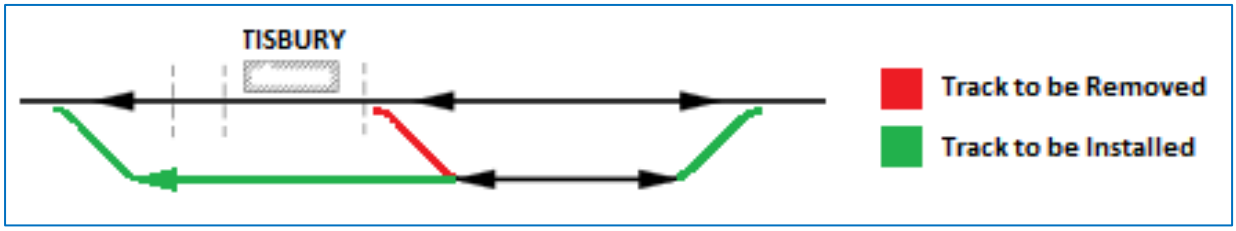


Figure 18: Schematic of proposed layout for an extended Tisbury Loop

Land would need to be acquired on the Down side to accommodate the new platform. There could be an opportunity to extend the existing platform and the proposed new platform at Tisbury to accommodate six-car services. This has not been considered in this study but would form part of any future scheme development.

Additionally, a new footbridge will be required to connect the new platform on the Down side of Tisbury station with the existing Platform 1 on the Up side. A sketch of the indicative placement of the footbridge is shown in *Figure 19*.

To be Access for All (AfA) compliant, the footbridge would be required to have either compliant ramps and/or lifts. Lifts are likely to be the preferred option at this station location and further development will be required to understand whether this can be achieved safely at this location or whether additional land on the Up side may be required owing to the width of the platform.

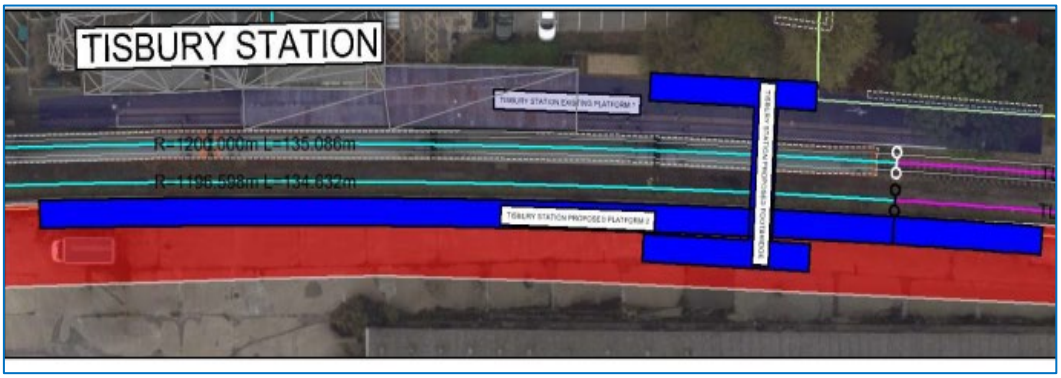


Figure 19: Indicative footbridge and platform location.

The line passes over Tisbury Level Crossing. There are two buildings, one to the north and one to the south of the railway, as shown in *Figure 20*. The building to the north, is within the Network Rail boundary so it is assumed that this land can be utilised, and existing assets relocated.

Figure 20: Tisbury Level Crossing.

Whenever enhancement works are undertaken in the vicinity of a level crossing, Network Rail will assess if the level crossing can be closed to remove the interface between road and rail and eradicate the safety risk. This should be investigated at the next stage of development and if full closure is not possible, the level crossing will require complete renewal, in modern form.

The extension of the loop would require interventions at a significant number of structures on the route including overbridges, retaining walls, culverts and further level crossings. More detailed assessments and individual design development for each structure should be undertaken as part of any scheme that results from this CMSP.

The signalling in the Tisbury area is currently controlled from Salisbury Signal Box via a route relay interlocking housed in an equipment room at the "country end" of Tisbury platform (the westwards direction). The current signalling is predominantly two-aspect (red and green lights) with bi-directional capability in the loop itself. At this early stage it is assumed that any new loop extension would maintain bi-directional capability and a set of signalling alternations would be required to support this. Future re-signalling of the Salisbury area may offer an opportunity to deliver these infrastructure changes in an efficient and cost effective manner.

8.1.3 Tisbury – Alternatives

Possible alternatives to the position and length of the Tisbury extension, as stated here, that will require further investigation as part of any future development of the scheme, include:

- An eastward extension of Tisbury Loop towards Dinton in combination with a westward extension through the station (with associated additional platform). Extending eastwards provides the key piece of infrastructure to enable the 2tph between Salisbury and Yeovil Junction to call at all stops, therefore providing all stations with 2tph rather than the more limited provision through the extension as described here which is primarily for journey time improvements and performance/ resilience
- An eastward extension of the Tisbury Loop to join the double traction section at Wilton South Junction. This would reduce the amount of single track further and provide even more potential capacity and performance/ resilience benefits
- Consideration of options that do not require land outside of current Network Rail ownership, as is the case on the Down side of the tracks, should also be assessed. For instance, an extension of the current platform with a crossover mid-way along to allow a 1a and 1b platform to be operated from both ends
- Further investigation of longer extensions to increase dynamic capabilities of the loop

8.2 Gillingham Loop

8.2.1 Description

This intervention is an extension of the loop at Gillingham westwards for approximately two miles towards Gillingham Tunnel. This intervention is required for performance/ resilience and journey time savings to SWR services by enabling trains to pass at Gillingham.

