

Macro Consolidation



Macro Consolidation is where lots of individual deliveries are sent to a central place - a regional distribution centre – and packaged up into a single load to be delivered to nearby businesses. Doing this means that items can be delivered in one go, instead of lots of different delivery vehicles having to make multiple trips around the local area.

This project looks at how this is currently done at the Southampton Sustainable Distribution Centre (SDC), and whether this can be expanded. We will also carry out research into more sustainable logistics in Portsmouth and other locations in the Solent region.



Latest updates:

- Working with Meachers, who run the Southampton SDC, to understand which sectors will benefit the most from consolidating their deliveries.
- Studying delivery data from across the region to understand major commodity flows and where else this could be trialed.



Next steps:

- Speak with businesses that could benefit from combining their deliveries in this way.
- Measure the effectiveness of reducing the number of vehicles through the SDC.



Benefits:

- Fewer delivery vehicles on the road, helping to reduce congestion and improve air quality.
- Deliveries are more predictable and more efficient.

Micro Consolidation



Micro consolidation is designed to reduce the number of individual deliveries that are made to private homes and businesses. Imagine your orders are sent to a central, local logistics hub, along with orders from other people in your area. It then only needs one vehicle or a single delivery round to bring all of those parcels to homes and businesses. Add to this the idea of using low emissions transport like electric vans or cargo-bikes for those deliveries, and you have a more sustainable way of doing small-scale deliveries. This approach can be used in the same way for handling returns. By trialling new ways of doing deliveries and returns, we can help make them easier and greener for all.



Latest updates:

- Working with local universities and councils to research how deliveries are currently made in the region and what land could be available for logistics hubs in future.
- Four initial trial projects chosen across Portsmouth, Southampton and Winchester.
- Working with delivery companies to see how this could improve the way they work.



Next steps:

- Continue working with delivery companies to maximise opportunities
- Look into alternative transport methods like cargo-bikes and small electric vans
- Explore whether the scheme can be expanded into other areas outside of big cities and towns



Benefits:

- Less traffic on residential roads and high streets caused by delivery vehicles.
- Better air quality due to fewer vehicles on the road and more electric vehicles and cargo-bikes being used
- Less noise pollution

Key Trip Generators (previously lift share)



The COVID-19 pandemic has had a big impact on the way that people choose to travel. Because of this, the Lift Share project has been carefully reviewed and reshaped.

The project will now focus on working with businesses in hotspot locations like entertainment venues (e.g. sports stadiums, theatres and festivals), universities and colleges, large supermarkets and shopping centres, business parks and hospitals.

The aim is to create behaviour change, encouraging people to move away from single occupancy car trips.



Latest updates:

- Interviewed local councils to understand how they are already working with businesses across the region
- Researched best practice from other sustainable transport projects that focus on working with businesses
- Reviewed and tested different ways to do this and chosen a preferred approach
- Commissioned In the Round (ITR) to develop a Business Engagement Plan.



Next steps:

- Make car sharing available in the Breeze app.
- Assess where the most popular transport hotspots are and start working with the businesses in these areas.
- Create a toolkit to help local businesses get the most out of Breeze
- Encourage large and medium employers in the Solent region to sign up to schemes that reward and incentivise their staff for taking part.
- Work with individual businesses or venues to develop bespoke features and services in Breeze.



Benefits:

- Less congestion and fewer vehicles on the road during rush hour.
- Improved air quality and road safety.
- Improve transport and travel to major venues across the region.

Mobility Credits

This project is trialling offering travel credits to under 30s who are on low incomes or looking for work. As part of this, we will carry out research to see what effect offering credits has on the method of transport people choose to use.



Latest updates:

- The project has been reviewed since the start of the COVID-19 pandemic, as people's travel patterns have changed.
- The trial is now planned to run for 18 months.
- We're reviewing the funding for providing mobility credits.



Next steps:

- Focus on project planning and development.
- Aim to go 'live' at the start of 2023.
- Make the credits available in Breeze.



Benefits:

- Better opportunities to travel.
- Helps those looking for work by lowering travel costs.
- Improves wellbeing by helping people access more locations for study and work.

Mobility Hubs

Mobility Hubs are places where all your transport needs are met in one go. Imagine a single location, or 'hub', conveniently located next to the train or bus station, where you can hop on e-scooters, bikes, park and ride, access lockers for deliveries, charge an electric vehicle and more. Although Solent Transport does not have funding for Mobility Hubs through the FTZ, we're helping local councils look at whether they can create mobility hubs in their area.



Illustration credit: Sophia Von Berg



Latest updates:

- Published a new set of guidance to help councils and transport authorities create successful mobility hubs that benefit their local community.
- Continuing to work closely with local authorities to ensure FTZ projects like bike share and e-scooters are included in mobility hub plans.
- Several organisations are now looking into mobility hubs around the Solent.
- This includes National Highways' M3/M27 'Travel Demand Management' project and the government-funded 'Transforming Cities' projects across the region.



Next steps:

- Detailed studies and research to decide whether to go ahead with creating some trial mobility hubs.



Benefits:

- Lots of different transport options in one convenient place
- Trips are safer, more convenient and more reliable.
- Helps reduce the amount of traffic on the M3 and M27
- Bring essential services for local communities closer together
- Designed around what the community needs both now and in the future
- Attract new businesses and jobs by creating ideal locations for businesses to start up
- Reduce congestion in residential areas

Solent Go

Solent Go is a range of tickets you can use across all the region's bus operators and on some key ferry routes. Solent Go tickets give you discounts on bus and some ferry journeys in Portsmouth, Southampton and across the Solent Region. You can buy Solent Go tickets from all main bus operators, both in-person and via their apps, and from the Gosport and Hythe Ferries.



Latest updates:

- Bringing you new products to make travelling by bus or ferry even easier.
- All products have been integrated into the Breeze app due to launch later this year, making buying and using tickets even easier



Next steps:

- Highlight the 'Saver 5' tickets through the new Breeze app. The 'Saver 5' gives you 10% off when you buy five one-day tickets in Portsmouth and Southampton, and £1 off when you buy them for the whole Solent region. You can use the tickets whenever you need, making it a more cost-effective option if you're not using the bus every day.
- Develop new types of tickets to make travelling by bus and ferry even easier. This will include tickets that work across multiple transport operators.
- Make new bus tickets in Portsmouth available in Solent Go which will especially help families, groups and young people.



Benefits:

- Solent Go tickets make it cheaper to travel by bus and ferry.
- More ways to travel, giving you more flexibility.
- The new "Hopper" ticket will let you change between buses operated by different companies and only pay once.
- Encourages more people to use public transport.

Get in touch

We want to hear from you

As we trial these projects over the next few years, it's really important that we gather feedback from everyone across the Solent region. In fact, this is a key part of running the Solent Future Transport Zone!

We also want to hear from businesses and organisations: whether you're interested in taking part in a trial, would like to tell us if a project is working well in your area or you would like to do more to promote sustainable travel, please get in touch today.

We work with a range of businesses and other organisations and are open to discussing how the FTZ can work alongside yours.

Email us at enquiries@solent-transport.com and follow us on Twitter and LinkedIn [@SolentTransport](https://www.linkedin.com/company/solent-transport).



Appendix D Stagecoach Route Cancellations Evidence



Stagecoach Bus Services Route
Cancellations

**A Record of Route Cancellations or
Modifications by Stagecoach in Stroud
and Gloucestershire**

December 1, 2022

Prepared for:

Sharpness Development LLP

Prepared by:

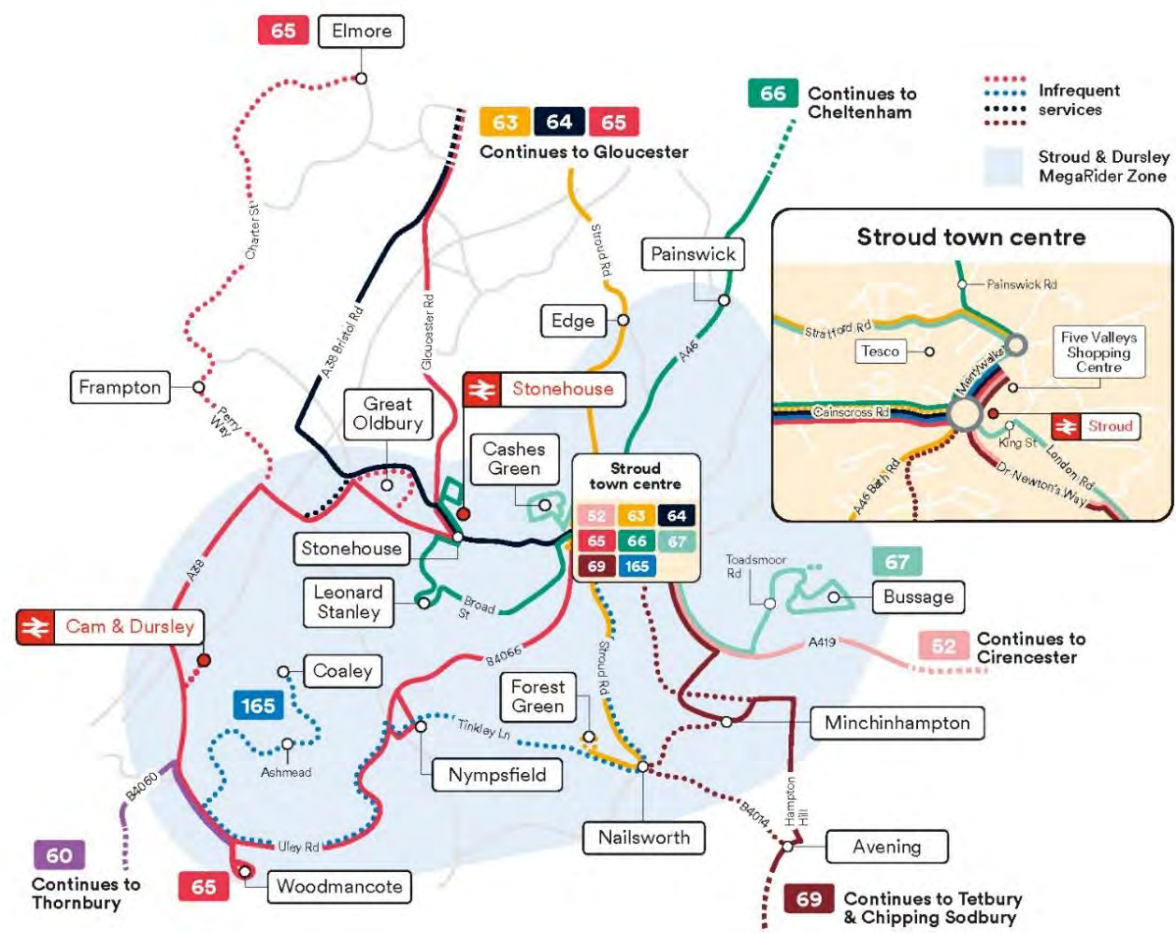
Stantec UK, Ltd

Stagecoach Route Cancellations - 2022

This information is compiled from day-to-day bus cancellation announcements and is all found in the public domain. The evidence below is categorised into services cancelled or modified during pre-Covid times and those affected post-Covid.

Past service updates are not available on Stagecoach website - <https://www.stagecoachbus.com/regional-service-updates/west/stroud>

Stagecoach Services in Stroud



For more detailed journey planning and real-time updates download the **Stagecoach Bus App**.



Correct at time of print; July 2021

Pre-COVID

63 service to Woodchester & Stroud early morning service cancelled (June 2015) - <https://www.stroudnewsandjournal.co.uk/news/lettersextra/13219634.new-nailsworth-timetables-punish-residents/>

“Faced with tighter budgets this year, the council is trying to protect services which have vital transport links for education and healthcare”. The services 36 and 40 were merged (Feb 2016) - <https://www.stroudnewsandjournal.co.uk/news/14250817.changes-to-bus-services-in-stroud-given-green-light-by-county-council-cabinet/>

25 from Oakridge Lynch to Stroud town centre bus service cut (Jan 2016) - <https://www.stroudnewsandjournal.co.uk/news/14183166.elderly-passengers-fear-loss-of-lifeline-bus-service-into-stroud/>

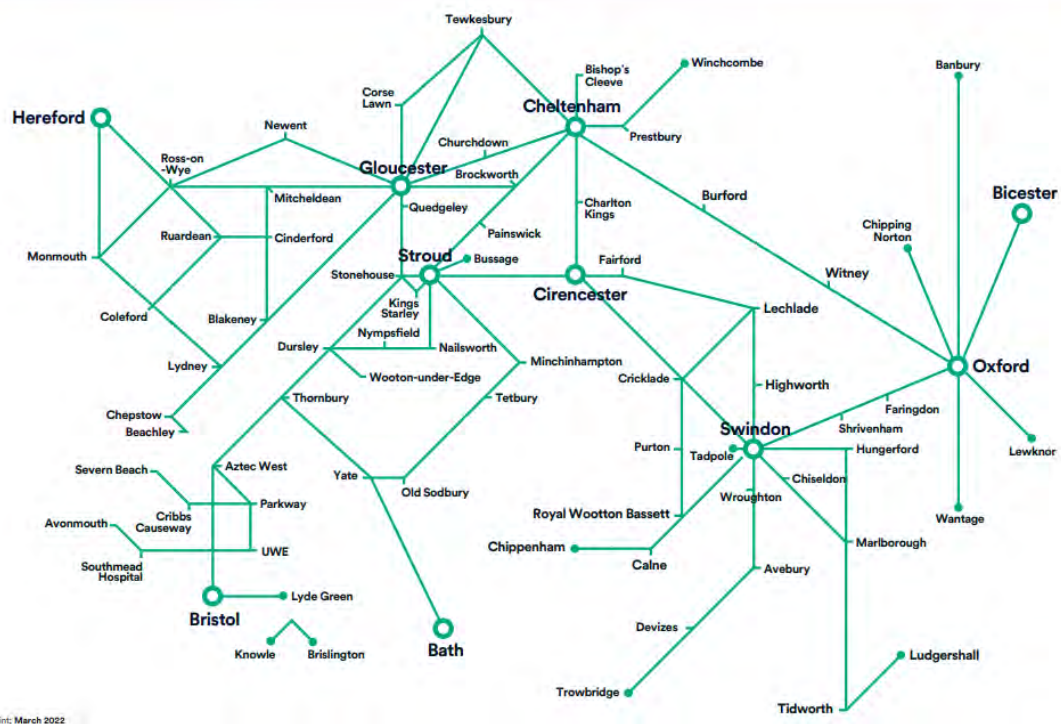
Post-COVID

Bus service adjustments, reduced services and route changes, due to driver shortage (Dec 2021) - <https://www.stroudnewsandjournal.co.uk/news/19798964.stagecoach-announces-changes-stroud-bus-services/>

Service updates	
63 and 64	To improve reliability, the 30-minute service on services 63 and 64 will temporarily be reduced, running every hour during weekday daytimes and all day on Saturday. Peak-time weekday services will continue to run every 30 minutes for students and commuters.
65 and 66	Minor changes have been made to late-afternoon and evening journeys on services 65 and 66. On 65, the 16:30 from Stroud to Dursley and Stonehouse will run only as far as Downton Road and not continue to Gloucester. The last 65 from Stroud will now run five minutes later. On service 66, the current 17:30 from Cheltenham to Stroud will no longer run and most evening trips from Stonehouse will run slightly earlier.
67	To accommodate additional double-decker buses for school time trips, early morning buses on service 67 will no longer run via King Street or Russell Street. The service will still run through the town centre after 09:30 on weekdays and all day at weekends. Afternoon buses from Thomas Keble School will also see slight changes. A single decker bus will run via Bisley to the town centre and continue to Cashes Green, with a double decker running direct to Merrywalks via Brimscombe and Thrupp.
69	Stagecoach’s new peak-time journeys on service 69 into Stroud have carried very few regular customers since being introduced in September. Due to these low passenger numbers, the timetable

	will revert from the New Year, with the first arrival into Merrywalks at 07:54.
52 / C64	The lunchtime Cirencester College link from Stroud will now run as C64 instead of 52, with buses starting and finishing in the College grounds and not Cirencester town centre. This means students will no longer need to wait on the A419 main road for these services. More information about Cirencester College buses can be found on the website.

Stagecoach Services in Gloucestershire



Pre-COVID

No information found

Post-COVID

Daily bus service cancellation across the county due to “covid and Brexit” (Dec 2021)- <https://www.gloucestershirelive.co.uk/news/gloucester-news/stagecoach-releases-update-after-services-6309367>

Stagecoach is removing the 132 service which runs from Gloucester to Ledbury via Newent from February 2022. The bus company is also reducing its 32 service between Newent and

Ross-on-Wye which will only operate a school and shopper link (Feb 2022) - <https://www.gloucestershirelive.co.uk/news/gloucester-news/gloucestershire-transport-chief-found-out-6671574>

A trial minibus service has been set up to help plug the gap left by a recent reduction in services near Newent. The service is operated by Newent Community Transport (May 2022) - <https://www.gloucestershirelive.co.uk/news/gloucester-news/minibus-service-restore-lifeline-isolated-7029005>

Appendix E Revolution Very Light Rural Rail

REVOLUTION VLR



**THE FUTURE IS
VERY LIGHT RAIL**

WWW.REVOLUTIONVLR.COM

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04



"Our mission is to help to facilitate the cost effective growth of the UK railway system, particularly through the use of line extensions and re-openings."

STARTING THE **REVOLUTION**

Revolution VLR is an innovative, first-of-a-kind project that utilises leading-edge technologies from the rail and other key sectors to provide a high-quality, affordable solution to facilitate growth of the UK railway, including line extensions and re-openings.

