Sharpness Vale: Railway Connectivity

Review of 'Transport Report in Response to "Questions Raised by Gloucestershire County Council', Stantec, February 2023"

Jeremy Higgins, SLC Rail,

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1. Introduction

On 9 March 2023, Gloucestershire County Council asked SLC Rail to review the additional evidence on transport submitted by the promoters of Sharpness Vale to the Stroud Local Plan examination.

The four railway enhancement options promoted by Stantec/Arcadis are:

(1) A new station at Sharpness and branch line infrastructure enhancements for a new 'heavy rail' train service to/from Gloucester (£7-21m, 'most likely', 10-30m 'worst case')
(2) As (1) but with shortened platforms designed purely for a Very Light Rail (VLR) vehicle, see Section 4, (£5-8m). This is the Arcadis preferred option.
(3) A new station at Sharpness and branch line infrastructure enhancements with an additional new 3-platform station at Berkeley Road. VLR services will then shuttle along the branch line from Sharpness and terminate at Berkeley Road station where passengers would connect with mainline services (£8m)
(4) New southern cord which allows the diversion of services off the existing mainline to Sharpness before re-joining the mainline along the same direction of travel (£56m).

This document forms our considered response in relation to the aspiration for a railway station at Sharpness with a train service (initially 1 train per hour (TPH), but with a view to increasing to 2TPH) to Gloucester.

This report is split into:

- The importance of the DfT's 5 transport business cases and 'strategic fit'
- Overview of the Arcadis report of infrastructure options on the branch line
- Analysis of the economic assumptions associated with the promoter's proposal
- Overall assessment

2. Alignment with the DfT's 5 transport business: the strategic case

There are many pressures on the railway as an integrated national transport system. To ensure that the scarce resources of the industry are maximised, the Department for Transport (DfT) requires promoters of schemes to prove to the satisfaction of the Secretary of State that the scheme being proposed is appropriate for railway industry involvement and has a clear 'strategic fit' with wider industry objectives. The first step is in making a strategic case for an intervention.

Railway enhancement projects are governed through a multi-staged business case procedure designed to ensure that only the most promising investment opportunities incur the full cost of undertaking the most detailed requirements of the government. The first stage of this process is the Strategic Outline Business Case (SOBC). If the project gains support from the DfT, Network Rail and other stakeholders at this stage, it can then progress to the Outline Business Case (OBC). Only if it gains approval at that stage can it progress to Full Business Case (FBC). This can be a long, expensive and time-consuming process before approval to implement is given.

The DfT's guidance on transport business cases specifies that, from the SOBC submission, the 'business need' for the enhancement must be clear along with how the need would be met.[1] Furthermore, even at this early stage, the government expect clarity on:

(1) the 'problems' identified (i.e. what is the proposed railway intervention designed to fix?)
(2) the aims of the proposed scheme

[1] DfT, The Transport Business Cases, January 2013.

(3) how the aims address all of the problems identified
(4) timescales and key drivers
(5) why the scheme is needed now
(6) what would happen if the scheme did not go ahead

What the proposer must do, then, is
(1) clearly explain the underlying 'problem'
(2) identify what improvements would be required to solve the problem(s).
(3) examine the range of possible options that deliver the improvements and so solve those problems.
(4) justify why a rail intervention is the most appropriate of the range of options.

The January 2021 letter from Network Rail to Sharpness Developments LLP points out to them that 'The strategic case for the proposal is of critical importance'.[2] In essence, the strategic case explains why rail is the answer to the 'problem'. However the strategic case for enhancement to railway infrastructure is not made within the developer's submission.

Railway industry stakeholders expect not only clarity on the problem and objectives, but also evidence of wider support for the proposed scheme. Network Rail explained that 'in addition to fully understanding the transport problem that the proposal is trying to solve, [we] 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 and Central Government]'.[3] The transport business case documentation also makes this point.