8.2.2 Overview

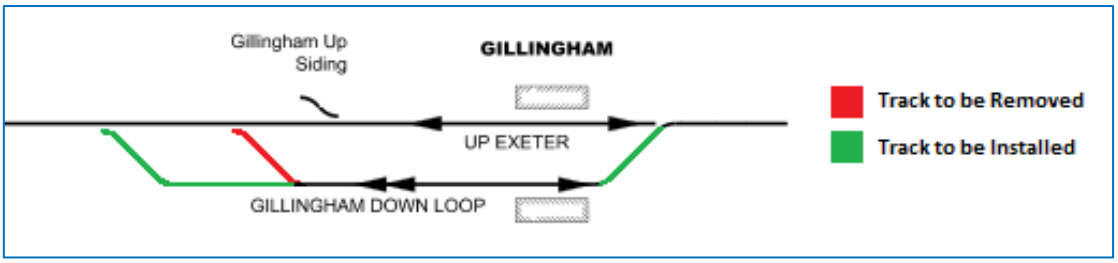


Figure 21: Schematic of proposed layout for an extended Gillingham Loop

The proposed loop would be 3.7km in length with an 85mph line speed and a 50mph turnouts. The loop would tie into the existing alignment in the cutting entry for the Gillingham Tunnel.

Figure 22: Aerial view of Intervention 2 reverting back to single track prior to Gillingham Tunnel (low mileage end)

An overbridge approximately 300m before the proposed location for the Switches & Crosses (S&C), where the loop will re-join the single line, is likely to require rebuilding. If the loop can be shortened by this distance, there is an opportunity to descope this bridge reconstruction. This should be investigated if the intervention is taken forward into development.

The extension of the loop would require interventions at a significant number of structures on the route including underbridges, a footbridge and a culvert. More detailed assessments and individual design development for each structure should be undertaken as part of any scheme that results from this CMSP.

The existing signalling is controlled from Exeter panel located in the Basingstoke Area Signalling Centre. It is assumed the extended loop would be bi-directional and will require the associated signalling works. A future re-signalling and re-control scheme for this area could provide an ideal opportunity to progress this intervention.

8.3 Yeovil Junction

8.3.1 Description

This intervention is an extension of the double track section at Yeovil Junction westwards towards Crewkerne for approximately 1.6km. The extension is primarily required for the operation of GWR diversionary services at times of disruption.

8.3.2 Track

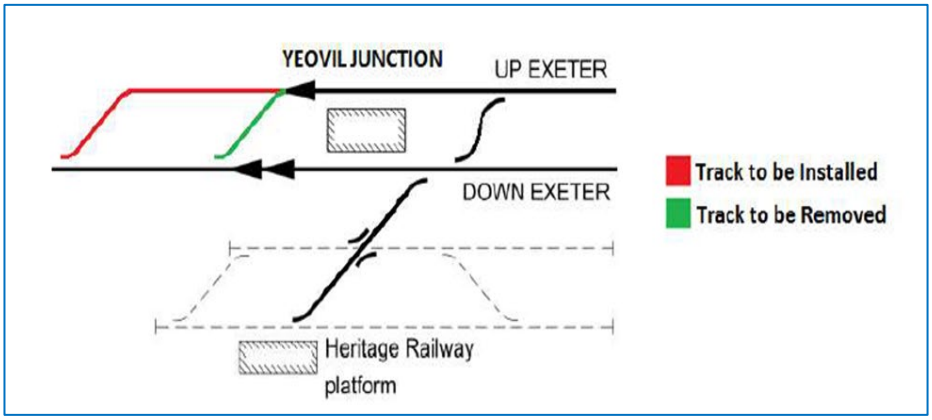


Figure 23: Schematic of proposed layout for an extended double track Yeovil Junction layout

At the west end the proposed double track extension will tie into the existing line shortly before Dorchester Road Overbridge, creating a loop extended by approximately 1.6km in length. The proposed line speeds would be 40mph within station limits and 85mph

outside, reflecting existing line speeds, with turnout speeds across the S&C units of 50mph throughout the site.

The proposal is to extend the Up Platform Loop over the Great Western Road Bridge, as shown in *Figure 24*, which may require the widening of the bridge itself to accommodate the additional track.

Figure 24: Aerial view of the extension of the Up Platform Loop at Yeovil Junction

An alternative solution to avoid the bridge works, may be to terminate the Down Main Siding and other tracks closer to Platform 3. However, this would impact the operation of Charter trains that access Platform 3 and use the turntable as well as SWR trains which are stabled there. This should be assessed through any future development of this intervention.

The additional track would require interventions at a number of other structures on the route including underbridges, a footbridge and a culvert. More detailed assessments and individual design development for each structure would be undertaken as part of any scheme that results from this CMSP.

The existing signalling is controlled from Exeter panel located in the Basingstoke Area Signalling Centre and a set of signalling interventions would be required to bring the additional track into use. A future re-signalling and re-control scheme for this area could provide an ideal opportunity to progress this intervention.