This revolutionary vehicle provides a unique blend of journey experience and ease of access. The lightweight composite bodyshell and hybrid powerpacks reduce energy consumption and maximise operational cost effectiveness.

Revolution VLR has been developed by a consortium of highly skilled, innovative, forward looking companies and organisations dedicated to the development and implementation of next generation Very Light Rail vehicles and technologies.

06



SUSTAINABILITY

Revolution VLR has been designed with sustainability as a key objective. It will enable all stakeholders such as scheme sponsors, land owners, developers and local authorities to ensure the provision of innovative, environmentally friendly, safe, secure and sustainable transport that make journeys easier and reliable.

“Our aim is to reduce the environmental impact of public transport/rail systems, provide sustainable cost-effective outcomes and educate future generations.”





INNOVATIVE **DESIGN**

The technologies incorporated in Revolution VLR ensure a cost effective, sustainable transport system. Modularity at system and sub-system level maximised through-life operational flexibility and technology insertion. This design approach facilitates reconfiguration to meet specific customer needs and provides multiple vehicle layout options.







CONSTRUCTION

- ▶ Composite bodyshell, recycled carbon fibre
- ▶ Spacious and high visibility driving cabs
- ▶ Modular vehicle design approach
- ▶ Easy access through four single sliding plug doors
- ▶ Kevlar-reinforced cabs



POWERPACK

- ▶ Efficient hybrid diesel-electric powertrain (Euro 6 compliant)
- ▶ LTO battery packs for performance, safety and durability
- ▶ Transferring state of the art automotive propulsion technology to a rail environment
- ▶ Low noise levels



PERFORMANCE

- ▶ Maximum speed of up to 65 mph (104 kph)
- ▶ High acceleration with regenerative braking
- ▶ Zero emissions operation up to 20mph
- ▶ Robust, industry proven LN25 bogies



CONFIGURATIONS

- ▶ Different vehicle interior configurations available
- ▶ Multiple propulsion system options
- ▶ Express logistics variant available



INTERIOR AND SECURITY

- ▶ Comfortable contemporary interior design
- ▶ Seating for up to 56 passengers
- ▶ Complies with PRM TSI accessibility requirements
- ▶ Heating, ventilation and air conditioning
- ▶ Interior and exterior CCTV cameras
- ▶ Passenger Information System (PIS)
- ▶ Ethernet backbone for WiFi connectivity
- ▶ Mobile device charging facilities





DEMONSTRATION **ENVIRONMENT**

Our Revolution VLR demonstration facility at Ironbridge, Shropshire, has been purpose-built to illustrate to stakeholders how a typical line reopening environment can be set up simply and cost effectively. It includes all essential elements for the operation of Revolution VLR in passenger service.



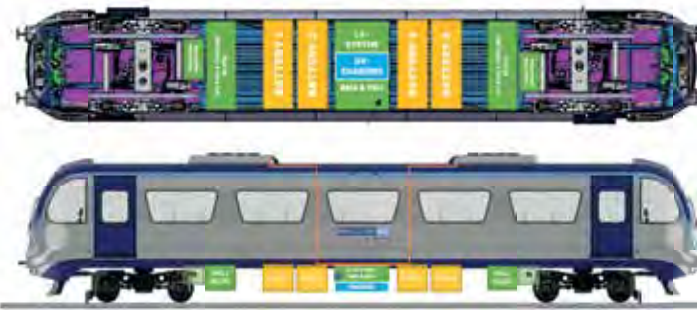




CONTINUING **EVOLUTION**

Building on stakeholder feedback the Revolution VLR team is progressing with development of further variants.

Current major workstreams include battery-only propulsion options with rapid charging capability, and an Express Logistics variant to assist in overall transport decarbonisation.





CONTACT US

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Ironbridge, Telford, TF8 7BL



Appendix F Network Rail Response to Sharpness Rail Timetable Study

Western House
1 Holbrook Way
Swindon
SN11BD

21 January 2021

To: Andy Faizey
Sharpness Development LLP

Dear Andy,

Response to Sharpness Branch Line Timetable Study – October 2020

Network Rail is pleased to provide you with an update on our considerations for the above. The scope of this response includes the following:

- The summary findings of our Quality Assurance report, detailing our assessment of the timetable analysis produced by Ed Jeffery Ltd, on the introduction of passenger services to the Sharpness Branch;
- Our advice on how the timetable study should be interpreted; and
- Our prioritised recommendations, should you wish to develop the proposal further.

Please note that this timetable analysis, which is at a high, overview level appropriate to the very early stage of the aspiration, is only one aspect of the feasibility of the scheme. As we have discussed in our productive meetings throughout 2020, of greater importance at this stage are – for the promoter – the strategic and economic case for the scheme, and – for the rail industry – the fit with strategic plans for the railway and the wider rail system implications.

1. Quality Assurance of the Sharpness Branch Line Timetable Study, Ed Jeffery Ltd, 14/10/2020

In summary, we found that the general scope of the report is appropriate for the early stage of scheme development and the analytical tools and techniques had been applied correctly, meaning that the findings of the study are valid.

The scope of the study, undertaken by Ed Jeffery Ltd., was to determine whether a 1tph or 2tph passenger service could be timetabled between a new station at Sharpness, at the far end of the branch line, and Gloucester, calling at Cam & Dursley to allow interchange for services to Bristol, with different levels of infrastructure intervention.

Our Quality Assurance assesses whether the analysis uses acceptable processes and data sources. Our report is enclosed with this letter. We found that the data used is correct, operational rules are adhered to, and necessary assumptions are reasonable for this early stage of development. The capacity identified in the two timetable hours analysed is as described in the report. The infrastructure interventions suggested for the 2tph option would be likely to resolve the identified operational constraints.

2. NR Interpretation of timetable study findings

The level of analysis undertaken is appropriate for this early stage of development, but there are important omissions and potential developments that would need to be factored into further timetable analysis. One of these is operation of the existing freight service on the branch line, where additional infrastructure may be required to develop an acceptable solution.

The timetable base used took account of committed enhancements to services, but rightly did not take account of potential future mainline service enhancements. As these develop further analysis will need to account for them, and the capacity that exists in the assessed timetable for Sharpness services may no longer exist, meaning more significant interventions are required.

The interventions identified as required must not be understated. None have been developed to any level so cannot be assumed to be feasible, and it is highly likely that additional scope would emerge (for example, level crossing risk mitigation measures on the branch line).

The timetable study recommends discounting the Do Minimum option, and NR supports this approach. However even this option includes a complete upgrade of the branch line, including resignalling. The Do Something includes the same scope but to a higher specification, as well as replacement of a main line crossover. Although no estimates have been developed a cost well into the tens of millions of pounds must be expected. The proposed intervention at Gloucester station if feasible would also involve substantial costs to the project, including through disruptive access.

Decisions on further development of the proposal to introduce passenger services to the Sharpness Branch must be taken in recognition of the substantial capital cost the scheme would incur and whether this is able to deliver a value for money solution for both passengers and taxpayers.

3. Priorities for further development

The timetable study indicates that an additional one or two train per hour service between Sharpness and Gloucester could be accommodated in the assessed timetable with significant infrastructure interventions including upgrade and resignalling of the branch line, replacement of the mainline crossing, and, in the case of the 2tph service, infrastructure interventions at Gloucester station. However, timetable analysis is only one aspect of the feasibility of the scheme. Of equal importance are the strategic and economic cases; and developing a view of how it could be operated. Development of these aspects will indicate whether further timetable analysis is worthwhile.

a) Strategic and economic case

The strategic case for the proposal is of critical importance. Funders, in addition to fully understanding the transport problem that this proposal was looking to solve, would expect to see alignment with and consensus between relevant transport and planning authorities, and clear links to the policy and investment goals of local, regional, and national government, as well as to their specific transport plans.

We note that this aspiration has not been promoted by any stakeholder in our ongoing Strategic Study for the Bristol to Birmingham Corridor, which is being undertaken in partnership with Sub-national Transport Bodies, and with representatives from county authorities and operators.

Inevitably this aspiration would compete for capacity on the network with other aspirations that do have broad-based support and may be at more advanced stages of development, such as the Midlands Rail Hub, which seeks to introduce new services in this corridor that would reduce the

capacity available for the Sharpness services. Understandably these further aspirations have not been taken into account in the timetable development to date.

The potential demand for and revenue generated by the new services is of critical importance for funders and operators, to demonstrate both the role the services could have and their financial viability. In this case of a short branch line demand from Sharpness would have to carry the ongoing cost of operation, as well as contribute to a substantial infrastructure cost. A large volume of regular users would be required, likely to constitute an exceptionally high modal share of the catchment population. This ties in to the need to demonstrate in the strategic case that this offers a viable service to the places people are likely to want to travel that is more attractive than competing modes.

b) Operation of services

Operation of passenger train services in Great Britain is undertaken train operating companies contracted by national governments to provide services, or directly subsidised by revenues or other means. Consideration of the operating model for Sharpness services, including whether they may form additions to an existing operator's contract is an essential consideration. Engagement with a Train Operating Company will help to establish the feasibility of the proposal, and specific issues. It will also inform the approach to procurement of rolling stock and stabling and maintenance facilities required, which will have major impacts on the operational and financial viability. GWR are the local operator and we would recommend contacting them to discuss your proposal with them in more detail.

Summary

We are pleased to provide our Quality Assurance report confirming that the analysis undertaken in the Sharpness Branch Line Timetable Study is sound and its findings valid. The timetable study, and our acceptance of it, does not demonstrate that the scheme is feasible or that it is supported by Network Rail or the rail industry. We recognise, however, that schemes such as this have the potential to be transformational by supporting local and regional growth in a sustainable way.

We recommend that the essential next step, if the proposal is to be taken forward, is development of the strategic and economic case, to clearly identify its likely benefits and costs, and in particular to establish and demonstrate alignment with and support by relevant strategic transport and planning authorities. Once this is established, we recommend engagement with rail industry stakeholders including our (Western Strategic Planning) team and GWR to assist with further development.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'M Haywood', written in a cursive style.

Matt Haywood

Lead Strategic Planner – Western, Wales & Western Region

Sharpness Quality Assurance

Capacity Analysis – System Operator

Analytical Assurance Statement


20 November 2020

Author:

Pete Piercy

Document Owner:

Paul Woodcock

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Date	20 November 2020
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Author	Pete Piercy
Document Location	V/SAP-Project/Western/2020- Sharpness Branch/004 Report
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DOCUMENT ADMINISTRATION

Change Record			
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0.1	20/11/20	Pete Piercy	Matt Haywood
0.2	14/12/20	Pete Piercy	Matt Haywood / Tamsin Dangerfield
1.0	15/01/20	Pete Piercy	

Abbreviations	
Acronym	Meaning
CA	Capacity Analysis
QA	Quality Assurance

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Part A: Analytical Assurance Statement

Network Rail Capacity Analysis (CA) has undertaken a quality assurance assessment of the files entitled '1 tph timetable' submitted by Ed Jeffery Limited on behalf of Sharpness Development LLP in relation to the reinstatement of passenger services on the Sharpness Branch Line. It should be noted that this file covers the 2tph option as well. Although the work was undertaken in ATTUne, CA used the same process detailed in the TPS Quality Assurance Guidelines v1.1 document and provides a high level view on whether the work undertaken is sufficient for this stage of development.

This Analytical Assurance Statement has been based on the timetable submission and the report dated 14 October 2020 from Ed Jeffery Limited.

CA undertook a review of the report of the Draft submission and reported the following findings:

The general scope of the timetable analysis is appropriate for an early stage. However, the current outputs highlight that the IRTs for the passenger stock have been 'Proportionally Estimated' for the Sharpness branch. This is not expected to impact the results.

It worth noting that, while not part of the assumptions for this piece of work, there are some potential future service proposals that could have an impact of the feasibility of these services. For example.

- Bristol – Birmingham CMSP

From the two hours of the timetable that were sampled, 07:00 to 08:00 to cover a peak hour and 10:00 to 11:00 to cover an off-peak hour. The 'white space' in the timetable exists as described in the report and would support the 1tph Do Something option.

The report highlights operational issues at Gloucester for platforming a second train every hour. The suggested intervention of amending the signalling at Gloucester has the potential to resolve the issue under the 'do something' option for 2 tph, if proved to be feasible.

Part B: Introduction

B.01 Background

The Sharpness Branch Line leaves the Bristol – Birmingham Main Line at Berkeley Road Junction (**Error! Reference source not found.**). Since passenger services were withdrawn in 1964, it has been used only for freight, and is maintained and operated as a freight-only line. Current traffic is typically only one freight train per week, associated with the decommissioning of Berkeley Nuclear Power Station.

The Sharpness Development LLP is promoting land near Sharpness alongside the branch line as a potential location for up to 5000 new homes (up to 2400 proposed before 2040). To support this development, the promoters seek to understand the feasibility of reintroducing passenger services onto the route, with either a 1 train per hour (tph) or a 2 tph service to Gloucester, calling at Cam & Dursley station to provide interchange onto services to Bristol.

B.02 Methodology

The QA has been carried out following the process set out in the Train Planning System Assurance Guidelines for Capability and Capacity Analysis V1.1. It should be noted that while this document has been produced to use on studies undertaken in Train Planning System (TPS) both the study and the quality assurance has been undertaken in Attune. The processes and theory detailed in the document can be used for both software and does not alter the Quality Assurance output.

To determine the level of assurance required the Impact Matrix referenced in Part D of the guidelines has been applied. In conjunction with our System Operator colleagues this analysis has been deemed to be of medium impact; the tables below detail the level of review required.

Input	High Impact	Medium Impact	Low Impact
Conformity to ITSS	100 % check	100 % check	100 % check
Master Data**	100 % check	100 % check	100 % check

Supplemental Data	100 % check	90 % check or 100 inputs whichever is smaller	80 % check or 50 inputs whichever is smaller
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*calculating one train will check the whole infrastructure for master data errors.

†calculating all unique train routes is required to check for problems which are not listed as errors such as missing block sections.

Table 1 - Level of Quality Assurance required for TPS Inputs

Output	High Impact	Medium Impact	Low Impact
Train Run	100 % check of every unique hour	If available check 2 unique hours*	Check the busiest hour
Timing Allowances	100 % check of every unique hour	If available check 2 unique hours*	Check the busiest hour
TPRs	100 % check of every unique hour	If available check 2 unique hours*	Check the busiest hour

*where possible a peak and off-peak hour.

Table 2 - Level of Quality Assurance required for TPS Outputs

The two unique hours used for the assurance was 07:00 to 08:00 to cover a peak hour and 10:00 to 11:00 to cover an off-peak hour. Key locations e.g. stations and junctions within the geographical scope of the study were reviewed individually within the hours noted and concerns identified in the findings below. This assurance has not considered unit diagramming. An analytical assurance statement has been included following completion of the assurance.

Part C: Findings

Conformity to the Indicative Train Service Specification (ITSS)	All trains listed in the ITSS should be accounted for within the project
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The report issued by Ed Jeffery Ltd is a high level view of what a Sharpness passenger could look like. There was no ITSS issued other than to review the options of 1tph and 2tph.

Master Data	TIPLOCs and Planning Location Banks should allow for a train to be calculated and ordered correctly
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The Master data is correct and allows trains to be calculated and ordered correctly. High level infrastructure assumptions have been made for an intervention - re-signalling at Gloucester that could allow for 2tph. For this stage of the project these are reasonable but should be reviewed when further development on this has been undertaken.

The figure below shows the proposed intervention for Gloucester station;

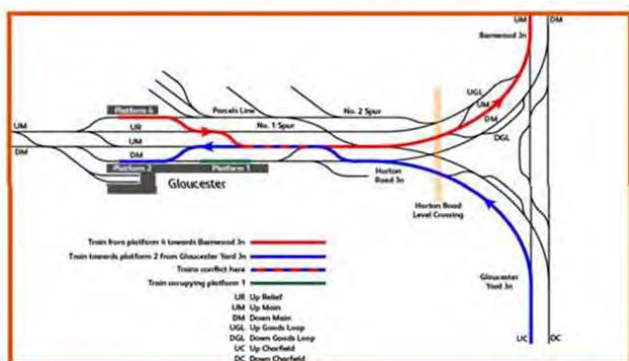


Figure D.3: Illustration of conflicts in the Gloucester station area

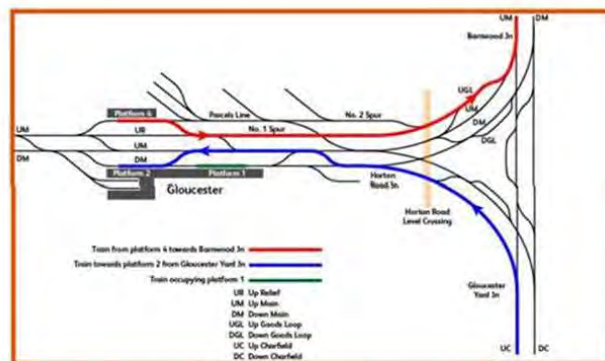


Figure D.4: Potential infrastructure intervention - No. 1 Spur useable by passenger services

**Supplementary
Data**

All SRTs should be present and correct

Where SRTs are not available high-level assumptions have been made. These assumptions are reasonable for this stage of the project but should be reviewed when further development on this has been undertaken.

TPRs

The timetable produced should be fully compliant with the relevant TPRs and/ or project assumptions.

Dwells

The Ed Jeffery Ltd Report has suggested a 7-minute turn round as a minimum which is in line with the Timetable Planning Rules.