The Sharpness Vale documentation does not explain the logic as to what problems the railway intervention solves, nor why other options could

[2] Matt Haywood, Network Rail, 21 January 2021 (Appendix F).
[3] Matt Haywood, Network Rail, 21 January 2021 (Appendix F).

not solve the problem (possibly in a more cost effective way). In short, it does not make the strategic case for a railway enhancement.

The Sharpness Vale documentation does not demonstrate full alignment with transport and planning authorities.

3. The strategic fit with the existing railway network.

The next step is to demonstrate that the railway solution from the strategic case can be introduced into the operational railway network without detriment to the system-wide efficiency. This is called the 'strategic fit'.

Network Rail states that 'Strategic fit is an assessment of whether a proposal for a change to the railway system aligns with the overall strategy for the railway system'. There are a number of important aspects to strategic fit including:

'Capability: will the proposal impact known constraints, or align with known strategies for the capability of the railway?'

'Resilience: will the proposal have an impact on the resilience of the railway' (How the railway copes with risks to loss of service, and recovery from loss of service).

'Safety and standards', which in this case largely relates to enhancements to the branch line infrastructure, in particular the risk associated with level crossings (see below).

The scheme promoter does not consider the wider strategic fit of introducing additional services onto the operational railway. But, using evidence of work undertaken by Ed Jeffrey Ltd, the promoter stresses that it is possible to introduce the proposed services into the existing railway timetable schedules.

The Network Rail letter points out the important omission of not considering strategic fit, explaining that 'timetable analysis is only one aspect of the feasibility of the scheme .. of greater importance at this stage are … the strategic and economic case for the scheme …[and] the fit with the strategic plans for the railways and wider rail system

implications'.[4] The deficiencies in the submission in respect to making a strategic case for rail investment have been made above and in Section 2. But in addition, the promoter appears to have given no consideration to the wider plans for the railway.

The wider plans for the railway are important for two main reasons:

- the strategic nature of the Birmingham to Bristol mainline railway, which is outlined in Network Rail's recent 'Corridor Study' and highlights the strain on the current system, identifies key priorities for service enhancements (which does not include Sharpness) and recommends future infrastructure enhancements necessary to unlock increased rail capacity.[5]
- any spare capacity on the existing system may have been utilised by higher priority passenger or freight services before the Sharpness Vale scheme could justify the proposed railway enhancement.

Network Rail makes the point that 'inevitably this aspiration [for the Sharpness scheme] would compete for capacity on the network' … other projects such as the more advanced 'Midlands Rail Hub … have not been taken into account in the timetable development work'.[6]

The key points are:

just because it might currently be possible to introduce another service into the existing railway timetable, doesn't mean that it will always be possible to do so.

In any case it might not be preferable to do so. There may be other higher priority schemes for the railway industry.

[4] Matt Haywood, Network Rail, 21 January 2021 (Appendix F).
[5] Network Rail Bristol to Birmingham Corridor Strategic Study, June 2021.
[6] Matt Haywood, Network Rail, 21 January 2021 (Appendix F).

4. Review of Arcadis report: Estimating the cost of reinstating passenger rail services on the Sharpness Branch, 1 February 2023.

Because of time constraints, the review of the Arcadis report does not attempt to challenge any of the costings (other than in relation to the Berkeley Road station assumption), but instead focuses upon potential limitations of the current scope which may undermine the viability of the strategic and economic cases for the reinstatement of passenger railway services. This section examines Arcadis's infrastructure and rolling stock assumptions.

4.1 Infrastructure

The Arcadis report considers the four railway infrastructure enhancement options with cost estimates for each. Network Rail is the infrastructure owner, with long term safety and maintenance obligations. Any infrastructure enhancement scheme will only progress if Network Rail is satisfied as to the detailed specification of the works required. There is no evidence that Network Rail has agreed the scope of work, nor verified the costs submitted by the promoter. It is possible that Network Rail would consider that both costs and scope of works are understated. It cannot be inferred, then, that these preliminary costs are anything more than indicative. A considerable amount of negotiation between the promoter and Network Rail is required before firm costings, which will be required to derive the strength of any business case, can be agreed.