8.4 Axminster Loop

8.4.1 Description

The proposed intervention is to extend the Axminster Loop eastwards towards Crewkerne finishing around the 142 Milepost. This is primarily to support GWR diversionary services.

8.4.2 Overview

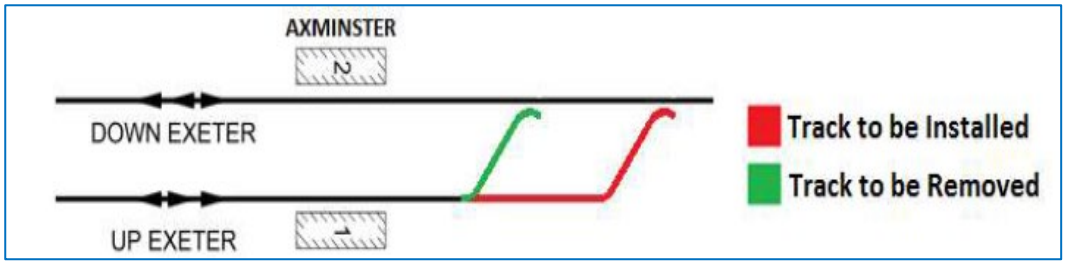


Figure 25: Proposed layout of Axminster Loop extension

The proposed loop ties into the main line at the east end, prior to Axe Level Crossing. The line speed would remain at 85mph with a 50mph capable S&C unit. Areas of the existing track will need to be moved/ slewed to centralise the alignment through two structures.

The additional track would require interventions at a significant number of other structures on the route including underbridges, overbridges and culverts. More detailed assessments and individual design development for each structure would be undertaken as part of any scheme that results from this CMSP.

The existing signalling is controlled from Exeter panel located in the Basingstoke Area Signalling Centre. The loop extension would be bi-directional with the associated set of signalling works. A future re-signalling and re-control scheme for this area could provide an ideal opportunity to progress this intervention.

8.5 Honiton Loop

8.5.1 Description

This intervention is an extension of the existing Honiton Loop to 3900m beyond the Honiton platform. This is to support the new Intercity Express GWR diversionary services and the Devon Metro timetable. A shorter extension would be required for just diversionary capability, but the longer extension is required to operate a sensible timetable for the additional Devon Metro service.

8.5.2 Overview

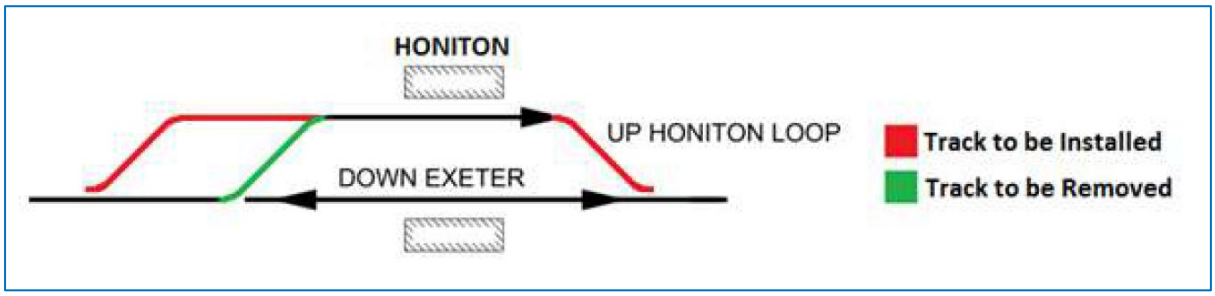


Figure 26: Schematic of proposed layout for an extended Honiton Loop

The proposed layout includes a new S&C unit at the east end of the Honiton Loop to enable 50mph speeds through it. This would be located on a tight curve but to locate the S&C on more suitable geometry would require 500m of additional double track renewal.

The proposed loop ties back into the main line with a second S&C unit suitable for 50mph, the proposed loop has been designed to 60mph to match the main line but there may be scope to increase this after further track assessment.

The extension of the loop would require interventions at a significant number of structures on the route including underbridges, overbridges, a footbridge and a culvert. More detailed assessments and individual design development for each structure would be undertaken as part of any scheme that results from this CMSP.

The existing signalling is controlled from Exeter panel located in the Basingstoke Area Signalling Centre. It is assumed the extended loop would be bi-directional and will require the associated signalling works. A future re-signalling and re-control scheme for this area could provide an ideal opportunity to progress this intervention. It should be noted that an extension of the loop may bring some

8.6 Whimple to Cranbrook

8.6.1 Description

This intervention is a new loop from Whimple and through Cranbrook Station. This would require a new platform to be built at Cranbrook Station. The proposed loop is planned to be located on the north side of the existing main line and would support improved performance, capacity and diversionary capability