Appendix G Sharpness Rail Timetable Study Update to consider new station and Stonehouse, Bristol Road

TECHNICAL NOTE

DOCUMENT CONTROL	
Project Title	Sharpness Branch Line
Version Number	1
Author(s)	Ed Jeffery
Status	Draft
Date	20 th June 2022

1 Background

A timetable study was undertaken in 2020 considering the feasibility of re-introducing a passenger train service on the Sharpness Branch line to support residential development (“Sharpness Branch Line Timetable Study”, 14/10/2020). This concluded that a service could operate between Sharpness and Gloucester with either a 1 train per hour or 2 trains per hour (tph) scenario (the 2 tph scenario requiring some additional infrastructure interventions in the Gloucester area).

Since the completion of that study, a strategic business case is being developed by Stroud District Council for a proposed new station at Stonehouse (Bristol Road) (on the Birmingham – Bristol main line, assumed to be just south of Standish Junction). Although the Sharpness trains would not necessarily call at this station, it is possible that this station may impact on the feasibility of delivering the Sharpness trains.

Therefore, this Technical Note summarises a sensitivity undertaken on the previous timetable analysis to determine what interaction there may be between the two schemes.

2 Findings

2.1 Calling Bristol – Gloucester services

In addition to the Sharpness service, the previous analysis also considered an additional train from Bristol to Gloucester, as delivered by the MetroWest scheme. The precise details of this train were not known, so it was assumed that this service operated approximately half-hourly with the existing Bristol – Gloucester (and beyond) service. It is therefore assumed that either or both of the Bristol – Gloucester services could call at Stonehouse (Bristol Road).

TECHNICAL NOTE

In the Down direction (from Sharpness / Bristol – Gloucester), an extract from the 1 tph Sharpness timetable is shown below (the 2 tph timetable is the same, but with the second Sharpness path half-hourly from the first).

	Bristol – Gloucester	Bristol – Manchester	Sharpness (new train)	MetroWest (new train)	Plymouth – Scotland	London – Cheltenham
Sharpness			1028 (depart)			
Berkeley Road Jn	1008 ½ (pass)	1023 (pass)	1033 (pass)	1038 (pass)	1057 ½ (pass)	
Cam & Dursley	1011 (stop)		1036 (stop)	1041 (stop)		
Standish Jn	1016 ½ (pass)	1028 (pass)	1041 ½ (pass)	1046 ½ (pass)	1102 ½ (pass)	1106 (pass)
Gloucester Yard Jn	1023 (pass)	1032 ½ (pass)	1048 (pass)	1054 (pass)	1107 (pass)	1112 (pass)
Gloucester	1029 (arrive)		1054 (arrive)	1058 (arrive)		1115 (arrive)

This shows that the Sharpness trains run immediately in front of the existing or new Bristol – Gloucester services. Adding a stop to the Bristol – Gloucester services would therefore have no impact on the Sharpness trains, providing they do not need to run earlier (i.e. if the Gloucester timings were fixed).

In fact, both Bristol – Gloucester trains have 2 – 2.5 minutes of pathing time (additional non-mandatory allowance) added between Standish Junction and Gloucester to ensure they arrive at Gloucester in the correct times for platforming purposes. This time could therefore be replaced with a stop at Stonehouse (Bristol Road) with no other impact on any train service, including the Sharpness trains.

The Up (Gloucester – Bristol / Sharpness) service is shown below.

	MetroWest (new train)	Cheltenham – London	Manchester – Bristol	Gloucester – Bristol	Scotland – Plymouth	Sharpness (new train)
Gloucester	1008 (depart)	1012 ½ (depart)		1042 (depart)		1101 (depart)
Gloucester Yard Jn	1010 ½ (pass)	1015 (pass)	1031 ½ (pass)	1044 (pass)	1057 ½ (pass)	1103 ½ (pass)
Standish Jn	1016 (pass)	1020 ½ (pass)	1035 ½ (pass)	1049 (pass)	1101 ½ (pass)	1109 (pass)
Cam & Dursley	1021 (stop)			1054 (stop)		1114 (depart)
Berkeley Road Junction	1024 (pass)		1040 (pass)	1057 (pass)	1105 ½ (pass)	1117 ½ (pass)
Sharpness						1123 (arrive)

TECHNICAL NOTE

In this direction, the Sharpness trains run immediately in front of the Gloucester – Bristol trains. There is no pathing time to remove in this direction, and it is assumed that the timings of the trains are fixed in the paths shown southwards due to constraints in the Bristol area. Therefore, the only way to accommodate a call is to depart Gloucester earlier (1.5 - 2 minutes is assumed to be required to include the station stop). This moves the train closer to the Sharpness train in both scenarios, but still complies with the minimum headway included in the Timetable Planning Rules. This reduces the turnaround / dwell times of the trains at Gloucester, but they still comply with the minimum required.

At Gloucester, the arrival times of the Down Bristol trains do not change, so there is no impact on platforming. The Up trains depart earlier, but this does not impact on the Sharpness trains (and is also compliant with other services in the standard hours considered).

Therefore, it can be concluded that adding a Stonehouse (Bristol Road) stop to the two Bristol – Gloucester services does not have any practical impact on the Sharpness trains.

2.2 Calling Sharpness services

Calling at Stonehouse (Bristol Road) is not required for the Sharpness services. However, it is technically possible to do so if required. In the Down direction, the Sharpness services have a small amount of pathing time that could be used to accommodate a station call. In the Up direction, there is no pathing time and the turnaround times at both ends of the route are constrained. The turnaround times could be reduced (and would still comply with the minimum) but this would impact on performance as the trains would have less time to recover.

With the 2 tph solution, it would be possible to provide 1 call per hour in opposite trains, therefore minimising the overall impact on performance.

However, as noted previously, the Sharpness trains run close to the Bristol – Gloucester services. If the Sharpness trains were also to call at Stonehouse (Bristol Road), the timings of the station calls would be very close together. Therefore, although an additional call would be provided, it would not be at an even spacing for passengers.

3 Conclusions

The provision of a new station at Stonehouse (Bristol Road) does not impact on the proposals for the re-introduction of passenger services on the Sharpness Branch. The Sharpness – Gloucester and Bristol – Gloucester services do not interact in a way that would impact on the operation of the Sharpness service and the two schemes are therefore compatible.

TECHNICAL NOTE

Although not an output for the Sharpness service, it may be possible to call the Sharpness trains at the new station as well, although this is likely to impact on performance (and would not provide an even interval timetable for passengers).

Once the full MetroWest timetable details are available, it may be necessary to confirm that this is still the case. However, there is likely to be minimal impact as there is a degree of flexibility provided by the operation of the Sharpness services. They are effectively 'fixed' at the Gloucester end only (by the platform interactions) and can therefore be 'flexed' as necessary to accommodate changes to the timetable elsewhere (provided the minimum turnround times are maintained at both ends).

It is much more difficult to adjust through services such as the Bristol – Gloucester / Worcester trains as they are more constrained in multiple locations. Timings through the Bristol area are likely to be fixed due to the need to fit amongst the high service levels in the area. Timings are also constrained by platforming at Gloucester and by interactions with further trains when they run on (e.g. to Worcester). The calls at Stonehouse (Bristol Road) have only been accommodated by there being pathing allowance in the right place and there being excess dwell / turnround time at Gloucester (that does not cause issues with other services).

Therefore, in this respect, the Sharpness services are relatively easier to accommodate compared to attempting to amend through services.

Appendix H Sharpness Development LLP & VoBR Statement of Common Ground



Sharpness Vale

STATEMENT OF COMMON GROUND BETWEEN THE VALE OF BERKELEY RAILWAY TRUST AND SHARPNESS DEVELOPMENT LLP

On behalf of **Sharpness Development LLP**

Project Ref: 41745/7422 | Rev: 2 | Date: 7 October 2022

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Project Name: Sharpness Vale

Project Ref: 41745

Report Title: STATEMENT OF COMMON GROUND BETWEEN THE VALE OF BERKELEY RAILWAY TRUST AND SHARPNESS DEVELOPMENT LLP

Doc Ref: 7422/SoCG

Date: 7 April 2022

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For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
Rev 2	08/07/2022	Revised with agreed amendments in consultation meeting with VoBR	Leigh Stolworthy	VoBR/TA	
Rev 3	30/09/2022	Revised with final edits from Leigh Stolworthy, Tim Allen, David Snell and Howard Parker	Leigh Stolworthy	DG	

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Appendices

Appendix A

Meeting Notes – Meeting between VoBR and Stantec, 16 February 2022

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1 Introduction

1.1 Background

- 1.1.1 Sharpness Development LLP are the promoters of the proposed Sharpness Vale settlement at land south and east of Newtown and Sharpness, in the district of Stroud, Gloucestershire.
- 1.1.2 The Vale of Berkeley Railway Charitable Trust (VoBR) is a charitable organisation, established to pursue the preservation of the Sharpness branch line and to operate heritage railway services along the line.

1.2 Sharpness Vale

- 1.2.1 The site, 'Sharpness Vale' is identified in the Stroud District Council's "Local Plan Review Draft" which has been submitted to the Secretary of State for consideration. The draft Plan is likely to be considered at an Examination in Public (EiP) during the second half of 2022. The site comprises the largest strategic allocation in the plan, under site reference 'PS36' comprising:
- 10ha mixed employment uses, to complement what already exists at and around Sharpness Docks;
 - 2,400 dwellings in the Local Plan period, by 2040, and a total of 5,000 by 2050;
 - Local centre including shops and community uses, primary school(s) and secondary school, associated community and open space uses;
 - Strategic green infrastructure and landscaping;
 - Priority for walking, cycling, "micro-mobility" modes and public transport over the use of the private car including high quality pedestrian, cycle and micro-mobility routes throughout the development, bus only routes and displaced car parking;
 - The reopening of the Sharpness Branch line to passenger services, in addition to the current freight operations, including provision of a new rail station, providing direct rail services to Cam and Gloucester, and onwards journeys to Bristol and the rest of the UK; and
 - Flexible and targeted bus services, utilising "Demand Responsive" services, traditional local bus routes, bespoke coach services and other emerging technologies to provide for a wide range of different journey purposes.
- 1.2.2 A vision for movement at Sharpness Vale has been developed that picks up on the latest transport and travel trends. This includes the re-opening of the railway which is central to the proposed mass transit solution for longer distance trips from Sharpness Vale to the North.
- 1.2.3 Further details of the development proposals are set out in the various documents and representations submitted as part of the Local Plan process, and so these are not replicated in this document.

1.3 Vale of Berkeley Railway Trust

- 1.3.1 Description of the aims and aspirations of the VoBR

The Vale of Berkeley Railway Charitable Trust (VoBR) is a registered charity (charity number 1176597) established *"to advance the education of the public in the history and heritage of the Sharpness Railway Branch Line, by the restoration, preservation and operation of the line or any part or parts thereof including the station and associated buildings, locomotives and rolling*

stock as a working museum for the benefit of the public” as a Heritage Railway. It is agreed that, in fulfilling the charitable objective, the VoBR will bring significant benefit to the area by increasing tourist footfall and extending the tourism season, and by providing employment and leisure opportunities.

An All-Party Parliamentary Study in 2013 recognised the significant contribution that Heritage Railways make to the UK economy (around £250m per year – recently updated to over £400m), with on average £2.70 being spent in local businesses by visitors for every £1 spent on the railway itself, and in terms of direct and indirect employment. In addition, Heritage Railways support over 20,000 volunteers nationally, bringing substantial benefit to the health and mental wellbeing of those involved.

1.3.2 Brief details of progress made to date

The VoBR have been in discussion with Network Rail (NR) regarding leasing the entire branch line for some years, and in June 2018 received a letter from them setting a number of criteria that must be met as follows:

- The Office of Road & Rail (ORR) Licence Condition 7 approval
- Network change
- Award of sufficient funding
- Planning Permission
- Track Access Agreement (if required)
- ORR Licence Exemption Notice – s7 Railways Act 1993
- Agreement with DRS, and completion of works to construct a loop at Berkeley
- Asset Protection Agreement
- Undertaking to meet the Legal and Surveying Costs of NR

Work to satisfy the criteria is well advanced and negotiations on the lease content are now concluded, although it remains unsigned in respect of the whole branch line.

However, since March 2018 the VoBR have occupied the former Sharpness Docks exchange sidings site at the end of the branch line under licence from NR. A 25-year lease has been granted to VoBR to develop a heritage railway maintenance, storage and display facility. This is planned to be the operational base for the VoBR, replacing the current facility in Sharpness Docks. It provides sufficient space for carriage and locomotive maintenance and the stabling of other rolling stock that might be provided for public use. There is also space at the Berkeley station site that could be used for this purpose.

1.3.3 Brief details of proposals for the future and programme

The VoBR have met with the railway regulator (the Office of Rail and Road – ORR) and are preparing the comprehensive Safety Management System that the ORR require to be in place before granting either a Licence or Licence Exemption as appropriate, which will allow the VoBR to commence railway operations over a section of the branch line from Newtown to Berkeley.

It is VoBR’s ultimate intention to also operate trains on the section of the branch line east of Berkeley, alongside the occasional DRS trains that will use this part of the line. This will be subject to ORR approval, and agreement in principle has been reached with DRS as to how these operations can be managed. The VoBR is currently in discussion with both NR and

Nuclear Transport Solutions (NTS) regarding this. Further details of VoBR development plans are provided in section 2 below.

1.4 The Purpose of this Statement of Common Ground

- 1.4.1 This document has been jointly prepared by the Sharpness Development LLP (SD LLP) and the Vale of Berkeley Railway Charitable Trust (VoBR) to aid discussion and planning for the future use of the Sharpness branch railway line by both parties assuming both achieve the required consents to progress.
- 1.4.2 Both parties agree that the future use of the line should be available to all, and that there is no technical or operational reason why both parties' objectives cannot be achieved. Indeed, the potential for success in re-developing and re-invigorating the line may well lie in the breadth of different uses that are being discussed. However, for this to be achieved both parties recognise that they will need to work together, discuss their particular requirements regularly and collaborate to ensure that, as far as possible, they do not prejudice the achievement of each other's objectives. The parties recognise that, where conflicts may occur that they will necessarily need to work together to develop sensible compromises and operational arrangements to maintain the momentum of both projects.
- 1.4.3 The parties also recognise that their respective timescales may be different – and that this is likely to create challenges in reaching agreement in the short term without the level of partnership working and collaboration that is being outlined. In particular, the VoBR want to progress their proposals in the next few months and years, whereas the new development proposals will follow the Local Plan process, and hence may not see physical works to provide train services for some years into the future.
- 1.4.4 Collaboration between the two organisations is considered to have the following benefits:
- reduce delivery costs and allow coordinated deployment of available resources
 - bring forward delivery of passenger rail services to the area, and
 - increase tourism, leisure, and education opportunities, with consequent economic benefits and job creation.

2 Vale of Berkeley Railway (VoBR) Plans

2.1.1 Both parties agree that it is helpful to set out a mutual understanding of the aims and objectives of the VoBR, as this establishes the broad context for collaborative running of trains and the re-establishment of services in the future.

2.2 VoBR Phase 1 Plans at Sharpness Docks end of the Branch Line

2.2.1 At Sharpness, VoBR activities would involve the following:

- Building a Shed for storage of the locomotives, coaches & wagons at Oldminster Sidings
- Building basic facilities at Oldminster Sidings to allow a Heritage Train operation including toilets, workshop, watering facilities, coaling etc, and
- Laying track in Oldminster Sidings connecting the shed and platform to the Sharpness branch line at Oldminster junction loop.



Figure 1 - VoBR Phase One Plans at Sharpness (courtesy of VoBR)

2.2.2 All of these proposals lie to the north of any of the proposed Sharpness Vale development rail proposals, and so, for clarity, there is no interaction between the Sharpness Vale rail scheme and the VoBR scheme at Sharpness Docks.

2.3 VoBR Phase 1 Plans at Berkeley Station

- 2.3.1 At Berkeley phase one would involve building a platform at Berkeley Station, most likely on the site of the old south platform.
- 2.3.2 The proposed new passenger rail service for the Sharpness Vale Development and the proposed VoBR historic rail service would need to co-exist on common track between the new “Sharpness Vale” station for the development and the restored Berkeley Station to be used by the VoBR.
- 2.3.3 It is agreed by the parties that the VoBR Phase One plans can be implemented without prejudice to the future delivery of scheduled train services along the branch line and onwards to Cam & Dursley and Gloucester, and potentially beyond.
- 2.3.4 It is further agreed that the provision of a passing loop at Berkeley Station will facilitate common running between VoBR and scheduled passenger services along the line, as this will provide the opportunity for trains to pass each other at an additional location along the branchline. The delivery of this loop will need to be incorporated into the works required to re-establish the scheduled passenger services on the line should these come forward in due course. Hence, it is agreed that these proposals are intrinsically helpful to both parties in achieving their respective aims and objectives. This is dealt with in more detail in section 4.4 below.

2.4 Phase 2 VoBR Plans

- 2.4.1 VoBR’s current plans are focussed heavily on development of the site at Oldminster as a railway centre with the intention of reconnecting with the branch line as soon as possible so that movements on the line itself become possible.
- 2.4.2 VoBR has begun negotiations with Network Rail to lease the line between Oldminster Sidings up to Berkeley station which will enable the introduction of a new platform at Newtown.
- 2.4.3 VoBR and SD LLP have held preliminary discussions regarding the possibility of locating a joint station in the Sharpness Development area. Whilst this has not been concluded, VoBR and SD LLP agree that continued close collaboration is required in order to identify optimal station locations that best serve the interests of all parties.
- 2.4.4 Both parties agree that VoBR’s plans can be integrated within the Sharpness Vale proposals to allow passenger and heritage services to operate seamlessly. Both parties are supportive of VoBR’s aspirations to re-establish a heritage related station at a location within or near Newtown.