Network Rail may specify significantly more works to enable the service to be introduced. Although there is no requirement on the Sharpness branch line to build brand new railway infrastructure the transformation required in terms of infrastructure capability could signal a complete rebuild. Arcadis has specifically excluded drainage, culvert, level crossing and

signalling work from their cost estimates, which may not be acceptable to Network Rail as the infrastructure owner.[7]

The existing permanent-way is configured for one freight train per day at a linespeed of 15 MPH. The proposal is for circa 50 trains per day (2 trains per hour in either direction) at linespeeds of 60-75 MPH. This rebuild might be on a scale similar to the East West Rail project between Bicester and Bletchley which might be useful as a cost benchmark.

Arcadis justifies limited upgrade to infrastructure, and therefore reduced cost estimates, by stating that the impact of Very Light Rail (VLR) operations on the permanent-way is because of the lower weight of the vehicles which then equates to a lower specification of track than for heavy railway users.[8] If it is accepted that the branch line is only configured for VLR services it limits the flexibility of the train operator (see below) and potentially increases risk in terms of project viability if, for whatever reason, VLR services cannot be introduced.

The costs estimated by Arcadis for the four options are:

(1) A new station at Sharpness and branch line infrastructure enhancements for a new train service to/from Gloucester (£7-21m, 'most likely', 10-30m 'worst case')
(2) As (1) but with shortened platforms designed purely for a Very Light Rail (VLR) vehicle, see Section 4, (£5-8m). This is the Arcadis preferred option.
(3) A new station at Sharpness and branch line infrastructure enhancements with an additional new 3-platform station at Berkeley Road. VLR services will shuttle along the branch line and terminate at Berkeley Road where passengers would connect with mainline services (£8m)

[7] Arcadis, Sharpness Rail Study, November 2022, Revision P02, 3 February 2023, 26, 27.
[8] Arcadis, Sharpness Rail Study, November 2022, Revision P02, 3 February 2023, 13.

(4) New southern cord which allows the diversion of services off the existing mainline to Sharpness before re-joining the mainline along the same direction of travel (£56m).

Irrespective of requirements on the branch line, both the Arcadis report and the Network Rail capacity analysis paper make reference to Ed Jeffrey Ltd's suggestion that signalling work will be required at Gloucester to facilitate the 2 TPH service provision.[9]

It is implied within the Stantec and Arcadis documents that any works required around Gloucester are not included within the cost estimates because there is a hope that the work will be undertaken as part of other projects (these projects may not have their own funding and may not be foreseeable in the short of medium term).[10] If so, these projects then dictate the timescale with which the Sharpness service could be enhanced, or possibly introduced, which may well be beyond the timescale of the current Local Plan proposals. This uncertainty questions the overall viability of the rail project since it is dependent upon an improvement which, at this stage at least, is still far from certain.

Given this uncertainty, it would be risky to assume that at this stage the enhancements can be delivered for the estimated costs

Network Rail makes the following key points that 'there are important omissions…' referring to freight line operations on the branch line' and that the infrastructure 'interventions cannot be assumed to be feasible …'[11] It also points out that 'the "do something" option includes the replacement of a mainline crossover [for which a] cost of tens of millions of pounds must be expected'.[12]

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[9] Arcadis, Sharpness Rail Study, November 2022, Revision P02, 3 February 2023, 26; Network Rail Sharpness Quality Assurance Capacity Analysis: Analytic Assurance Statement 20 November 2020.
[10] Stantec, Sharpness Vale: Transport report in response to questions raised by Gloucestershire County Council, 19; Arcadis, Sharpness Rail Study, November 2022, Revision P02, 3 February 2023, 26.
[11] Matt Haywood, Network Rail, 21 January 2021 (Appendix F).
[12] Matt Haywood, Network Rail, 21 January 2021 (Appendix F).