8.6.2 Overview

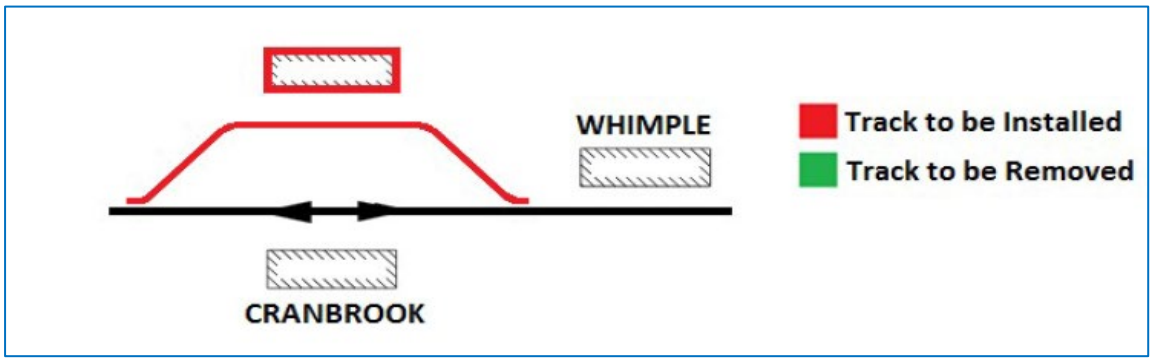


Figure 27: Schematic of proposed layout for a Whimple - Cranbrook Loop

The proposed loop would be approximately 6km long and there is an area of existing track that would require major slews to traverse centrally through structures.

The proposed loop ties back into the main line with a S&C unit suitable for 50mph, the proposed loop has been designed to 60mph to match the main line but there may be scope to increase this after further track assessment.

The loop would require interventions at a significant number of structures on the route including underbridges, overbridges, level crossings, culverts and arches. More detailed assessments and individual design development for each structure would be undertaken as part of any scheme that results from this CMSP.

The existing signalling is dual controlled from Exeter signalling panel located in the Basingstoke Area Signalling Centre and the Exmouth Junction Signal Box. It is assumed the new loop would be bi-directional and would require the associated signalling works. A future re-signalling and re-control scheme for this area could provide an ideal opportunity to progress this intervention.

An additional platform is to be implemented on the Up side of the existing Cranbrook station, as shown in *Figure 28* and *Figure 29*. Additionally, a new footbridge will be required to connect the new platform on the Up side of Cranbrook station with the existing Platform 1 and station car park on the Down side. To be Access for All compliant, the footbridge will be required to have either ramps and/or lifts. Lifts are likely to be the preferred option at the station location.

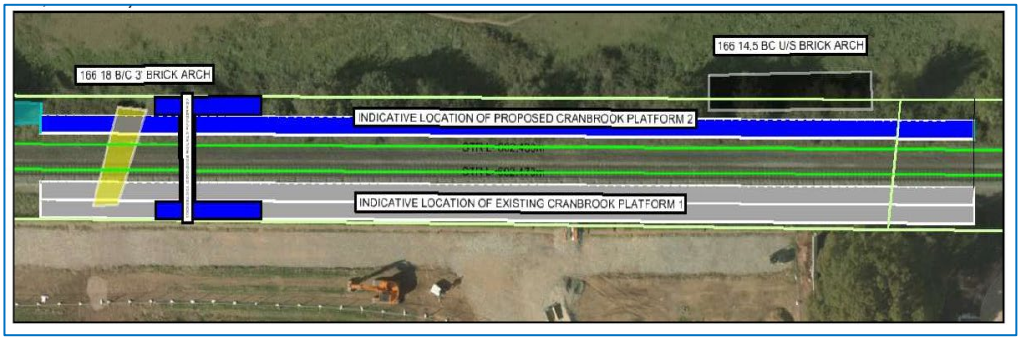


Figure 28: Cranbrook layout of new platform and footbridge.

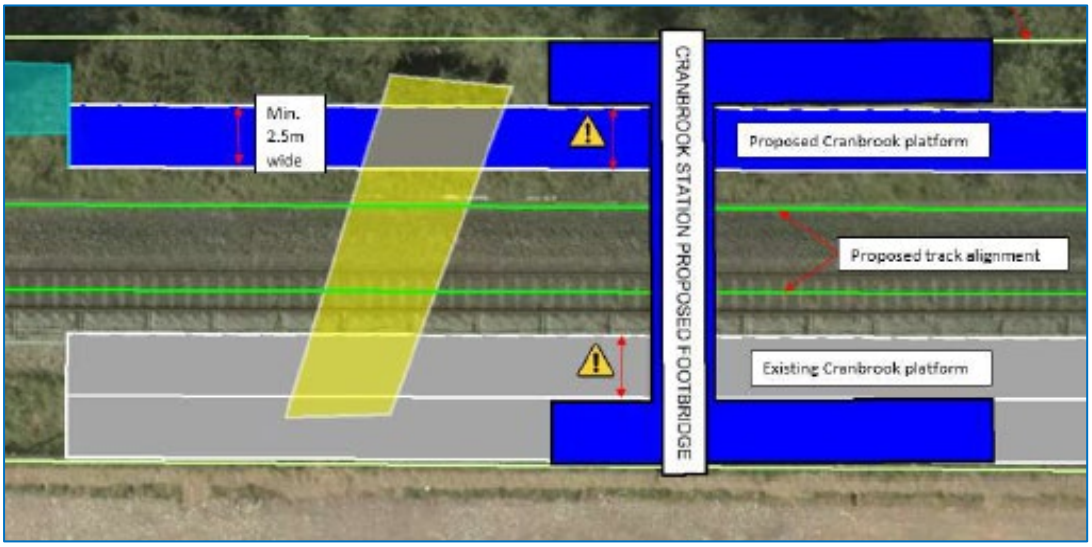


Figure 29: Indicative layout of new footbridge.