2.5 Future VoBR Plan Phases

- 2.5.1 A series of later phases would look to developing the railway further, including rebuilding Berkeley station, possibly creating a halt at Cattle Country and extending further up the line towards Berkeley Road and further improving facilities for visitors, such as a Park and Ride facility at Berkeley Road as part of a broader coordinated tourism experience.
- 2.5.2 The parties have agreed that, should these proposals develop, there would be a need to ensure that scheduled train services would be dove-tailed to accommodate public, freight and heritage services. It is agreed that this could be easily achievable by the provision of a further passing loop at an appropriate location which can be accommodated on the original twin track-bed.
- 2.5.3 Therefore, the parties have agreed that there is no reason that these additional phases could not be provided, subject to mutual agreement at the time, and that neither party would seek to object to them in principle, and that they would work together to deliver future enhancements to VoBR’s train operations as far as possible.

3 Sharpness Vale Rail Strategy

3.1 Introduction

- 3.1.1 The re-opening of the Sharpness branch line for passenger services would support the transport offer from Sharpness Vale. It is proposed that a new, fully accessible station, available to scheduled and VoBR trains, would need to be provided at Sharpness Vale, at an agreed location as close to the heart of the development as practicable.

3.2 Background

- 3.2.1 The reopened Sharpness Branch Line will be used by a service between a new station at Sharpness Vale and Gloucester with an intermediate stop at Cam & Dursley and possible stops at new stations at Stonehouse Bristol Road and Hunts Grove. The proposals are for an initial hourly service, which would be in place by the time the initial draft Local Plan phase of development (up to 2,400 homes) was completed, and that this would have the capability to expand to a half hourly service as demand grows with subsequent development beyond the draft Local Plan proposals.

3.3 Infrastructure Requirements

- 3.3.1 Both parties agree that upgrades to railway infrastructure will be required in order to deliver the proposed scheduled passenger train services. This is because, although the railway line is in place, and remains fully operational, it is only maintained at a suitable level for freight services at the moment. It is likely that the track would need to be upgraded to allow for the higher speeds that passenger services would need to travel at to provide attractive journey times. In addition, upgrades to signalling and token arrangements on the line, and providing access to it from the mainline, would also need to be upgraded.
- 3.3.2 Both parties agree that the requirement to upgrade the track and signalling along the branch line will be mutually beneficial and will assist in the operation of both passenger services related to the Sharpness Vale development and VoBR heritage services.
- 3.3.3 Both parties also agree that as the track is already in place and operational, that the costs of achieving this upgrade are likely to be significantly less than for many branch line resurrection schemes where the track bed itself would also need to be re-established. However, they also agree that there is no requirement for these upgrades to be in place to allow VoBR operations to commence and be maintained, and therefore that VoBR would not be expected to make a financial (or other material) contribution to the infrastructure upgrades.

3.4 Sharpness Vale Station

- 3.4.1 It is agreed that there should be a new station serving Sharpness Vale, at a location that best serves existing and future local communities. It is further agreed that this would most likely be at a location between Oldminster Sidings and the Berkeley Station site.
- 3.4.2 It is further understood by both parties that the scheduled passenger train will terminate at the new Sharpness Vale station. See Figure 3 below
- 3.4.3 It is envisaged that the Sharpness Vale station could usefully be made accessible to both scheduled passenger services and VoBR services, as this would allow tourists visiting VoBR to arrive by train, improve sustainable access to the visitor economy along the line and in the area generally. Therefore, the parties have agreed to work together to seek to deliver a station layout that can be delivered as economically as possible, but which will also allow the interaction of scheduled passenger train services and VoBR heritage services when necessary. Further details of this proposal are set out later in this document.

- 3.4.4 Therefore, it is agreed by both parties that, in order to serve the Sharpness Vale Development, the new Sharpness Vale station would be configured to include the following:
- A single 100m long platform
 - Automatic ticket machines
 - Lighting, security cameras and customer help points, and
 - Seating and an enclosed waiting areas on the platform.
- 3.4.5 It is not expected that the station would need to be staffed for the operation of the Sharpness Vale passenger service but would need to be staffed by VoBR as required. It is envisaged that the station would have the very latest connectivity and digital information to ensure that users were fully informed and able to obtain virtual tickets where necessary.
- 3.4.6 The station would be located within easy reach of the development at the market centre, where many of the local bus services and pedestrian / cycle / personal mobility routes would converge.

4 Matters Agreed between SD LLP and VoBR relating to operational considerations

4.1 VoBR / Stantec meeting at Sharpness – February 2022

- 4.1.1 On the 16th of February 2022 Tim Allen and Leigh Stolworthy of Stantec met with Howard Parker and David Snell of VoBR at the VoBR facilities in Sharpness. Notes of this meeting are attached as Appendix A
- 4.1.2 It was agreed that both parties considered that their respective aspirations were entirely compatible, and that there were a number of areas where collaboration would be mutually beneficial. Therefore, it was agreed that this Statement of Common Ground (SoCG) be drafted relating to the shared aspirations for the introduction of services on the Sharpness branch line.

4.2 Shared Aspirations for the Reintroduction of Rail Services on the Sharpness Branch Line

- 4.2.1 The intention of VoBR is to establish an operational historic rail service between Oldminster and the historic Berkeley Station whilst the Sharpness Vale Development intends to establish a commuter train service between a new Sharpness Station central to the development to Gloucester. This will create service overlaps as illustrated in Figure 2 below.

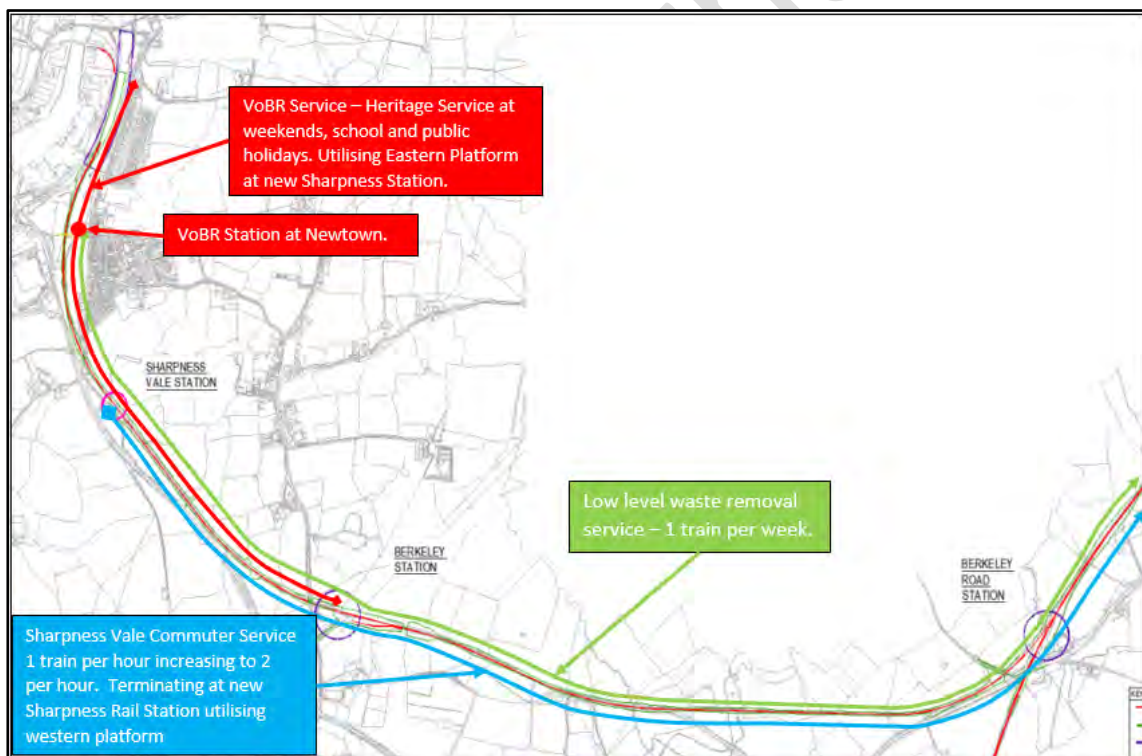


Figure 2 - VoBR and Sharpness Development rail service extents

4.3 Further Agreed Matters

- 4.3.1 The parties agree that the benefits of the scheme will be considered in the context of the existing communities in Sharpness, Berkeley, and surrounding villages and for the proposed new development areas.

- 4.3.2 The VoBR has no in principle objection to the proposed reintroduction of passenger railway services on the branch line in support of the Sharpness Vale development provided that it does not impede their plans for the introduction of a historic rail service as described in section 2 above. For clarity, it is noted by both parties that VoBR is maintaining an entirely neutral stance in respect of the merits or otherwise of the development proposals themselves, and considers that this is a matter for others to determine as part of the Local Plan process. Hence, VoBR has limited its comments and the scope of this SoCG purely to matters related to railway operations. Both parties note that VoBR has made a representation to the Inspector that argues for the inclusion of a reopened Berkeley station in the Local Plan.
- 4.3.3 The Sharpness Development LLP supports the introduction of a heritage rail service and museums and visitor facilities at Oldminster and Berkeley (and potentially at other locations to be agreed along the branch line) by the VoBR and recognises the added community benefit that this will create in enhancing the character and type of development it is trying to achieve at Sharpness.
- 4.3.4 Both parties agree that the future use of the line should be available to all, and that there is no technical or operational reason why both parties' objectives cannot be achieved.
- 4.3.5 In order for the two types of rail services to co-exist allowance needs to be made by Sharpness Vale in its redevelopment of the rail service to accommodate future VoBR operations. Similarly, once both services are operational, VoBR will need to ensure that any further development of its operations on the branch line between the Sharpness Vale station and the mainline will need to take account of any scheduled passenger and freight services that may be using the line.
- 4.3.6 The parties are agreed that a "first comer" principle is acceptable, whereby subsequent operational aspirations need to demonstrate how they can work around already established services, irrespective of who operates them.

4.4 Agreed Track Layouts

- 4.4.1 The two parties have discussed and agreed the means by which the services can co-exist on the branch line in respect of the likely arrangement of provision at the proposed Sharpness Vale station and at VoBR's proposed reopened station at Berkeley.

Sharpness Vale

- 4.4.2 The Sharpness Vale development will provide a new Sharpness Vale Station that will enable shared use by the commuter service to Gloucester as well as the historic rail service by VoBR. This could take the form of an island platform as illustrated in Figure 3 below.

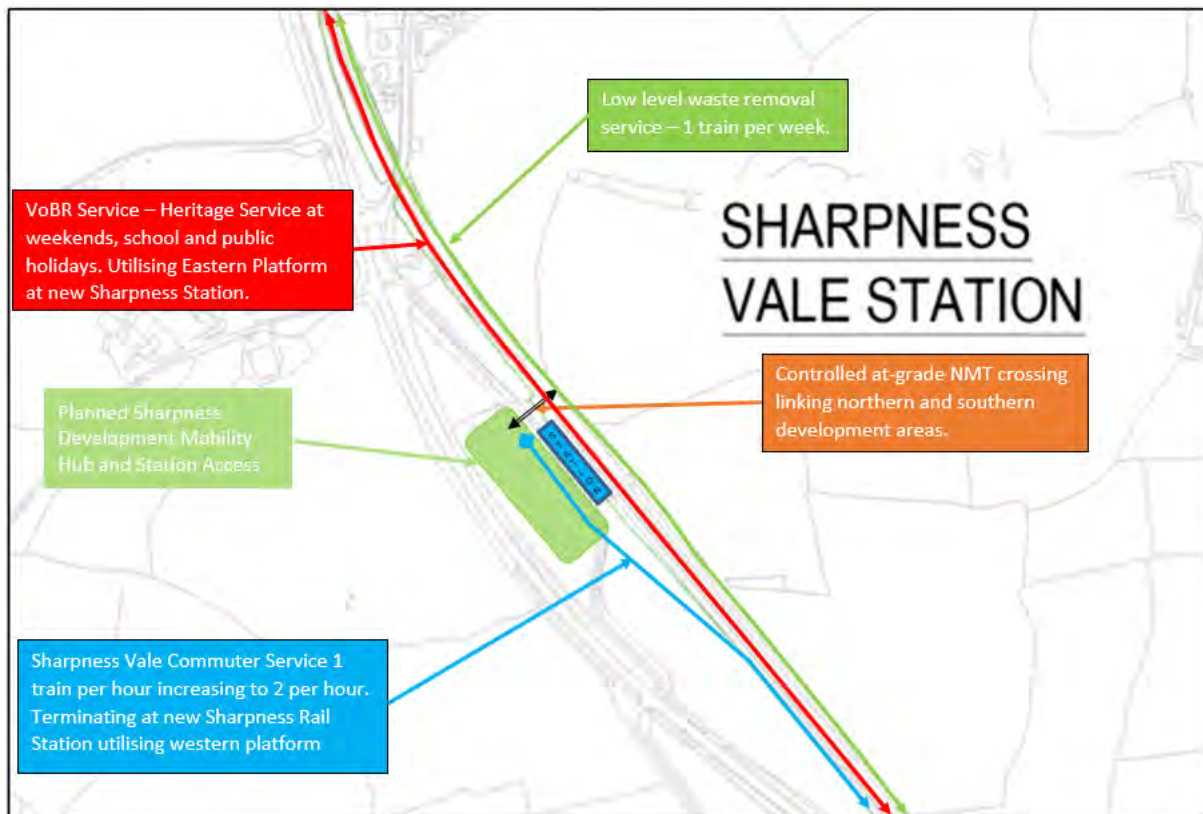


Figure 3 - New Shared Station at Sharpness

- 4.4.3 The Sharpness commuter service will not operate further north of the proposed Sharpness Vale Station, and it is proposed that a controlled at-grade non-motorised transport crossing be provided north of the new Sharpness Vale Station in order to provide a movement link between the northern and southern development areas in the centre of the development in the Station precinct. The design and operational control of this crossing will need to be in accordance with ORR requirements.
- 4.4.4 It is clear that there is no technical or operational reason why the intended uses of the branch line for passenger and freight services and as a heritage and tourist attraction cannot be achieved. The uses are considered compatible, and the busiest periods of each of the planned uses is not likely to overlap. The capacity of the line to meet the various demands is therefore not considered to be an issue or limitation. Where any VoBR services continue to the east, beyond the Sharpness Vale station location, they will, if necessary, be able to pass a scheduled passenger train at Sharpness Vale.
- 4.4.5 It is recognised that there are sound business advantages of collaboration to both organisations since by working together it should be possible to significantly reduce costs and also to potentially bring forward by several years the delivery of a regular passenger service between the Berkeley / Sharpness area and Gloucester and Bristol (the latter via a change at Cam & Dursley station).
- 4.4.6 VoBR hopes to be able to trial the operation of public trains running the full length of the branch and onto the mainline ahead of any developments related to the introduction of a full public train service. Information gained from this process will be helpful in planning future developments. Sharpness Development LLP is supportive of this initiative and will work with VoBR to help to procure it where appropriate,

Berkeley Station

- 4.4.7 It is agreed that provision needs to be made for a passing facility in or within the vicinity of the Berkeley Station in order to enable the Sharpness passenger services to pass a VoBR or DRS train at Berkeley Station. An option for this is illustrated in the figure below. However, the precise configuration of a loop at Berkeley will need the approval of NTS and Network Rail.

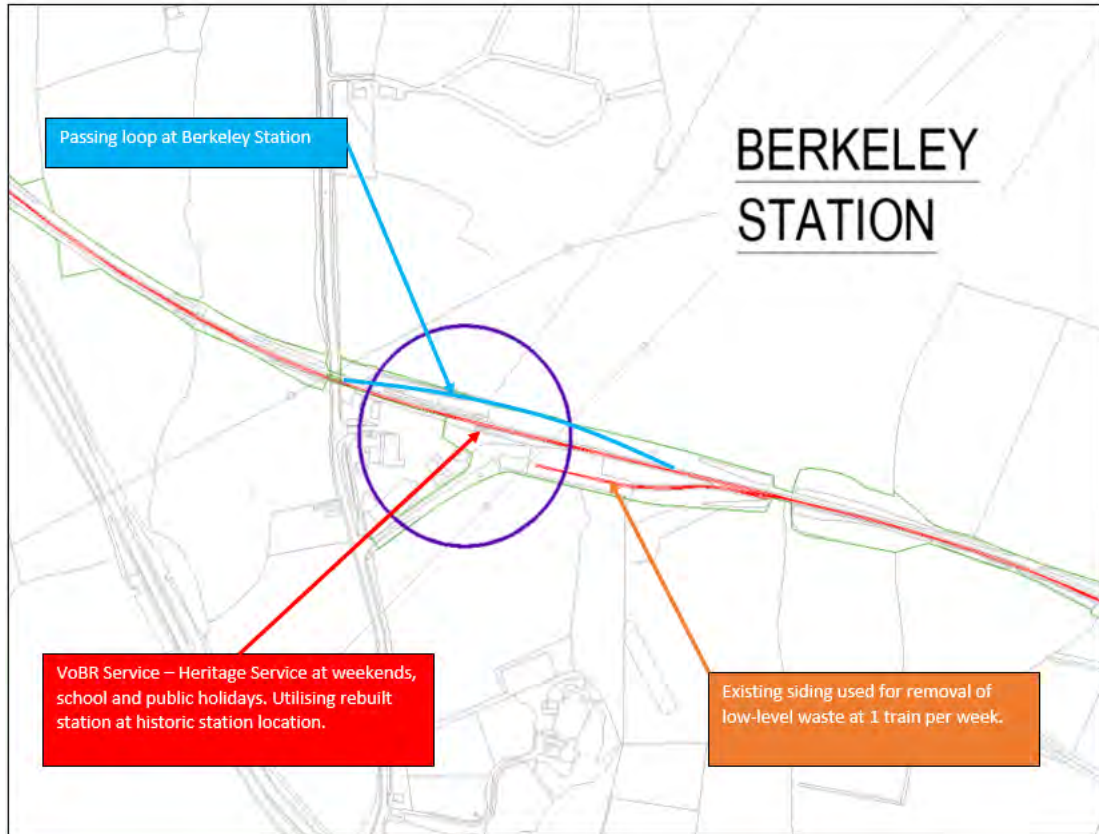


Figure 4 - Passing loop provision at Berkeley Station

- 4.4.8 It is further agreed that both the VoBR and Sharpness Development LLP will continue to collaborate in the development of their shared aspirations for the Sharpness Branch Line and keep each other informed of progress from both parties.