There appears to be some inconsistency in the costings of the four options. The base cost for Option 2 is estimated by Arcadis to be £4.9m, which specifically excludes station passing loops and signalling upgrades. The cost for Option 3, which includes a new 3-platform mainline station is estimated at £7.9m. It seems that the cost estimate for a new Berkeley Road station is £3m (i.e. the difference between the two costs). By way of comparison, the estimate for a new Stroudwater station (Stonehouse Road) some six miles away is £18m.[13] Current SLC Rail cost estimates for similar sized new stations typically exceed £20,

Furthermore, the Arcadis costs do not appear to include Optimism Bias (of 60%) which is a requirement for transport business cases at this early stage of maturity.

4.2. Train operation

Arcadis's preferred approach, Option 2, is configured specifically for the use of VLR. Under this option, the station cannot operate longer (or indeed almost any other) trains. Such an approach limits flexibility for Train Operating Companies (TOC) which may drive significant additional operating cost.

It is understood that because of the crashworthiness of VLR these trains are not cleared for mainline railway operations. It is possible that rules may change, but as things stand, the infrastructure solution is designed for rolling stock which cannot be used for the intended service.

In any case, the advertised top speed is 65 mph may cause congestion/performance issues on mainline (strategic fit issues as mentioned in Section 3, which may prove to be a reason for NR concern). It is not clear from the timetabling report by Ed Jeffrey Ltd whether the

[13] Stantec Allen Rail, Strategic Outline Business Case: Restoring Your Railways – Stroudwater station, 25 March 2022, 47.

timetabling assessment is based upon a 65 MPH maximum speed or a train service that can operate at linespeed.

Network Rail recommended 'discussions with Great Western Railway (GWR) on operational and financial viability'.[14] There is no mention within the documentation of any discussions with any TOC in relation to costs associated with the VLR train. Operating a bespoke fleet will come with significant additional costs in terms of: maintenance, spare capacity, stabling, driver training. It is not clear how many trains would be required to maintain the service, where they would be based, nor how many traincrew would be required.

The choice of VLR has a direct impact on the infrastructure costs and the viability and deliverability of the project. If there has been no agreement with the TOC that VLR is acceptable and workable, then there is a considerable risk to this project that costs are sunk on a venture that cannot then be delivered.

The limitation of short platforms for VLR services means that the TOC could not substitute other rolling stock, for example during times of perturbation. It is not clear which organisation would bear the risk/costs of e.g. unit failure on the delivery of services.

It is likely to prove unacceptable to the railway industry that a station is built that can only accommodate a specific rail vehicle.

5. Demand for rail

Network Rail has stated that 'the potential demand and revenue generated is of critical importance'. It also points out that 'a large volume of regular users would be required, [which is] likely to constitute an

[14] Matt Haywood, Network Rail, 21 January 2021 (Appendix F).

exceptionally high modal share of the catchment population …' [15] Its suggestion appears to be that the Sharpness Vale development may not generate such a level of footfall.

Demand is not solely about the number of residents, but a complicated combination of the propensity of residents to use rail and other services, the destination , frequency, journey time and reliability of services. It is not solely a case taking a pro-rata of the number of residents and assuming that they will wish to travel by train.

Section 8.1.1 suggests that the promoter believes that 1 million passenger journeys p.a. (2018-2019) is achievable when the development is fully built out. This would equate to the 574th largest station of 2,462 in the UK network. Akin to Kettering, Redditch, Caterham, Stratford-on-Avon and Biggleswade in passenger throughput.