8.6.3 Whimple – Cranbrook Alternatives

Possible alternatives to the position and length of the Whimple – Cranbrook loop, as stated here, that will require further investigation as part of any future development of scheme, include:

- Joining the new loop to the double track section at Pinhoe. This would further improve performance and resilience, but it would require significant infrastructure to address the issue of the bridge under the M5 motorway which is built to allow only one track underneath it
- An eastward extension of the new loop through Whimple station. This would require a second platform and accessibility enhancements that are not currently required at this station

9.0 Emerging Strategic Advice

This CMSP module has investigated potential interventions that could solve the known problems of performance and reliability, overcrowding, capacity, journey times and diversionary capability on the West of England Line. The study has demonstrated that there is a strategic case for addressing these problems both to solve what passengers are currently experiencing on the West of England Line and to address the need to meet future demand on the railway.

It is important to stress that the recommendations that this CMSP module has developed are not only about providing improvements to West of England Line services in the future, but also seeking to address current problems, such as poor performance, that are experienced now.

9.1 Passenger services

The data presented in *section 3.5.3*, shows that performance and resilience of service are key issues that need to be addressed on the West of England Line. The extent of single track sections on the line mean that recovery from delays is extremely challenging. A reduction in the length of those single track sections, so that more of the infrastructure is double track, would provide an opportunity to improve the operation of the railway and recovery of service.

The West of England Line also provides an important function as a diversionary route for services that would usually operate to and from the West via the Great Western Main Line. Not only are Great Western services impacted by being unable to operate a full service when diverted via the West of England Line, but services to/ from London Waterloo are also impacted when services are diverted.

At the time of this document, a Public Performance Measure (PPM) value of 74.9 % means that a service is being operated that is unlikely to be providing passengers with confidence that they will experience a reliable and robust service on the West of England Line. It is likely that this is reflected in the decrease in patronage shown in the ORR station usage figures over recent years, as presented in *section 3.3.1*; although, the Waterloo blockade in 2017 and the ongoing industrial action have also contributed.

The demand analysis carried out for this CMSP modules highlights that as of 2018, crowding is most severe on the West of England Line from Andover to London Waterloo in the AM Peak, and from London Waterloo to Andover in the PM peak. Standing occurs on the most crowded trains in the AM Peak from Andover into London Waterloo. Forecast demand by 2031 suggests that standing is expected on all services in the AM and PM peak to and from Andover to London Waterloo and that this will extend to services from Gillingham by 2041. Some off-peak services currently experience high passenger volumes between Gillingham to Salisbury and are expected to experience standing by 2041; this reflects the growth in leisure and business travel in the area. Standing occurs in the PM Peak on some services from London Waterloo as far as Salisbury.

There is crowding and standing on services into and out of Exeter in the peak periods on some services. This can be more of a problem when student are travelling into Exeter in term time. By 2041, unacceptable standing is expected on most services in the AM and PM peaks, when aspirational growth to meet housing targets is considered. The problems

at Exeter are further exacerbated by the long gaps between services in the AM peak, this results in trains arriving into Exeter at times that are not ideal for passengers.

When coupled with the need to improve performance and improved diversionary capability, this demand analysis and the subsequent timetable analysis suggested the following interventions be considered:

- Extension of Tisbury Loop – required for performance, journey time and capacity improvements
- Extension of Gillingham Loop – required for performance and journey time improvements
- Extension of the double track section at Yeovil Junction – required for improved diversionary capability
- Extension of the Axminster Loop – required for improved diversionary capability
- Extension of the Honiton Loop – required for performance and to enable an optimum timetable for additional Devon Metro services
- A new loop in the Whimple/ Cranbrook area – required for improved performance, capacity and diversionary capability

It should be noted that in the example of Tisbury Loop, this study has focussed on the westward extension of the loop only as this provides journey time benefits in combination with the Gillingham Loop extension. Extending the loop eastwards to Dinton (or beyond), as well as westward through the station, is essential for operating a 2tph service between Salisbury and Yeovil Junction where all intermediate stations get a 2tph service throughout the day.

The emerging strategic advice that has resulted from this CMSP module suggests that the proposed interventions could be grouped into packages to deliver the benefits of performance, reliability, capacity and journey times. These could be delivered sequentially or in combination, but it should be noted that their impacts are cumulative.

Suggested packages are:

Package No.	Sub-package	Interventions	Benefit
Package 1	Package 1a	• A new loop in the Whimple/ Cranbrook area • Extension of the Honiton Loop	• Performance and resilience • Additional capacity (2tph to most stations between Exeter St. David's and Axminster • Incremental journey time improvements

	Package 1b	• Extension of Tisbury Loop (westwards and/ eastwards)	• Performance and resilience
			• Additional capacity between Salisbury and Yeovil Junction
			  ○ Eastwards extension will allow 2tph to all stations
			  ○ Westwards extension will allow 2tph to some stations
			• Incremental journey time improvements

Package No.	Sub-package	Interventions	Benefit
Package 2	-	• Extension of the double track section at Yeovil Junction • Extension of the Axminster Loop	In combination with Package 1a: • Improved diversionary capability (1tph in each direction) • Small improvements in performance and resilience
Package 3	-	• Extension of Gillingham Loop	In combination with Package 1b: • Performance and resilience • Significant journey time improvements (up to 14 minutes) to services between London Waterloo and Exeter St. David's

Table 15: Potential intervention packages

In addition to these packages the timetable analysis has identified the potential for improved infrastructure and rail operations in the Exeter area including at Exeter St. David's itself and around Exmouth Junction. This will be addressed through future CMSP modules and any subsequent development of a scheme resulting from this CMSP module

As well as infrastructure solutions to increase the frequency of service to address overcrowding it is also suggested that by 2031, train lengthening by a couple of cars during the peaks could be sufficient to reduce average crowding to acceptable levels to/ from Andover. However, the analysis also suggests an additional 6-car service would be required by 2041 to/ from Andover, along with a couple of additional cars per hour to Gillingham. The current fleet operating on the West of England Line would not be able to provide these additional vehicles and when considered alongside the decarbonisation agenda it is recommended that the change in franchise in 2024 is likely to be a good time to consider a change in rolling stock to meet the needs of passengers.