5 Report agreed by

Agreed on behalf of Sharpness Development LLP

.....Andy Faizey – Lioncourt Strategic Land

.....Date

.....Craig Currey – Green Square Accord

.....Date

Agreed on behalf of Vale of Berkeley Railway

.....Howard Parker

.....Date

Final for Signature

**Appendix A Meeting Notes – Meeting between
VoBR and Stantec, 16 February 2022**

Final for Signature

Appendix I 2022 Sharpness Rail Study Estimating the cost of reinstating passenger rail services on the Sharpness Branch

2022 Sharpness Rail Study

Estimating the cost of reinstating passenger rail services on the Sharpness Branch

NOVEMBER 2022

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This report dated 01 February 2023 has been prepared for Lioncourt Strategic Land (the “Client”) in accordance with the terms and conditions of appointment dated 01 August 2022(the “Appointment”) between the Client and **Arcadis (UK) Limited** (“Arcadis”) for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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Appendices

Appendix A

Service options and infrastructure matrix

Appendix B

Cost estimate breakdown

Appendix C

List of structures with description, condition and works required

Acronyms and abbreviations

3SC	Abbreviation of <i>third Severn crossing</i> , referring to a new bridge crossing at approximately the location of the former Severn Railway Bridge.
ACE	The name of the customer portal used by the Network Rail ASPRO team, for which each project has its own unique reference number.
APA	Abbreviation of <i>asset protection agreement</i> , one possible form of agreement made between a client and Network Rail during a third-party railway project.
ASPRO	Abbreviation of <i>asset protection</i> , referring to the Network Rail team that manage third-party projects.
attainable speed	The speed that a train can reach at a given position. This might be different in different directions, based on the position of stations and the gradient on the line.
BAPA	Abbreviation of <i>basic asset protection agreement</i> , one possible form of agreement made between a client and Network Rail during a third-party railway project.
BCMI	Abbreviation of <i>bridge condition measuring index</i> , a unique measurable score for the condition of a Network Rail structure
BSA	Abbreviation of <i>basic services agreement</i> , one possible form of agreement made between a client and Network Rail during a third-party railway project.
culvert	A type of structure that carries a small water course such as a stream under a highway or railway.
CV switch	A turnout with a short switch length using vertical rails, commonly allowing trains to diverge at 25mph.
DfT	Abbreviation of <i>Department for Transport</i> , the UK government department responsible for transport.
differential speed restriction	Where two or more speeds apply on a given stretch of track, generally for lighter and heavier trains.
DMU	<i>A diesel multiple unit train.</i>
EMGTPA	The traffic levels along a stretch of railway line, calculated as the <i>equated million gross tonnes per annum</i> , which approximates “annual tonnage”.
EMU	<i>An electric multiple unit.</i>
FRP	Abbreviation of <i>fibre-reinforced plastic</i> .

gauge clearance	The space between moving trains (specifically, their kinematic envelope) and the adjacent railway infrastructure.
GSM-R	Abbreviation of the <i>global system for mobile communications (railway)</i> , which is the current standard for radio communications on railways.
GWR	Common abbreviation of <i>Great Western Railway</i> , a train operating company.
IEQ	Abbreviation of <i>initial enquiry questionnaire</i> , a document submitted to the Network Rail ASPRO team in the early stages of a third-party railway project.
interlocking	In railway signalling, an interlocking is an arrangement of signal equipment that prevents conflicting movements of trains through any given track arrangement.
IPEMU	An <i>independently-powered multiple unit</i> . More commonly referred to as a BEMU, or a battery electric multiple unit.
journey time	The length of time a train takes to depart from one location and arrive at another, including the time taken to stop at intermediate stations.
km	Abbreviation of <i>kilometres</i> .
linespeed	The maximum value of speed that can be attained along a railway line is its <i>linespeed</i> . For example, the linespeed of the East Coast Main Line is 125mph, even though trains are limited to lower speeds on sections of that line.
mph	Abbreviation of <i>miles per hour</i> .
multiple unit or MU	A train comprised of several connected vehicles where power is applied by motors connected to wheels on more than one of them.
Network Rail or NR	The government body that owns and manages the majority of railway infrastructure in Wales, Scotland and England.
overbridge	A structure carrying something over the railway.
permanent speed restriction or PSR	The speed a train must not exceed, as defined between two points and generally marked by a speed board on the entry to the PSR.
permissible speed	The speed a train must not exceed at any specific point on a railway line. This may be different depending which direction a train is travelling, even along the same track.
plain line	In railway engineering, this refers to track that doesn't include switches and crossings and other features.

rolling stock	Refers to trains, locomotives, wagons, coaches, multiple unites and other vehicles that can travel on railway tracks.
Route Availability or RA	This refers to the combination of weight and speed of trains that are allowed along a given stretch of railway line as limited by the structures (generally underbridges) along that line. Specified as a number, such as RA10.
SIM	Abbreviation of <i>scheme interface manager</i> , the person appointed by the Network Rail ASPRO team as the single point of contact for a third-party railway project.
sixfoot	The name given to the standard distance between two railway tracks.
sleeper	In railway engineering, a transverse beam that supports plain line railway track.
strengthening	In railway engineering, this generally refers to the work needed to improve the capacity of a structure, usually to deal with increased loads passing over it.
structural capacity	In railway engineering, the ability of a bridge to sustain the loads passing through it.
switches and crossings or S&C	In railway engineering, the metalwork required where tracks intersect, converge or diverge.
tph	Abbreviation of <i>trains per hour</i> .
track alignment, track geometry	The horizontal and vertical alignment of a given railway track.
track materials	The components such as rails, sleepers and ballast, that form a railway track.
track realignment	Physical works that change the track geometry along a section of railway line.
track renewal	Physical works that change some or all of the track materials along a section of railway line.
turnout	A type of switch and crossing where tracks diverge or converge.
underbridge	A structure carrying the railway over something.
VLR	Abbreviation of <i>very light rail</i> , a recently coined term within the transport sector used to refer to lightweight trains and infrastructure.
VoBR	Abbreviation of the <i>Vale of Berkeley Railway</i> , a proposed heritage railway.

Executive summary

Building on previous studies, this report provides cost estimates for operating passenger services on the Sharpness Branch.

A workshop and subsequent analysis established a range of minimum viable rail service options that satisfied all stakeholders whilst enabling a more rapid and cost-effective entry into service of passenger operations. Each of these was costed, and the assessed “most likely” cost of delivery is included below:

- Service option 1 – Conventional multiple unit operation to Gloucester at 1tph or 2tph (£7.6M)
- Service option 2 – VLR operation to Gloucester at 1tph or 2tph (£4.9M)
- Service option 3 – VLR shuttle to Berkeley Road Junction (£8.8M)
- Service option 4 – Diversion of existing through service to Sharpness (£56M)

Arcadis recommends that service option 2 is taken forwards, as this option provides the most rapid path to deployment and can be incrementally enhanced to match passenger demand as the Sharpness development is advanced.

The following actions should be progressed at the next stage of development:

- timetable impacts of existing service alterations
- Revolution VLR entry into service timeline
- Cross Country Route resignalling scope
- infrastructure condition survey, desktop review of structure records, level crossing risk assessments
- train leasing costs
- begin Network Rail ASPRO engagement process

1 Introduction to the 2022 study

1.1 Study background

Arcadis have been engaged to support the property developer Lioncourt Strategic Land by developing updated cost estimates for a passenger rail link to support new housing developments in the Stroud District (Gloucestershire) area around Sharpness.

The development proposals include restoration of the existing Sharpness Branch to enable a passenger rail service at frequencies of one or two trains per hour, with a new station at Sharpness Vale. This would enhance local transport connections from the development northwards towards Gloucester and potentially southwards toward Bristol.

The restoration of passenger services interfaces with proposals for a heritage railway between Sharpness port and Berkeley.

1.1.1 The Sharpness Branch

Brief history

Originally built by the Midland Railway as a 4 mile long, two-track railway to link to the newly constructed docks on the River Severn, the Sharpness Branch was authorised in 1871 and opened in August 1876. By this point, construction had also started on a new crossing of the Severn which was to utilise this branch line. On opening in October 1879, the new Severn Bridge Railway was amalgamated with the Severn & Wye Railway on the western side of the river to form the Severn & Wye & Severn Bridge Joint Railway.

The aspiration was for the new bridge to form the main trunk railway route into England, and plans were in development for a new railway alignment to link directly to Gloucester from the eastern end of the bridge.

However, these plans were curtailed with the opening of the Great Western Railway's Severn Tunnel in 1886. Traffic diminished on the bridge, and the poor performance of the Severn & Wye & Severn Bridge Joint Railway led to its sale along with the Midland Railway's Sharpness Branch to form the Severn & Wye Joint Railway, operated by both the Great Western Railway and Midland Railway.

Construction of the Great Western Railway's Badminton Line (providing a bypass of central Bristol and a more direct route from London to the Severn Tunnel) included a south-facing chord at Berkeley Road, known as the Berkeley Road Loop. This opened in March 1908, though the limited load capacity of the original Severn Railway Bridge constrained its use for heavy freight.

In 1931, persistent low traffic on the Sharpness Branch led to its conversion to single track by its post-Grouping owners, the London, Midland and Scottish Railway. Following nationalisation, British Railways undertook strengthening work to enable heavier trains to use the bridge, however in October 1960 the bridge was struck by an errant barge and two spans collapsed. Further damage led to a decision to demolish the bridge, with the final work being completed in May 1970. Meanwhile, the Berkeley Road Loop was lifted in 1963.

The line today

The existing Sharpness branch (engineers' line reference SAW) utilises the remaining Midland Railway link to the docks, with mostly single track between Berkeley Road Junction and Sharpness. The current speed throughout the line is 15mph, though the alignment is capable of higher speeds as high as 75mph or more.

Whilst this section of line previously included stations at Berkeley Road, Berkeley and Sharpness, today it is used exclusively for freight. Services operate bi-directionally using token block signalling, and the only regular trains are operated by Direct Rail Services Ltd for nuclear waste decommissioning. Whilst there are currently freight “paths” for two trains per day, actual usage is no greater than two or three freight trains per week.

Track condition along the line is varied but has been assumed as acceptable for safe operation of freight services (thus also for light passenger services). Track materials are also mixed, but much of the line is laid in bullhead rail on timber sleepers. Much of the sidings remain at Sharpness docks, however these are overgrown and likely in poor condition.

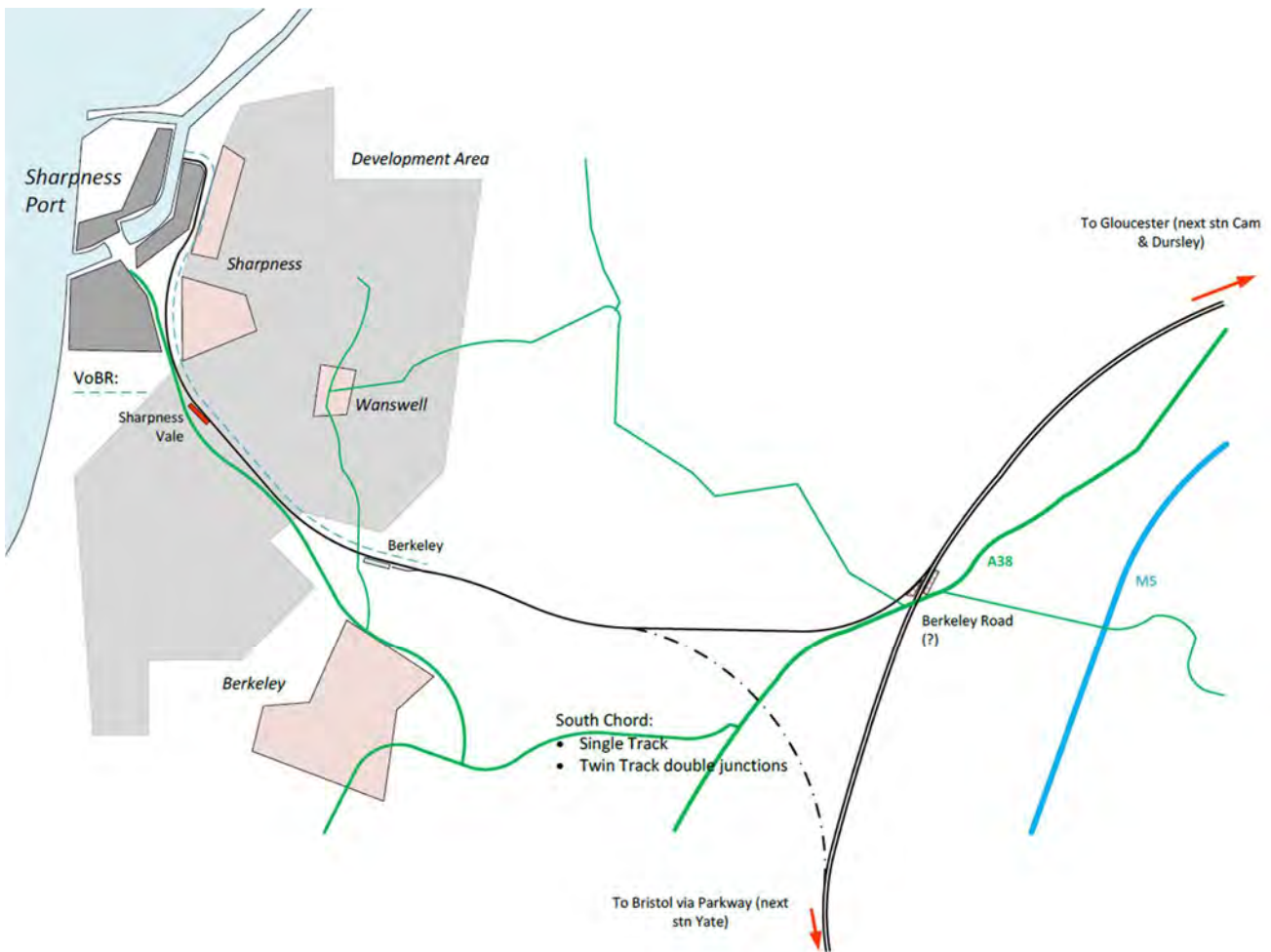


Figure 1 – diagrammatic map showing local context of Sharpness Branch

1.1.2 Sharpness Development LLP

Sharpness Development LLP are the promoters of a new settlement to be established following garden village principles, at Sharpness, which is proposed for allocation in the Stroud District Council draft Local Plan Review. The LLP is formed by GreenSquare Group and Lioncourt Strategic Land.

Formed in 2008, GreenSquare Group is a major provider of housing, regeneration, care and support and commercial services across Wiltshire, Oxfordshire and Gloucestershire. Lioncourt Strategic Land Limited forms part of The Lioncourt Group, a Worcestershire based company comprising Lioncourt Homes Limited, a five star quality rated housebuilder and Lioncourt Strategic Land Limited, a specialist land trading company.

1.1.3 Vale of Berkeley Railway

The Vale of Berkeley Railway (VoBR) has ambitions to run a heritage service from Sharpness docks to a new Berkeley station. The current proposals would see a second track reinstated along the length of the Sharpness Branch, separated by a standard “sixfoot” interval from the existing operational track.

However, the acceptability of this assumption needs to be tested from a maintenance access, operational safety and infrastructure responsibility perspective. It may be the case that a wider separation or a permanent fence is required between the two sets of infrastructure to avoid heritage staff requiring Network Rail Personal Track Safety training to access the railway. The risk of operation on parallel lines with two different maintenance regimes also needs to be understood.

In any case, the track currently in-situ remains in its original position on what would have been the westbound (Berkeley Road to Sharpness) track. Existing underbridges seem to have sufficient width to accommodate two tracks with a standard sixfoot separation.

Both the physical and operational assumptions made here will need to be tested at the next stage of development.

1.2 Purpose of this report

Building on previous work undertaken by Stantec, the purpose of this report is to test the previous proposals to operate passenger trains on the Sharpness Branch and provide more appropriate cost estimates for a new passenger service by:

- laying out the relevant context of the line and adjacent development proposals
- presenting a shortlist of feasible engineering interventions that would enable a minimum viable service
- describing these interventions to a level of detail such that costs can be estimated
- considering the incremental changes to enable future enhancement of the Sharpness Branch passenger service

Primarily, this was achieved through a workshop attended by stakeholders and experts, where a sifted set of service and associated engineering options were presented, considered and either accepted for further evaluation or dismissed.

The resulting shortlist of options was investigated and costed, enabling a view to be taken on the minimum viable service as well as the potential for incremental enhancement as demand increases.

2 Determining viable service options

2.1 Developing the options

2.1.1 Workshop

A workshop was organised with the intention of establishing a range of minimum viable rail service options that satisfied all stakeholders whilst enabling a more rapid and reduced cost entry into service of passenger operations.

Ultimately, the objective for the workshop was to identify a range of appropriate infrastructure and operational interventions that would enhance the commercial viability of the development proposals through improved and regular public transport links.

Options considered

Various rail service options were considered in the workshop, these are detailed in Table 1.