If the 1 million passenger numbers are deliverable, then the VLR option is almost certainly insufficient.[16] At that point 77% of the seated capacity of the service would be taken. If the same growth rate occurs as at Ashchurch in the period between 2012 and 2018 then within 6 years of full operation every seat on every train will be taken and at least 2 people will be standing.[17] This failure to accommodate growth would be unattractive to customers and the railway industry. It is likely to result in the industry not accepting the shorter platform model as it does not allow for any capacity improvements.

Since it is predicted that 2,400 new dwellings are built by 2040, a pro-rata of the 1 million passenger estimate equates to 480,000 journeys p.a. A number similar in scale to Wrexham, Sandy, Torquay and Tiverton Parkway,

[15] Matt Haywood, Network Rail, 21 January 2021 (Appendix F).
[16] 1 million passenger numbers equates to 2,755 per day, 1,377 in each direction. If the seating capacity of the VLR train is 56 and there are two trains per hour for 16 hours per day (32) then on average every train will have 43/56 seats taken (77%).
[17] Growth at Ashchurch between 2012/2013 and 2018/2019 equals 34%. 43 seated passengers plus 34% equals 58 passengers on average to each train.

and slightly below that of Stroud (561k). At this level of demand, it seems unlikely that the minimalist specification of station facilities would be acceptable to the railway industry.

Passenger numbers for similar local stations amount to less than 200,000 journeys p.a. Cam and Dursley (191k) and Ashchurch (102k) - which has direct connectivity to Birmingham, Cardiff, Worcester, Cheltenham, Gloucester and Bristol compared to Gloucester only for Sharpness Vale.

On the generous assumption that Sharpness Vale could generate 500k passenger journeys p.a. this number would equate to 1,377 journeys per day (including Saturdays and Sundays) of which 688 (50%) would be outward journeys. This would compare to 526 per day for Cam and Dursley, 263 out/return. So, by 2040 Sharpness Vale station will be 2.6 times busier than Cam and Dursley.

Section 5.3.2 shows that Stantec estimate that between 0800-0900 on a weekday with 1 TPH the loadings are 279 passengers (40% of the total daily outward services). The VLR vehicle has seats for 56, so the projected loadings for the peak train are 2.5 times the capacity of that train. Throughout the remainder of the day (on outward services) there would be 409 passengers. If there are 16 services per day (1 TPH) then there will be an average of 27 customers on each outward train other than the 0800-0900 morning peak.

The proposition does not consider an alternative to rail by increasing the provision of bus capacity (n.b. DfT seeks all business cases to consider key such alternatives). Stantec's estimates show that 1,757 residents, around 30%, are predicted to leave the settlement between 0800-0900 (Table 3.1).[18] During this peak hour bus loadings are projected at 716 passengers (2.5 times greater than rail). It is not clear why it would not be feasible to further increase bus provision to cater for the remaining 279 passengers. Such an approach could

[18] If there are 2,400 dwellings with 2.4 residents per dwelling, then this number amounts to over 30% of the residents leaving during this single hour.

completely avoid the long-term risks associated with railway infrastructure and operations by providing a more cost effective alternative to rail.

Consideration should be given as to how Stantec justifies its estimate of rail passenger numbers. Its logic appears to be based upon 'comparable' stations to Sharpness Vale. The passenger numbers for six of the stations are not readily comparable because these locations are also significant tourist destinations.[19] The remaining stations are very different in comparison to Sharpness Vale because these are served by a high frequency of services (up to 5 TPH pre COVID, compared to 1 TPH for Sharpness potentially building up to 2 TPH) and are close to significant urban and economic centres (between 3 – 18 times larger than Gloucester in GVA terms).

In addition, for these 'comparable' stations, there tend to be numerous stations along the line of route, meaning that each station has to contribute less in revenue to justify the service provision. There are, for example, 8 station calls between Glossop and Manchester and 12 between Aberdare and Cardiff. Yet there is only Cam and Dursley between Sharpness and Gloucester (which is a smaller economic centre in comparison to Cardiff, Bristol, Leeds and Manchester which the 'comparable' stations serve).