The provision of new rolling stock to replace the nearing end of life and unreliable fleet currently in operation is essential. The service changes that have been modelled through this CMSP cannot be achieved in a robust and resilient way without a change in rolling stock. Rolling stock that is faster, more efficient, more reliable, has improved accommodation/ capacity and a lower carbon impact should be included in any solution to improvements on the West of England Line.

Further development of schemes on the West of England Line provide an opportunity to seek alternative or complementary funding streams to deliver facilities at stations that could be improved to integrate other transport modes, particularly in relation to "green" modes such as bus turning circles, electric charging points and cycle storage. There is also the opportunity to provide improved access and inclusion to make the railways attractive and usable by all, including those with reduced mobility.

The need for a change in rolling stock as well as potential renewals, such as track and signalling, in Control Period 7 (CP7) offers an opportunity to take these enhancements forward into development in Control Period 6 (CP6) at a time when a holistic, whole industry approach can be taken to improving the West of England Line.

9.2 Freight services

The West of England Line provides an important freight route and freight diversionary route at the east end of the line where services come up from Southampton to travel via Romsey, Laverstock and Andover. In addition, diversionary freight operates via Castle Cary and Yeovil Junction when the usual route via Taunton is not available, although the capability of the route for freight diversions is hampered by the number and length of the passing loops.

Consultation with freight industry stakeholders has suggested that there is not a current market for freight services along the length of the West of England Line but that its use for diversionary services at both ends of the line and for potential growth in regular freight at the east end of the line is key for the freight market going forward. However, locations such as the Sky Park, near Cranbrook, may provide opportunities for future growth of the freight market.

This CMSP module has not sought to find solutions for increasing freight capacity on the West of England Line. It is important that this potential for freight growth is not forgotten.

Improving the resilience and the capability of infrastructure on the West of England for passenger services, through the recommendations of this CMSP, could provide an opportunity for stimulating long-term growth in freight flows to and from the West. This in turn will impact on maintenance regimes, maintenance access requirements and renewal rates on the West of England Line; all of which should be considered alongside any enhancements.

Where additional track infrastructure (loops or double track extensions) recommended by this CMSP module is taken forward through to a funded scheme for development, then consideration should be given to how these interventions can also provide freight capability. This could be by making sure that all loops or double track sections are capable of accepting full length (775m) freight trains, with entry and exit speeds across switches and crossings (S&C) of at least 40mph (higher for passenger services).

9.3 Future Connectivity

Although this CMSP module has not addressed the solutions to providing improved connectivity to wider locations or the potential for new stations, these will be important considerations should a scheme be progressed.

New Stations: the addition of any new station along the West of England Line could impact the location of a new infrastructure (loops), as additional stops mean that the location where trains need to pass each other, to avoid a single track section, may change. Stations identified through the process of this CMSP module include:

- **Oakley** – this is a potential station between Overton and Basingstoke that may be associated with housing growth in the Basingstoke area
- **Porton** – this is a potential station between Salisbury and Grateley
- **Wilton Parkway** – this is a potential station that could have platforms on the line to Westbury and/ or the West of England Line to the east of Salisbury

- **Cranbrook (2)** – this is a potential additional station at Cranbrook to serve the growing housing development

As Network Rail is not directly funded for new stations, they have not been specifically addressed in this CMSP module and it will be the responsibility of the interested parties to promote these aspirations. These potential new stations should be considered as appropriate in any future, more detailed timetable analysis.

New Services: the interaction of services that provide interchange with the West of England Line core services may impact platform capacity at interchange stations as well as track capacity. Potential new services identified through the process of this CMSP module include:

- **TransWilts** – this is a proposed service between Swindon and Westbury that could see a future extension to Salisbury where it would provide interchange with West of England and Romsey/ Southampton/ Eastleigh services; this may require additional platform capacity at Salisbury
- **Heart of Wessex Line** – there are aspirations for improvements to the service operated on the Heart of Wessex Line to enable a 1tph resilient service to potential locations such as: Westbury, Bristol and Taunton. There may be opportunities to connect directly to the West of England Line via a southern chord linking the Heart of Wessex Line to Platform 3 at Yeovil Junction. Improvements to this line will be addressed through the Dorset Connectivity CMSP module in 2020/21
- **Salisbury to Reading** – this service is operating on Sundays providing a direct service to Reading via the West of England Line and Basingstoke. There may be the potential for this to become a more regular service; this may require additional platform capacity at Salisbury

These potential services should be considered as appropriate in any future, more detailed timetable analysis.

9.4 The Strategic Advice

This study recommends that in the short-term the Package 1 outputs should be progressed through the current Railway Network Enhancement Pipeline (RNEP) to initiate a Strategic Outline Business Case (SOBC). This could be coupled with Package 2 if full diversionary capability is seen as a priority.