Table 1 – Service options considered in workshop

Possible option	Details
Shuttle on spur, interchange with main line at Berkeley Road Junction	<p>Service could use Parry People Mover, urban or rural VLR, or single car DMU.</p> <p>Alternatively, VoBR could operate a shuttle as a timetabled heritage operation, though this may have less appeal for residents of the new development.</p> <p>This option would require severing or otherwise isolating the Sharpness Branch from the main line Cross Country Route.</p>
Sharpness to Gloucester return service at 1tph or 2tph frequency	<p>This would be a new service to be introduced into the timetable.</p> <p>It assumes the use of a 2-car or 3-car DMU, in keeping with the existing operations on the wider GWR local network.</p> <p>Timetable modelling has identified that this would be feasible, with frequencies of 3tph or more requiring interventions in the Gloucester area.</p>
Additional Sharpness to Bristol return service at 1tph or 2tph frequency	<p>A link to Bristol has been expressed as desirable by the developer and other stakeholders.</p> <p>This would require reinstatement of the Berkeley Road Loop (south chord) and associated track and signalling connections at each end.</p> <p>No timetable modelling has been completed to validate this proposal – significant capacity constraints exist in the Bristol area.</p>

Possible option	Details
Modified existing local service between Gloucester and Bristol, e.g. Worcester to Weymouth	This option would avoid adding new services into the timetable, but would significantly impact on journey times for non-Sharpness passengers.

Variations on these options were also considered in the workshop, looking at possible timetable, rolling stock and infrastructure combinations.

2.1.2 VLR as an enabling technology

The development of the “Revolution VLR” (very light rail) vehicle has progressed such that this can be considered as an enabling technology for running a lightweight single unit service on rail lines with older, or less frequently maintained, infrastructure.

Revolution VLR¹ is the brand name of what is essentially a lightweight single-car passenger rail vehicle, with a configurable layout that can seat up to 56 passengers. It is capable of up to 65mph, and relies on a variety of technologies to reduce its axle load down to 6.2t, compared with the equivalent current DMUs which have axle weights in excess of 10t. This means Revolution VLR can run on track that is of a lower specification than current DMUs.

Revolution VLR is also being developed to offer hybrid and battery-only powerpacks to provide zero-emission running, and is designed to enable level boarding where platforms are compliant with standard offsets.

The test vehicle is already undertaking validation and acceptance testing, and would be ideally suited to the type of operation required for the Sharpness Branch.

During discussions with the Revolution VLR development team, the question of its compatibility for operations on a mixed traffic railway was raised, chiefly considering crashworthiness. Whilst the current safety case for the operation of the unit has been shaped around isolated operations without other timetabled traffic on the same line, based on Arcadis’ experience in developing safety cases for rolling stock, a sufficiently robust risk assessment process should be able to demonstrate that the risks involved with running a Revolution VLR vehicle on the main line are acceptable.

Any risk assessment would include a review of the proposed timetable, consideration of the existing and proposed signalling protection, and evaluation of the size, speed and design of other trains using the route. Combining this information would then enable the establishment and demonstration of a safe operating procedure for Revolution VLR for the specific use case defined for the Sharpness Branch.

Such an assessment would need to be approached systematically, however Arcadis can and have facilitated this type of work via signalling assessments and analysis of the relative crashworthiness of rail vehicles. This would require ASPRO agreements to have been put in place.

Note that this is a separate vehicle to the urban VLR system being developed for Coventry and being considered for use elsewhere.

¹ Further information about the Revolution VLR can be found at revolutionvlr.com.

2.1.3 Option sifting and selection

Following the workshop, the various options discussed were reviewed against pre-agreed selection criteria so that minimum viable service options could be taken forward for the updated estimation exercise.

The pre-agreed selection criteria were as follows:

- stakeholder acceptance/objection
- viability
- whole life cost
- benefits unlocked
- likelihood of Network Rail acceptance
- environmental impact
- safety implications
- fit with VoBR aspirations
- fit with wider transportation aspirations

2.2 Options taken forwards for estimation

Four service options have been considered that meet the strategic objectives and are referenced back to the previous Stantec studies. In all cases, freight compatibility is retained at its current level.

2.2.1 Service option 1 – Conventional multiple unit operation to Gloucester

The first option is considered the baseline option, reflecting the conclusions from the original Stantec reports. It involves the running of a Great Western Railway (GWR) multiple unit from Gloucester onto the Sharpness Branch to a new Sharpness Vale station. It would include a stop at Cam and Dursley station to allow passengers to change onto Bristol-bound services, and could also include an additional stop at the proposed heritage station at Berkeley.

The option has been further split into two sub-options based on the required service frequency, with option 1A providing for a single train per hour (tph) versus option 1B which enables a 2tph return service.

2.2.2 Service option 2 – VLR operation to Gloucester

The second option utilises the potential of the Revolution VLR train alongside an assumed lightweight platform installation to provide the new station at Sharpness Vale and services that run to and from Gloucester.

As with option 1, this option has been further split into two sub-options based on the required service frequency, with option 2A providing for a single tph versus option 2B which enables a 2tph return service.

This assumes a risk assessment can demonstrate safe operation of the Revolution VLR train on a mixed traffic main line railway (see 2.1.2 for further information).

2.2.3 Service option 3 – VLR shuttle to Berkeley Road Junction

Taking the approach to infrastructure from option 2, this option only considers a shuttle service running from Sharpness Vale to a new station at Berkeley Road Junction, allowing interchange with existing services running north and south from Bristol and Gloucester.

Services would be timed to meet the main line services at Berkeley Road station, with the benefit of self-contained operations meaning that multiple tph could operate. This would require introducing an additional stop to existing local services running along the Cross Country Route.

2.2.4 Service option 4 – Diversion of existing through service to Sharpness

The final service option considers the diversion of existing through services operated by GWR onto the Sharpness Branch, with a reversal at Sharpness Vale station. Both northbound and southbound services could be diverted, enabling connections both north and south from the branch line.

This assumes a single tph along the branch, with alternating northbound and southbound services being diverted each hour.

3 Identifying required infrastructure changes

The requirements for alterations to infrastructure have been identified on a per-option basis, allowing a cost estimation to be built up for each option. These have also assumed limited works to improve the condition of the railway asset, which has been assessed and assumed as the same across all options.

3.1 Option 1

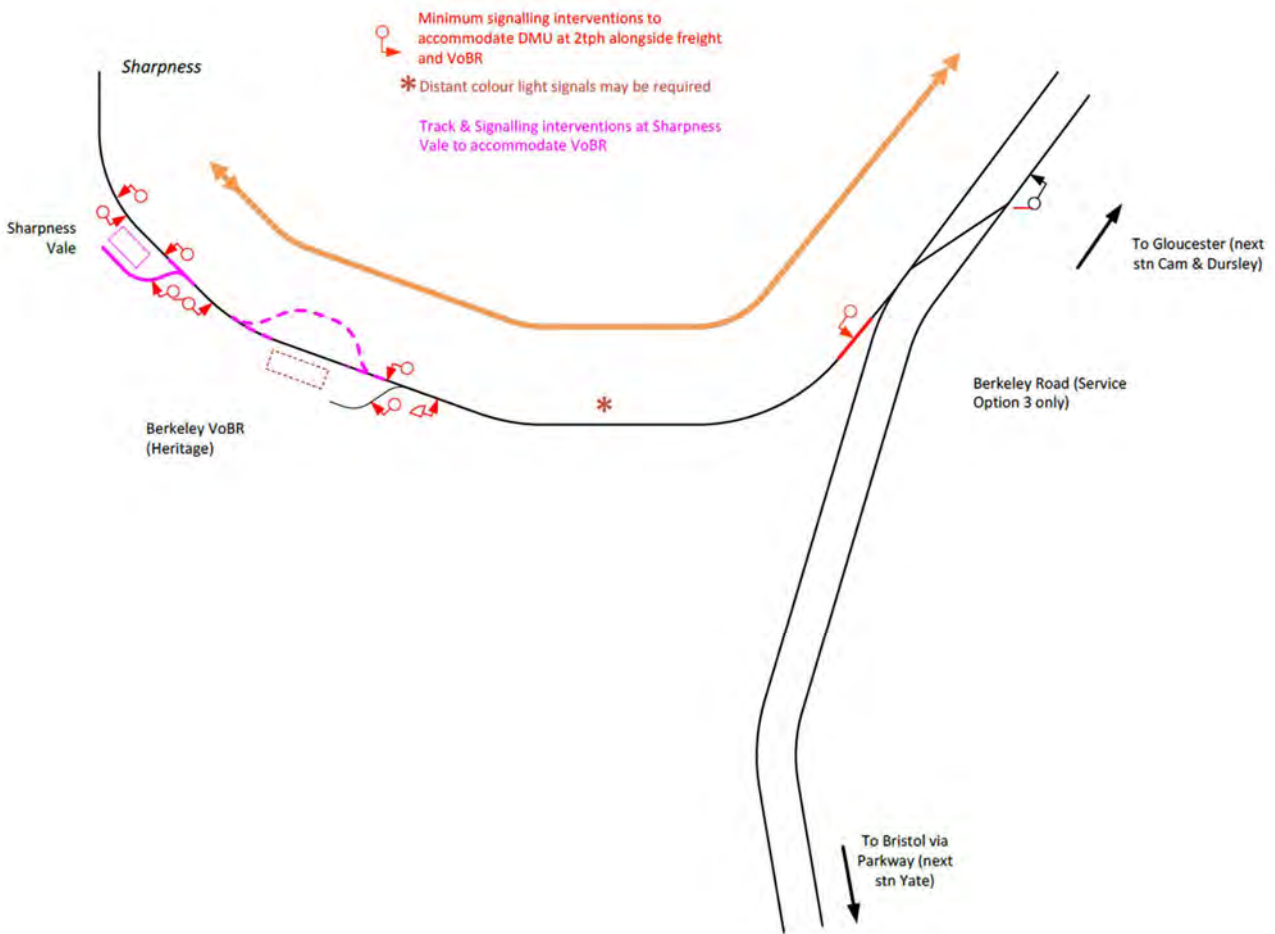


Figure 2 – infrastructure interventions to achieve service option 1

3.1.1 Stations

Sharpness Vale

Option 1 would require a new station to be constructed at Sharpness Vale.

To accommodate up to a 3-car multiple unit, a 70m long and 2.5m wide platform would suffice. For the minimal viable product this could be of FRP rapid assembly type, with the potential for later improvements as demand increases. Level access from the highway would be provided, with platforms set to the standard offsets to enable level boarding should future level access stock (such as the Revolution VLR) be used.

To start with, this station could be unstaffed, relying on ticket vending machines and passenger information displays in keeping with the local operator and Network Rail station guidelines. Shelters and canopies could

be limited, with provision of a small shelter to house the ticket vending machines and seating. Improvements to facilities could be easily retrofitted to a simple station as demand increases.

Provision should be made for an assumed level of car parking.

3.1.2 Track

Track alterations

To facilitate the proposed Option 1 passenger operations, the following track works are required:

- at the proposed Sharpness Vale station, where 90m of new track including a buffer stop and switch (as well as additional 18m of track renewal either side of the switch in the existing track) will be required to create the bay platform
- to create a minimum 100m-long passing loop to facilitate passing of services at the Berkeley heritage station operated by VoBR, including two CV switches and an associated 72m of renewal
- as specified by signalling, removal of the trap points at Berkeley Road Junction requiring 56m of new plain line track

For drainage, see [3.6](#).

Track renewals

An allowance has been made for 10% sleeper renewal and 25% rail renewal within the cost estimate. Refer to [3.5.1](#) for further information.

Option variations

Note that two variations of Option 1 were costed for comparison:

- including additional passing loops at the proposed VoBR stations
- fully renewing all track materials along the Sharpness Branch

These variations were costed and included for information in [Table 1](#). For more information, refer to [5.1](#).

3.1.3 Signalling

The Sharpness Branch operates on a physical token block system (i.e. no semaphore or colour light signals). Such a system could be maintained for the Option 1 service levels and the token handover moved from its current location north of Gloucester to Cam and Dursley station.

To facilitate the proposed passenger service whilst retaining freight capability along the Sharpness Branch, some modification of the signalling system within the existing interlocking is required, including the removal of the trap points at Berkeley Road Junction and replacement of the existing shunt signals with regular signals.

New or modified ground frames are required at two locations:

- the entry to the Magnox freight sidings at Berkeley
- Oldminster sidings, west of the new Sharpness Vale station

It should be noted that Network Rail are planning for the renewal of signalling interlocking and associated infrastructure along the Bristol to Gloucester line (part of the Cross Country Route). Whilst the extent of these works is not known, they will likely have an impact on the Sharpness Branch. Network Rail should be notified of the passenger service proposals at the earliest opportunity, such that any potential passive provision can be

included within the scope of works. A dialogue with the Network Rail project team should be established as part of the next stage of development.

3.1.4 Telecommunications

It has been assumed that GSM-R radio coverage is already acceptable for the proposed operations given the existing freight services that use the line.

However, additional telecoms works will be required for the new station to provide passenger information and for help point telephony, as well as any required security systems.

3.1.5 Bridges

Three of the eleven bridges along the route require some form of limited refurbishment. The remaining eight bridges only require minor masonry repairs. Refer to [3.5.2](#) for further information.

3.2 Option 2

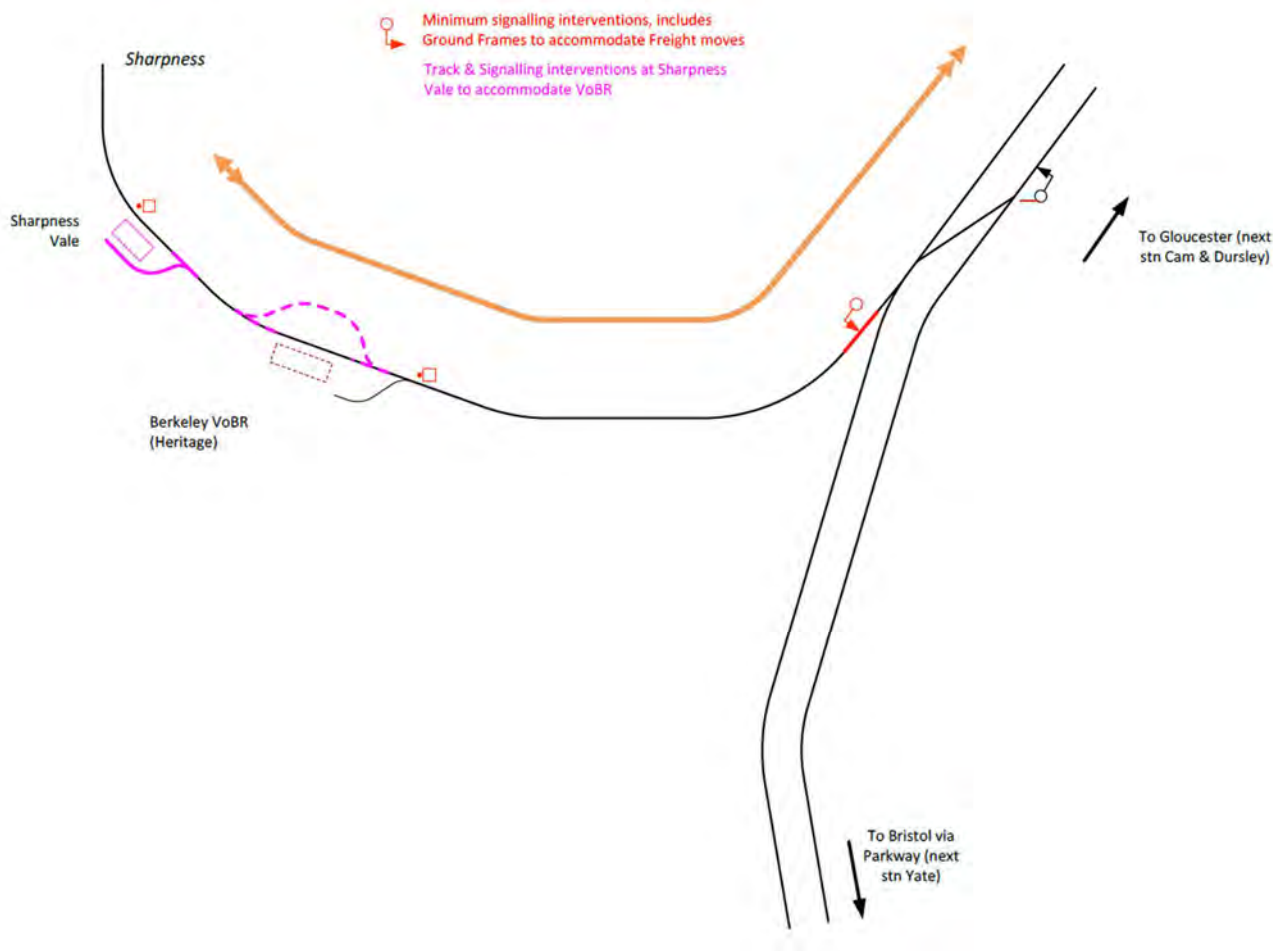


Figure 3 – infrastructure interventions to achieve service option 2

3.2.1 Stations

Sharpness Vale

As with Option 1, Option 2 would require a new station to be constructed at Sharpness Vale, though the reduced platform lengths will reduce the scale of works.

To accommodate a single-unit Revolution VLR train, a 30m long and 2.5m wide platform would suffice. For the minimal viable product this could be of FRP rapid assembly type, with the potential for later improvements as demand increases. Level access from the highway would be provided, with platforms set to the standard offsets to enable level boarding with the level access Revolution VLR stock.