Comparable stations used in Stantec analysis (from Table 8.1)

[19] Seaford, Exmouth, Malvern, Dawlish, Teignmouth, Totnes.

Other stations	TPH	Key destination	GVA	Miles	Journey Time
Garforth	4	Leeds	21 bn	8	11
Glossop	2	Manchester	56 bn	13	33
Aberdare	2	Cardiff	9 bn	22	64
Ilkley	4 (3)	Leeds	21 bn	16	28
Bradford-on-Avon	5 (3)	Bath		10	17
			4 bn	21	36
Trowbridge	5 (3)	Bristol	14bn	14	23
				25	43
New Milton					
Ashchurch	1	Gloucester	3 bn	14	19
Cam and Dursley	1	Gloucester	3 bn	13	15
Sharpness	1	Gloucester	3 bn	18	Not known

The closest comparative stations are Cam and Dursley and Ashchurch. These stations appear to have been ignored by Stantec for comparative purposes.

The logic behind the argument of potential journey numbers for Sharpness Vale is flawed and therefore unconvincing.

It is possible that railway connectivity is seen as an essential prerequisite to making the overall development sustainable. The DfT and the railway industry would not, however, expect to pick up the obligations for an unviable service. They are likely to insist that passenger numbers reflect a realistic level based upon the factors described earlier in this section.

6. Summary

Strategic Case	There is no strategic line-of-sight making the case for rail intervention, explaining the underlying problem,

	the options that could resolve the problem and the justification of a rail intervention. No consensus between transport and planning authorities on the investment goals
Strategic Fit	Takes no account of the wider strategic fit of the intervention on the railway system. Competition for railway capacity means that just because it is possible to implement a timetable enhancement it may not be the right thing to do for the wider system. No consideration of the potential performance impact on the wider system of a train running at a speed considerably slower than the line speed
Cost	Scope of works and cost assumptions not agreed with NR. Not all costs included (e.g. Gloucester work and level crossing improvements). Preferred option only works for VLR solution (increases deliverability risks). Costs do not include Optimism Bias required for transport business cases
Rail operation	Infrastructure assumptions based on VLR – limits flexibility because not sufficient for other trains. VLR not cleared for mainline operation. Linespeed of VLR may be an issue with timetabling/performance. Unclear whether GWR underwrites the introduction of VLR (trains, maintenance, stabling, train-crew etc).
Demand	Demand drives the business case. Evidence to support assumption of 1 million passenger journeys p.a. is weak. Best comparable evidence (100k -200k) is not considered.

	At 1m passengers p.a. little capacity for increased demand with VLR. Projection indicates that 40% of demand is between 0800-0900. Indicates that off-peak services will be heavily under-utilised. Not clear why increased bus capacity cannot substitute for railway services (much cheaper).

7. Conclusion

How might the railway industry view the current proposal for an upgrade of the branch line at Sharpness and a reinstatement of passenger services and an increase in traffic on the Bristol to Birmingham main line?

There is limited evidence that a strategic case has been made that explains the problems and why a railway intervention is the best solution compared to other options.

The proposition does not address strategic fit with the wider railway system.

Levels of anticipated demand, which drives income for the railway industry, appear optimistic with limited evidence to support the promoter's case.

Capital and operational costs appear to be hypothetical, unverified and the methodology not yet agreed with the railway industry.

The logic for VLR remains far from certain and may create incremental costs for a TOC in operating a bespoke fleet whilst also limiting flexibility in how the branch line can be used.

Some or all of these concerns may be allayed at a later stage of maturity. But until clear evidence-based answers are provided and the project progressed through the transport business case process, there can be no certainty that the rail industry would support the introduction of railway services from Sharpness.

Therefore, if planning consent for the wider Sharpness Vale scheme is granted on the basis of the current state of the railway infrastructure enhancement project, it is done so with a very high degree of risk that the anticipated railway enhancements may never be delivered.