This process will allow for other service patterns, analysis of sensitivities relating to new rolling stock, possible electrification, new stations, alternative stopping patterns and additional stakeholder aspirations to be investigated as part of the development of the scheme. There is also an opportunity to investigate synergies with other rail programmes, including renewals, to delivery efficiencies in cost, disruption and construction.

The need for a change in rolling stock as well as potential renewals, such as track and signalling, in Control Period 7 (CP7) offers an opportunity to take these enhancements forward into development in Control Period 6 (CP6) at a time when a holistic, whole industry approach can be taken to improving the West of England Line.

The key recommendations from this CMSP module are:

1. Submit a Decision to Initiate through the RNEP process to progress an agreed combination of infrastructure interventions as discussed above

2. Progress the Woking Area Capacity Enhancement (WACE) scheme to unlock the potential for a future service to operate between London Waterloo and Salisbury (destinations to be agreed)

3. To understand the impact of a third train at Salisbury and potential enhancements at Exeter St. David's related to diversionary capability

4. Implement new, greener, rolling stock and improved depot capability on the West of England Line to enable the lengthening of services to ease overcrowding and improve performance and resilience

9.5 Strategic Questions

The following table summarises how the strategic questions originally stated in *section 5.0*, of this document, have been addressed through this CMSP module.

Strategic Question	Response
What are the key markets that the West of England Line serves or needs to serve?	Commuter travel corresponds to about 50 % of rail travel on the West of England Line (based on SWR market surveys), with the other 50 % made up from the wider market for leisure and business travel. This demonstrates that the West of England Line must meet the needs of markets that can sometimes have conflicting priorities. It is recognised that poor performance and reliability of service are key constraints to growth on the line.
Based on the demand analysis, how is capacity best provided and managed on the West of England Line?	There is current standing on services in the peak from Andover, this could be solved through the introduction of lengthened services. It should be noted this is not achievable with the current fleet. In the medium to long-term the Salisbury to London Waterloo section will require an additional service to accommodate growth on the West of England Line and locations into London Waterloo. There is some standing on services into and out of Exeter St. David's in the peaks that will require an additional service between Exeter St. David's and Axminster for both to meet current and future demand and to encourage modal shift. Extra capacity is required between Yeovil Junction and Salisbury to meet aspirations for increased frequency and to meet future demand that is expected to see standing from Gillingham by 2041. To meet the capacity requirements on the West of England Line the following infrastructure has been identified: • A new loop in the Whimple/ Cranbrook area • Extension of the Honiton Loop • Extension of Tisbury Loop
Where are the stakeholder priorities for improved journey times and by how much?	Analysis shows that journey times between West of England Line stations are better than those by car. However, there are requirements for journey time improvements for services to/ from London Waterloo as well as incremental journey time savings for services into Exeter St. David's. The addition of new loops and extended double track sections will enable some incremental journey time benefits. The extended loops at Tisbury and Gillingham could provide improved journey times of approximately 10-15 minutes.
How can the West of England Line best support local and market growth opportunities?	Improving poor performance and service resilience, increasing capacity and reducing overcrowding, and improving journey times are key components in providing a transport network that supports access to education, work and leisure for all communities. The infrastructure interventions identified through this CMSP module will provide important improvements that offer the opportunity for economic growth in the area covered by the West of England Line. In addition, the interventions associated with diversionary capability allow the wider South West region to remain open when they would otherwise be cut off.

Strategic Question	Response

What are the potential opportunities for onward connectivity from locations on the West of England Line?	The study has identified several potential opportunities for onward connectivity that could be taken forward by third party promoters or could be addressed through future CMSP modules; these include:
	• New stations:
	  ○ Oakley
	  ○ Porton
	  ○ Wilton Parkway
	  ○ Cranbrook (2)
	• New services:
	  ○ TransWilts – linking East Devon/ South Somerset with Swindon
	  ○ Heart of Wessex Line – improving current connectivity or opening up potential new destinations (to be addressed in the Dorset Connectivity CMSP)
	  ○ Salisbury to Reading – linking East Devon/ South Somerset with the Thames Valley
	These should be reviewed as appropriate should a scheme be developed on the emerging strategic advice presented by this CMSP module.
	In addition, the infrastructure suggested as part of this CMSP module will also provide improved connectivity. For example, the additional loop at Whimple could provide the opportunity for linking Axminster (and the rest of the West of England Line) with Barnstaple/ North Devon and other locations such as Okehampton.

What does the rail freight industry require of the West of England Line?	The West of England Line provides an important freight route and freight diversionary route at the east end of the line where services come up from Southampton to travel via Romsey, Laverstock and Andover. In addition, diversionary freight operates via Castle Cary and Yeovil Junction when the usual route via Taunton is not available. Consultation with freight industry stakeholders has suggested that there is not a current market for freight services along the length of the West of England Line but that its use for diversionary services at both ends of the line and for potential growth in regular freight at the east end of the line is key for the freight market going forward. However, locations such as the Sky Park, near Cranbrook, may provide opportunities for future growth of the freight market.
What is the extent of poor resilience and performance on the West of England Line, how can this be addressed and how can the West of England Line support the resilience of other lines?	This study has shown that performance and reliability/ resilience of service have decreased over recent years, and this is a likely contributor to the reduction of patronage that has also been experienced over the last couple of years. It should not be under-estimated how much the impact of poor performance can undermine passenger confidence and influence decisions to use rail. If rail is to become an important contributor to the economic success of the region then improvements need to be made. The infrastructure interventions identified through this CMSP module will provide potentially significant improvements to performance and the ability for the service to recover after an incident. In addition, the infrastructure interventions directly related to diversionary capability, on the line via Castle Cary and Yeovil Junction, will enable the West of England Line to be used as a resilient diversionary route for Great Western Main Line services.