To start with, this station could be unstaffed, relying on ticket vending machines and passenger information displays in keeping with the local operator and Network Rail station guidelines. Shelters and canopies could be limited, with provision of a small shelter to house the ticket vending machines and seating. Improvements to facilities could be easily retrofitted to a simple station as demand increases.

Provision should be made for an assumed level of car parking.

3.2.2 Track

Track alterations

To facilitate the proposed Option 2 passenger operations, the following track works are required:

- it is assumed no bay is required at Sharpness Vale for this service option
- it is also assumed that no passing loop at Berkeley is required in the initial iteration of this service option
- as specified by signalling and as with Option 1, removal of the trap points at Berkeley Road Junction requiring 56m of new plain line track

For drainage, see [3.6](#).

An option including passing loops to accommodate the VoBR services has been costed in a similar fashion to Option 1. Note that although the VLR vehicle is considerably shorter than the DMUs for Option 1, the loop at Berkeley Station assumes a 100m train length for VoBR.

Track renewals

Track renewal requirements are the same as for Option 1, noting of course the greatly reduced axle loads for the VLR concept.

An allowance has been made for 10% sleeper renewal and 25% rail renewal within the cost estimate. Refer to [3.5.1](#) for further information.

3.2.3 Signalling

Signalling requirements are the same as for Option 1.

To facilitate the proposed passenger service whilst retaining freight capability along the Sharpness Branch, some modification of the signalling system within the existing interlocking is required, including the removal of the trap points at Berkeley Road Junction and replacement of the existing shunt signals with regular signals.

New or modified ground frames are required at two locations:

- the entry to the Magnox freight sidings at Berkeley
- Oldminster sidings, west of the new Sharpness Vale station

For comparison purposes an estimate for a more complete signalling upgrade has been included for full control along the spur.

3.2.4 Telecommunications

Telecoms requirements are the same as for Option 1.

It has been assumed that GSM-R radio coverage is already acceptable for the proposed operations given the existing freight services that use the line.

However, additional telecoms works will be required for the new station to provide passenger information and for help point telephony, as well as any required security systems.

3.2.5 Bridges

Three of the eleven bridges along the route require some form of limited refurbishment. The remaining eight bridges only require minor masonry repairs. Refer to [3.5.2](#) for further information.

3.3 Option 3

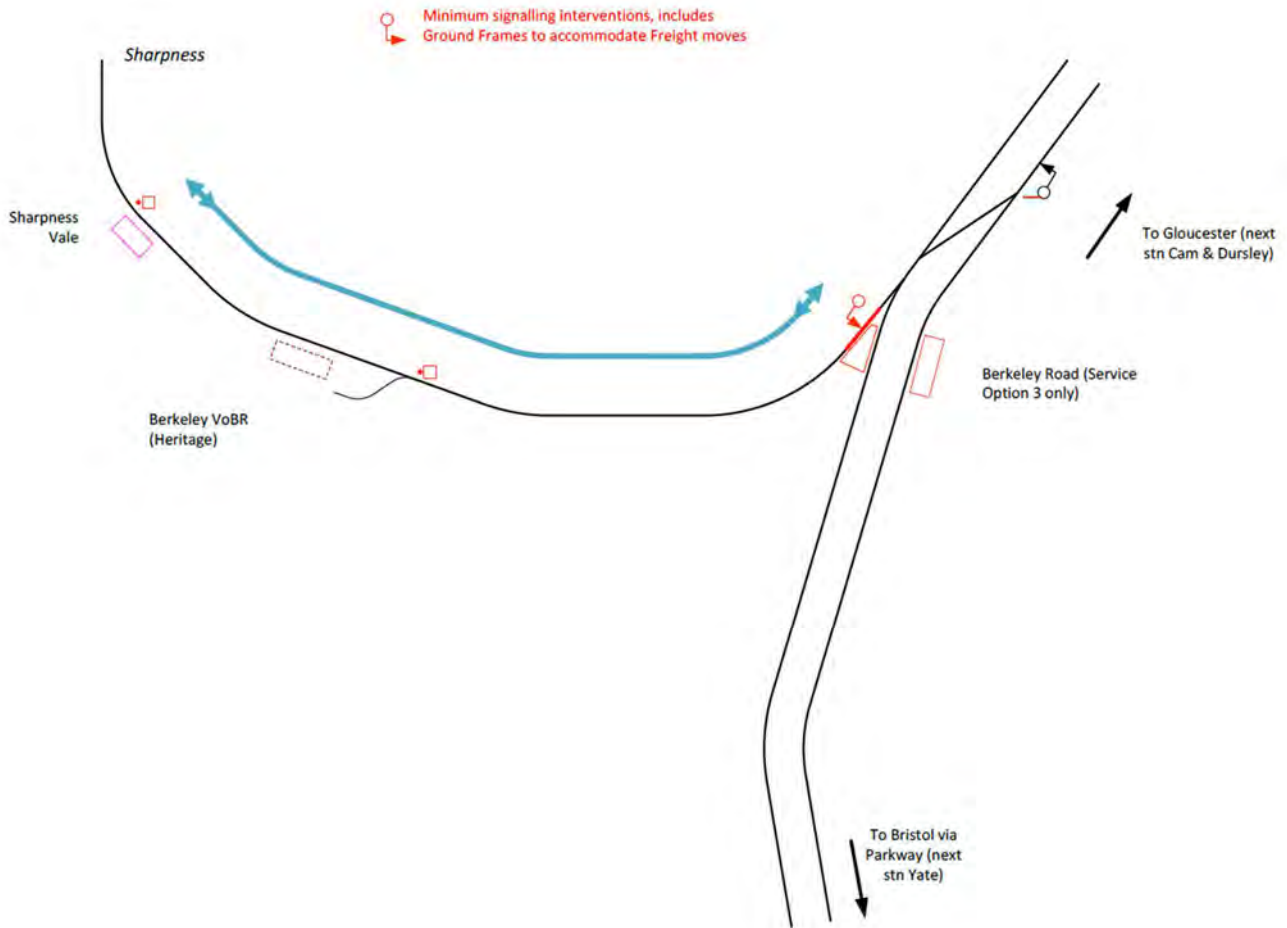


Figure 4 – infrastructure interventions to achieve service option 3

3.3.1 Stations

Sharpness Vale

Option 3 requires the same level of provision as Option 1, however as the Revolution VLR only requires a 30m long platform, this would slightly reduce the scale of works at the proposed Sharpness Vale station.

Berkeley Road

To allow exchange from the shuttle onto northbound/southbound services on the rest of the rail network, a three-platform station is required at the location of the former Berkeley Road station. This would likely consist of a two-face island platform between the Sharpness Branch and the Up Charfield line, and a single face platform in the cress of the Down Charfield line.

Platform lengths on the “main” lines have been assumed to be 90m in length, with the Sharpness Branch platform only 30m long to accommodate Revolution VLR trains. The length of this platform could be extended to enable VoBR services to call at this station, providing direct interchange between the heritage railway and the main line network.

The station would include a ramped footbridge, with 60m ramps at an angle of 1:10 provided, in line with Cam and Dursley station.

Given the need to provide platform waiting facilities at this new station, facilities may be slightly more substantial than what is proposed at Sharpness Vale. Consideration of the wider value of the new station at this location may also determine that expanded car parking facilities are worthwhile to unlock the full potential of the site.



Figure 5 – satellite view showing approximate footprint of proposed Berkeley Road station

3.3.2 Track

Track alterations

Same as for Option 1, however a shorter bay platform is required at the proposed Sharpness Vale station. It has been assumed that no additional track works would be required for the proposed Berkeley Road station.

Track renewals

An allowance has been made for 10% sleeper renewal and 25% rail renewal within the cost estimate. Refer to [3.5.1](#) for further information.

3.3.3 Signalling

Same as for Option 1, with an allowance for any alterations associated with the proposed station at Berkeley Road.

3.3.4 Telecommunications

Same as for Option 1, with an allowance for any alterations associated with the proposed station at Berkeley Road.

3.3.5 Bridges

Three of the eleven bridges along the route require some form of limited refurbishment. The remaining eight bridges only require minor masonry repairs. Refer to 3.5.2 for further information.

3.4 Option 4

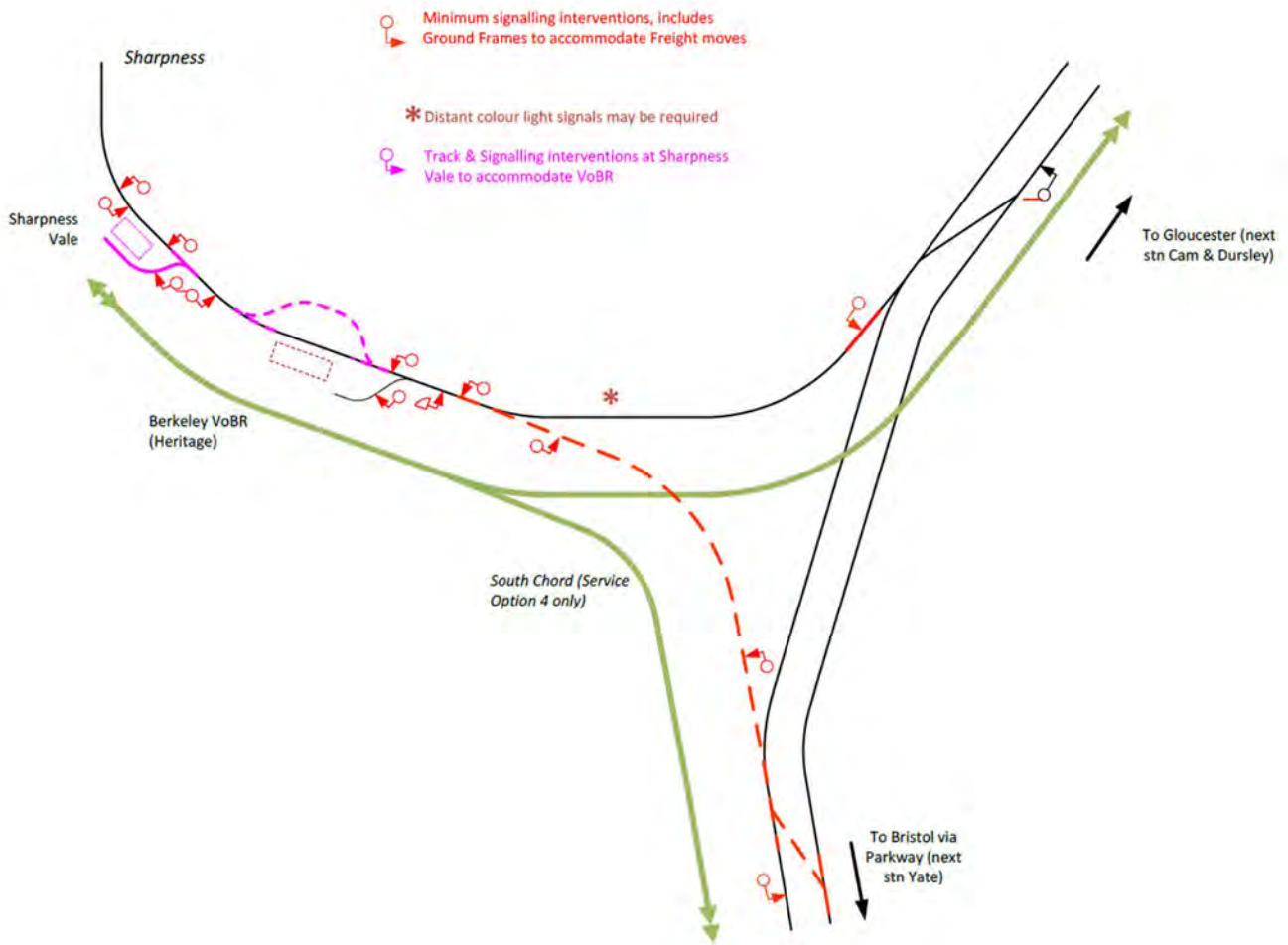


Figure 6 – infrastructure interventions to achieve service option 4

3.4.1 South-facing chord

To facilitate services to and from the southbound direction (towards Bristol), the former Berkeley Road Loop would need to be reinstated. This would involve the construction of a 2100m-long single-track embankment up to 5m high above existing ground level, and the construction of a new single-span underbridge over the A38.

3.4.2 Stations

Sharpness Vale

Same as for Option 1.

3.4.3 Track

Track alterations

Same as for Option 1. Additionally, 2100m of new track would be required on the south-facing chord, as well as two CV switches and a CV crossover to enable connection to the main line and existing Sharpness Branch.

Track renewals

An allowance has been made for 10% sleeper renewal and 25% rail renewal within the cost estimate. Refer to [3.5.1](#) for further information.

3.4.4 Signalling

Same as for Option 1.

3.4.5 Telecommunications

Same as for Option 1.

3.4.6 Bridges

Three of the eleven bridges along the route require some form of limited refurbishment. The remaining eight bridges only require minor masonry repairs. Refer to [3.5.2](#) for further information.

Additionally, a new single-span underbridge over the A38 is required as part of the construction of the new south-facing chord.

3.5 Works included for all options

Desktop survey information was used to understand the condition of both the track and bridge structures along the Sharpness Branch. This enabled Arcadis to develop an understanding of any physical works required to enable the proposed service options, and to adjust the price against each option accordingly.

3.5.1 Track and ballast renewals

Network Rail's Visivi RouteView tool provides high resolution aerial photography, which enables an assessment of track condition to be made. Observationally, the track along the Sharpness Branch is in varied but acceptable condition for current freight operations, comprising jointed bullhead rails on timber sleepers in fair condition.

From this information, it appears that in 2014 there had been a recent ballast refresh, tamp and reprofile alongside some spot track renewals and marking of track geometry on sleepers. Since this date, it appears that there has been spot-reballasting indicating that tracks have been inspected and significant defects resolved.

Even with a combination of the heaviest passenger train and an intensive service pattern, only an additional 5 EMGTPA (equated million gross tonnes per annum) are added per year to the line, which would not warrant track renewals in accordance with Network Rail requirements. This is detailed in [Table 2](#) for a range of rolling stock and service provisions.

Given the current Network Rail track category (a function of speed and EMGTPA allowing an understanding of track material requirements) is likely to be 5 or 6, an additional 5 EMGTPA would be unlikely to increase this, meaning no requirement for materials renewal. Even an increase to track category 4 would not require materials renewal.

Table 2 – EMGTPA values for various rolling stock and service patterns

Rolling stock	Vehicle mass	1tph EMGTPA	2tph EMGTPA	3tph EMGTPA
Class 150 (3-car)	107.4 t	1.31	2.61	3.92
Class 158 (3-car)	115.5 t	1.41	2.81	4.22
Class 195 (3-car)	128.4 t	1.56	3.12	4.69
Class 755/3 (3-car)	135.0 t	1.64	3.29	4.93
Revolution VLR (1-car)	24.8 t	0.30	0.60	0.91

It has been assumed that a new differential speed limit will be imposed to enable passenger stock to traverse the line at or above 60mph (trains are currently limited to 15mph). Whilst the current track materials in good condition can accommodate an increase to 75mph without renewal, a detailed condition assessment (for example, on the condition of joints or presence of welds) is not possible. This assumption should therefore be validated against the more detailed asset information that would be available from Network Rail once the ASPRO agreement is in place.

A more detailed geometry assessment would also be required as part of this exercise, though the current track curvature has been assessed as capable for operation up to 60mph.

It has therefore been assumed that the existing track condition is sufficient for the proposed additional passenger traffic. However, an allowance has been made for 10% sleeper renewal and 25% rail renewal within the cost estimate.

3.5.2 Bridge structures

Eleven bridges exist along the Sharpness Branch, comprising eight underbridges and three overbridges.

Unfortunately, headline assessment values were not available within the structures database. However, an Arcadis structural engineer has reviewed the structures using desktop information alongside the latest detailed examination reports to make a high level assessment of each structure. The output of this review, listing all bridge structures, a description of their form and condition, and a summary of the expected works, is included in [Appendix C](#).

From this review, a summary of the required works along the line was created, allowing a price to be established. This is included in Table 3. The pricing considers a minimum level of intervention prior to the granting of a safety case for passenger use (at higher speeds) on the branch line.

Service options (2 & 3) facilitated by the Revolution VLR (Very Light Rail) unit assume a reduced level of structural interventions as compared with the service options facilitated by more regular rolling stock. The VLR units are very much lighter than the DMUs, resulting in reduced, if not negligible, impact upon the structures over time.

Given that these are in current railway use, it has been assumed for pricing purposes that no major bridge reconstruction or refurbishment would be required to these structures, either for gauge clearance or load capacity purposes, to accommodate the proposed passenger services.

Table 3 – Summary of assumed structure works

Type of works	Number of structures
Minor masonry repairs.	3 of eight (1 of eight for R VLR)
Limited structural refurbishment.	2 (0 for R VLR)
Major structural refurbishment	1
<i>Source archive information, site inspection to confirm section sizes, material testing if required, structure assessment with new speed/loading parameters, specify refurbishment/strengthening accordingly.</i>	

3.6 Works excluded for all options

3.6.1 Drainage

It has been assumed that the line is free-draining and so no additional drainage works are required along the line. This assumption would need to be tested as part of the track condition walkout at the next stage of development.

3.6.2 Signalling

The proposed ground frames may not provide the necessary protection if freight is increased or the VoBR runs a high frequency service such as at weekends or on bank holidays. In this case, the Sharpness Branch would need to be brought into the existing interlocking with all attendant signals and telecommunications infrastructure. This would include protecting signals at the entry and exit to the freight sidings. Nevertheless, such interventions need not add significant complexity or cost.