Table 16: Summary of strategic questions and responses

10.0 Next Steps…

Following the completion of this CMSP module it is recommended that the following process is followed to progress the identified interventions and changes to services that will ultimately benefit passengers.

Owing to the size of the infrastructure interventions identified through this CMSP module the main way that funding will be sought will be through the Railway Network Enhancement Pipeline (RNEP), which is summarised in the diagram below:

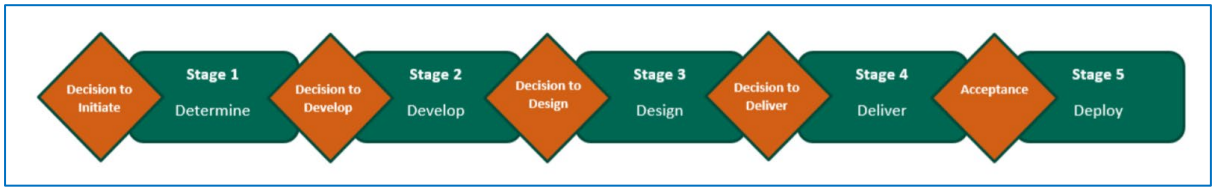


Figure 34: Railway Network Enhancement Pipeline (Source: DfT)

The RNEP approach creates a rolling programme of investment, focused on outcomes that provide benefits for passengers, freight users and the economy and moving government investment in enhancements away from a rigid 5 year cycle. Further details of the process can be found at: https://www.gov.uk/government/publications/rail-network-enhancements-pipeline
It is the intention that Network Rail will take this CMSP module through the Programme Board at which DfT and Network Rail agree the enhancements that will form part of the pipeline of schemes. This will form the 'Decision to Initiate' a scheme.

Through this discussion it will be determined what outputs or outcomes should be delivered by any scheme developed through the RNEP. In the case of this CMSP it will need to be agreed what level of performance improvement, increase in capacity and frequency, journey time improvement or diversionary capability the DfT wish to see delivered to meet the needs of passengers, freight users and the economy.

It is important that interested parties, including those involved in the working group for this CMSP module, lobby their MPs and the DfT for the outputs or outcomes they would wish to be included in any agreed project scope that may come from the 'Decision to Initiate'. For instance, consideration of new stations or stopping patterns that could impact the eventual position of any loops or other infrastructure required to deliver those outputs.

Although this CMSP module has identified potential infrastructure interventions for the purposes of understanding the possible infrastructure required to deliver service changes against a specific concept train plan, further development is required to refine the outcomes or outputs and enable the consideration of alternatives not specifically looked at through the CMSP module.

The emerging strategic advice, as set out in *section 9.0*, suggests that there is a real and current problem associated with performance and reliability, on the West of England Line, that the reduction in single track sections through the delivery of additional loops and double track extensions can help to improve. It is also clear that capacity is required now, both at the west end of the line into Exeter and between Yeovil and Salisbury to accommodate the overcrowding that can be experienced and begin to meet expected

demand. It is therefore recommended that discussions with DfT through the Programme Board for access into the RNEP are taken forward as soon as appropriate.

This CMSP module and the emerging strategic advice that it presents allows stakeholders to frame their requirements against a strategy for the future growth of the West of England Line. Should the 'Decision to Initiate' be agreed then there are several items that have been raised through the production of this CMSP module that should be considered when developing a scheme, these are (not exclusive):

- Alternative stopping patterns, particularly in relation to journey time improvements between Yeovil Junction and Salisbury where some stations could lose direct services to the Exeter St. David's based on the concept train plan assessed
- Extension of the current platform at Tisbury and the provision of a longer platform on the Down side when the loop is extended through
- A recommended change in rolling stock and the associated requirement for additional depot and stabling capability
- Electrification of the line, dependent on the outcomes of the Network Rail/ RSSB workstream on decarbonisation
- Potential new services that would interact with West of England Line services:
    - TransWilts service
    - Heart of Wessex Line service
    - Salisbury to Reading service
- Platform capacity at locations such as Exeter St. David's and Salisbury
- Alignment with emerging Strategic National Transport Body strategies
- Further investigation of freight opportunities and diversionary requirements
- A third train operating between London Waterloo and Salisbury, potentially released by the Woking Area Capacity Enhancement (WACE) project
- Consideration of extending loops further or joining up loops to increase the performance and resilience benefits
- Further consideration of freight diversionary capability via Castle Cary and Yeovil Junction; for instance, the ability to accommodate 775m freight
- Opportunities for efficient delivery alongside the renewals programme, such as signalling renewals
- Station pedestrian capacity analysis to assess the impact of increased patronage on current station facilities
- New stations
    - Cranbrook (2)
    - Wilton Parkway
    - Porton
    - Oakley

Stakeholder forums, specific to the West of England Line, will continue and provide the opportunity for those involved in this CMSP to be part of ongoing discussions alongside their own lobbying through other channels.