Work undertaken by Ed Jeffery Limited suggests that signalling modifications may be required at Gloucester to facilitate the 2tph service pattern. This has been excluded at this stage as further investigation and a deeper understanding of the proposed signalling upgrade scheme on the Bristol to Gloucester line is required to establish the scale of these works.

3.6.3 Level crossings

Seven footpath or farm access crossings exist along the Sharpness Branch. A level crossing risk assessment will need to be undertaken for each to determine the requirement for their upgrade given the increase in service provision.

However, it has been assumed that these are to be retained in their existing arrangement given the low number of services proposed. Sufficient communication of the change in service would be required to the users of these crossings prior to the commencement of the new service.

3.6.4 Culverts

There are at least fourteen culverts along the length of the Sharpness Branch. Whilst it has been assumed that no work is required to any of these structures given that only a limited increase in annual tonnage is expected, this should be verified by a desktop review of Network Rail's inspection and assessment records at the next stage of development.

3.6.5 Battery charging infrastructure

For a line of this length and for the proposed service frequency, the Network Rail Traction Decarbonisation Network Strategy² recommends battery operation as the preferred method of traction power. This may require end-of-line charging at Sharpness Vale station.

This study has excluded the costs of any infrastructure associated with train battery charging owing to the uncertainty and complexity of such proposals at this stage. Further analysis at the next stage of development should determine the required performance specification and charging infrastructure requirements.

Any assessment should take into account the long-term aspirations for wider network decarbonisation, given the high priority of conventional electrification on the Cross Country Route.

² The Network Rail *Traction Decarbonisation Network Strategy* was published in draft form in September 2020 and provides a framework for decision making around the optimised non-diesel traction solution for given service parameters. [A copy can be downloaded by following this link.](#)

4 Estimating the costs

4.1 Infrastructure costs

Once the required infrastructure changes were determined, a new set of estimates per option were established. The full breakdown of each of these is included in [Appendix B](#), with a summary of each option within its optimism range detailed in [Table 4](#).

Table 4 – Headline option estimates

	Optimistic -10%	Most likely +0%	Worst case +40%
Option 1	£6,929,507	£7,699,452	£10,779,233
<i>Option 1 with station passing loops</i>	£8,970,550	£9,967,278	£13,954,189
<i>Option 1 with full track renewal</i>	£19,566,278	£21,740,309	£30,436,432
Option 2	£4,424,413	£4,916,014	£6,882,420
<i>Option 2 with station passing loops</i>	£6,404,114	£7,115,682	£9,961,955
<i>Option 2 with additional signalling upgrades</i>	£7,359,060	£8,176,734	£11,447,427
Option 3	£7,139,127	£7,932,363	£11,105,309
Option 4	£51,229,451	£56,921,612	£79,690,257

4.2 Train leasing costs

Note that the figures in [Table 4](#) exclude the train leasing costs associated with options 1, 2 and 3.

Though specific values have been excluded at this stage given the commercially sensitive nature of rolling stock leasing, the annual costs of leasing a single unit can range from £250k to £600k or more depending on the length of train and the scope of the leasing agreement (e.g. inclusion of regular cleaning and maintenance).

It is likely that the leasing costs of a DMU would be higher than Revolution VLR, given the appeal of the latter train is for cheap and lean operations.

5 Recommendations

5.1 Recommended option

Following the work undertaken in this refreshed study, Option 2 is recommended to be taken forwards, as it offers similar benefits to the other options for the lowest cost outlay. It is also the most flexible option, and can be incrementally enhanced by making use of increased frequencies, larger rolling stock and elements of the other options as demand for the service grows.

A passenger service could be reasonably quickly introduced with a lightweight FRP “temporary” platform and Revolution VLR train running connecting services to Gloucester via Cam and Dursley. Capacity could be quickly increased by running VLR trains in multiple, by running other multiple units, and/or by running at increased frequencies.

The estimated cost of Option 2 (£4.9M) is comparable with Option 1 (£7.6M) and Option 3 (£8.8M) (see [Table 4](#) and [Appendix B](#)). However, Option 4 is significantly more costly (£56M) whilst also being the least flexible and most operationally challenging option to progress. It also offers the least opportunity for incremental enhancement.

Getting Network Rail involved at the earliest possible stage will enable them to incorporate the signalling requirements either actively or passively into their proposed resignalling scheme on the Cross Country Route, which can reduce the costs associated with signalling work.

For a marginal increase in capital cost associated with slightly enhanced signalling provision, increasing the freight capability along the line could encourage freight expansion at Sharpness docks, which in turn could pay for the infrastructure enhancements without precluding a 2tph (or greater) service.

5.2 Opportunities for incremental enhancement

Options 1, 2 and 3 all offer the potential for incremental enhancement to accommodate increased demand.

For Options 1 and 2, service frequencies could be increased to meet demand. For up to 2tph, the proposed “temporary” platform would be acceptable for longer-term use. Should demand require it, the proposed use of the Revolution VLR single-car train enables running in multiple, swapping out with a higher capacity multiple unit, or increased service frequencies should demand require it.

However, should demand justify increases to 3tph or more, it may be necessary to improve the station facilities accordingly, including with a more conventional platform construction and larger car parking or bus interchange facilities.

For Option 3, increases in frequency on the Sharpness Branch would need to be matched by the number of services calling at the reopened Berkeley Road station, which would be more challenging as it would impact on the wider network timetable.

Option 4 offers fewer opportunities for expansion, as the service provision is linked directly to the main line timetable.

5.3 Actions to be taken forwards

5.3.1 Project actions

Infrastructure condition survey

To validate the assumptions about the existing infrastructure layout and condition, the next stage of development should incorporate a site visit. This should include a track condition survey, walkout at the proposed station sites, and a visual inspection of the existing drainage arrangements.

5.3.2 Third party actions

Safety system for operation of VoBR

As part of the next stage of development, a draft safe system of operation of the VoBR infrastructure should be attained, to inform the infrastructure requirements (such as the requirement for track intervals and safe walking routes) and feed into the next stage of cost estimation.

For further information, see [1.1.3](#).

Revolution VLR entry into service timeline

The Revolution VLR development project is ongoing, with full-scale trial testing ongoing. It would be advisable to establish further contact with the Revolution VLR team to understand their timeline of entry into service, potential other orders in the pipeline, and other information pertinent to the proposals considered in this study.

See [2.1.2](#) for additional background information.

Alternative traction solutions

The current timeline of passenger service introduction means that, whilst diesel multiple units will be in service, this will be a non-preferred form of traction. Though battery will likely be the preferred option, further development work should identify the specific options for non-diesel traction, including the performance specification and charging requirements.

Any assessment should take into account the long-term aspirations for wider network decarbonisation, given the high priority of conventional electrification on the Cross Country Route. See [3.6](#) for further details.

Train leasing costs

To develop a full schedule of costs, the project should engage with train operating companies and rolling stock operating companies to understand possible train leasing costs for a range of train types that could feasibly operate the proposed service.

5.3.3 Network Rail actions

Timetable impacts of existing service alterations

Options 3 and 4 require the alteration of existing timetabled services. The viability and impact of these changes should be understood, both from a timetable resilience perspective and from an operator viability and preference perspective.

Cross Country Route resignalling scope

Network Rail are planning for the renewal of signalling interlocking and associated infrastructure along the Bristol to Gloucester line (part of the Cross Country Route). Whilst the extent of these works is not known, they will likely have an impact on the Sharpness Branch.

Network Rail should be notified of the passenger service proposals at the earliest opportunity, such that any potential passive provision can be included within the scope of works. A dialogue with the Network Rail project team should be established as part of the next stage of development.

Bridge assessments

There are a total of 25 structures along the Sharpness Branch, including 3 overbridges, 8 underbridges and 14 culverts. Whilst a desktop review has determined that three bridges require limited refurbishment and eight require minor masonry repairs, this analysis was made without access to the headline assessment values against route availability (weight of traffic) and speed.

These values should be requested from Network Rail to validate the assumed level of structure works.

See [3.5.2](#) for further information.

Level crossing risk assessments

A number of farm crossings exist along the Sharpness Branch. Level crossing risk assessments should be undertaken at the next stage of development to score these in relation to the proposed increase in services. This will enable a determination to be made on the level of intervention required to safely operate the proposed services.

See [3.6](#) for further information.

5.3.4 Network Rail engagement

Network Rail asset protection process

To complete the above actions and move the scheme forwards requires engagement with Network Rail via the asset protection (ASPRO) process³. Whilst there is some variation between organisational regions within Network Rail, the principles remain predominantly similar and can be broken into the following stages:

- an initial questionnaire is sent to ASPRO, at which point a scheme interface manager is assigned as the single point of contact
- a basic asset protection or basic services agreement is made at the early stages of the project, this is advanced in later stages into a full asset protection agreement or third-party agreement depending on the project scope
- following initial services payment, a kick-off meeting will enable progress on other actions

More detail on these stages is provided below.

Initial enquiry questionnaire

The first step is to formally engage with ASPRO by sending an initial enquiry questionnaire (IEQ) with a succinct summary of the project, key contacts, a draft programme and ideally an annotated drawing clearly showing the

³ Further information about the Network Rail ASPRO team and associated processes can be found at [their website](#).

railway. It should be noted that ASPRO is only interested in the areas that affect the railway. If the impact of a proposal on the railway is not clear, include this information anyway and ASPRO will be able to advise.

ASPRO will also be able to advise at this stage whether previous agreements made with Network Rail are still in place.

Once the IEQ is received, a named scheme interface manager (SIM) will be assigned. A remit number and ACE number (ACE is a customer portal used by ASPRO) will be generated and will be the reference throughout the project. The SIM will usually call the consultant acting on behalf of the client to discuss the IEQ in more detail before deciding on the most appropriate type of agreement to proceed under. They will also draw up an emerging cost estimate.

Asset protection or services agreement

There are two types of agreement that this project could proceed under.

- a Basic Services Agreement (BSA) is a “talking agreement” and is generally used in the feasibility stages of a scheme
- a Basic Asset Protection Agreement or BAPA is more comprehensive and would cover all activities, particularly if any physical works were required within a short time period

Depending on the developing scope of the project, the BSA or BAPA would then progress to a more substantial agreement – either to an Asset Protection Agreement (APA) or a Third-Party agreement.

The selected agreement and estimate for Network Rail costs would then be sent to the client for sign-off and payment. At this stage, and prior to the first meeting, ASPRO will be able to provide support to complete the actions detailed in 5.3.3, as well as handling any other requests for information, including drawings and locally held records.

ASPRO is not funded through government as they are enabling outside party projects, thus it is likely that payment will be required before they provide support to the project.

Kick-off meeting

Following the selection of the agreement, both the SIM and client will arrange a kick off meeting to provide additional background and address any immediate concerns. During or after this meeting, ASPRO will set out a timeline and a list of outputs such as submission schedules, line possessions (if required), consultations, legal requirements and business and technical clearances.

There will likely be a property deal of some kind with the Network Rail property team as the developer will be utilising Network Rail assets for their gain. Throughout this process, all communications with the various Network Rail stakeholders (including route asset managers, stations liability teams etc) will be managed by the SIM, who will remain the single point of contact and facilitator for Network Rail throughout the project.

Appendix A

Service options and infrastructure matrix

Cost estimate breakdown

Appendix B

Cost estimate breakdown

Appendix C

List of structures with description, condition and works required

Table 5 – List of underbridges and overbridges on Sharpness Branch, including condition

Bridge designation and name	Structure type and description	Structure condition and likely required works
0-22 Berkeley Road (Breadstone)	Overbridge Typical masonry arch structure, 3-span overbridge carrying a single highway, skewed	BCMI Score of 54 (Fair). No major defects however several brickwork fractures throughout. Signs of waterproofing failure due to wetness throughout. Previously repaired fractures still have date tabs from 2006 in place therefore no signs of deterioration, movement issues or other concerns. Envisage typical refurbishment works to repair masonry fractures. Any changes to track position running underneath the structure will need updated UIC 777-2R assessments (typically held by the asset owner).
1-08 Crawless	Underbridge 4m span, 4Nº main plated girders with cross girders spanning between, creating 2Nº troughs for longitudinal bearers which in turn supports individual tracks, hidden critical element on the structure: top of cross girders hidden by longitudinal bearers	BCMI score of 75 (Good). No major defects noted in latest Detailed Examination report. Area underneath the structure appears to be prone to flooding. Works required to the structure to confirm changes in rail loading include: (1) source archive information, (2) site inspection to confirm section sizes, (3) material testing if archive information cannot be sourced, (4) assessment with new rail speed/loading parameters, (5) refurbish/strengthen structure as required following assessment outcomes.

List of structures with description, condition and works required

Bridge designation and name	Structure type and description	Structure condition and likely required works
1-30.5 Kitesnest	<p>Underbridge</p> <p>Masonry brick arch underbridge. Approximately 4m span.</p>	<p>BCMI Score 49 (Fair).</p> <p>No major defects noted other than significant vegetation covering the structure and localised areas of spalling to the abutments.</p> <p>Envisage typical masonry refurbishment being required. Archive information should be sourced, then if required site investigations to confirm the accuracy of these details then typical MEXE/similar arch analysis carried out to confirm capacity.</p>
1-40.5 Ironmongers	<p>Underbridge</p> <p>4m span underbridge over farm access road. Direct fix long timber structure. Riveted sections (steelwork TBC). Plated sections form U-troughs in which longitudinal timbers sit. This creates hidden critical elements (HCEs).</p> <p>Timber cross beams span transversely between main girders which are then covered by a deck plate. This has been removed in previous HCE examinations to review the condition of the webs of the main girders however no ultrasonic testing/results are available to confirm the condition of the asset.</p>	<p>BCMI score of 52 (Fair).</p> <p>From an initial high level review, this structure is at high risk of requiring works. The structure comprises plated riveted sections (therefore date of construction will be older), there's no protective paintwork and there are hidden critical elements.</p> <p>Works required to the structure to confirm changes in rail loading include: (1) source archive information, (2) site inspection to confirm section sizes, (3) material testing if archive information cannot be sourced, (4) assessment with new rail speed/loading parameters, (5) refurbish/strengthen structure as required following assessment outcomes.</p>
1-70 Berkeley Heath	<p>Underbridge</p> <p>Masonry brick arch underbridge spanning over farm access road. Approximately 4m span.</p>	<p>BCMI Score 80 (Good).</p> <p>No major defects noted other than significant vegetation covering the structures. There are 2no. adjacent culverts which currently have no information.</p> <p>Envisage typical masonry refurbishment being required. Archive information should be sourced, then if required site investigations to confirm the accuracy of these details then typical MEXE/similar arch analysis carried out to confirm capacity.</p>

List of structures with description, condition and works required

Bridge designation and name	Structure type and description	Structure condition and likely required works
2-06 Wickshelm	<p>Underbridge</p> <p>3№ span masonry arch. Each span typically 4m. Structure is an underbridge and spans over 2№ Farm access tracks with the central span spanning over a watercourse.</p>	<p>BCMI score of 58 (Fair).</p> <p>There's also a separate underwater review which states the structure is also in fair condition.</p> <p>Works required are typical masonry refurbishment repairs. Archive information should be sourced, then if required site investigations to confirm the accuracy of these details then typical MEXE/similar arch analysis carried out to confirm capacity.</p>
2-29 Station Road, Berkeley, also "Purton Road B4066"	<p>Underbridge</p> <p>Two track, two span brick arch with skew. High risk low bridge for road traffic - evidence of strikes however 2020 Detailed Examination states that signed clearance is correct. Both spans at opposite skew giving intermediate partial span which is fully enclosed.</p>	<p>BCMI score is 63 (Fair).</p> <p>Heavy vegetation and typical masonry defects.</p> <p>Envisage typical masonry refurbishment being required. Archive information should be sourced, then if required site investigations to confirm the accuracy of these details then typical MEXE/similar arch analysis carried out to confirm capacity.</p>
2-36 Cooks	<p>Underbridge</p> <p>Almost identical to Crawless. Same construction type and similar span. 1№ additional old trough girder remains which supports the handrail to 1№ elevation only.</p>	<p>BCMI score is 74 (Good).</p> <p>Same HCE and possible works as per Crawless.</p> <p>Works required to the structure to confirm changes in rail loading include: (1) source archive information, (2) site inspection to confirm section sizes, (3) material testing if archive information cannot be sourced, (4) assessment with new rail speed/loading parameters, (5) refurbish/strengthen structure as required following assessment outcomes.</p>

List of structures with description, condition and works required

Bridge designation and name	Structure type and description	Structure condition and likely required works
2-65 Abwell	<p>Overbridge</p> <p>Typical 3-span masonry arch structure. Carries farm track road only.</p>	<p>BCMI Score of 55 (Fair).</p> <p>No major defects.</p> <p>Envisage typical refurbishment works to repair masonry fractures. Any changes to track position running underneath the structure will need updated UIC 777-2R assessments (typically held by the asset owner).</p>
3-07.5 Rookery	<p>Overbridge</p> <p>Typical 3-span masonry arch structure. Carries farm track road only.</p>	<p>BCMI Score of 55 (Fair).</p> <p>No major defects.</p> <p>Envisage typical refurbishment works to repair masonry fractures. Any changes to track position running underneath the structure will need updated UIC 777-2R assessments (typically held by the asset owner).</p>
3-25 Saniger Lane	<p>Underbridge</p> <p>Masonry arch, single span approximately 7m. Skewed. Spans over single carriageway.</p>	<p>BCMI score 52 (Fair).</p> <p>Heavily vegetated, no significant defects noted. Damage to soffit due to several road strikes. Detailed examination states that the signed height is correct however possible review required.</p> <p>Works required are typical masonry refurbishment repairs. Archive information should be sourced, then if required site investigations to confirm the accuracy of these details then typical MEXE/similar arch analysis carried out to confirm capacity.</p>



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