South Gloucestershire Council

Wickwar Bus Review

Rebuttal

REP
October 2023

Confidential

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Type of document (version) Confidential

Project no. 70116829

Our Ref. No. REP

Date: October 2023

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1 Introduction

1.1.1 South Gloucestershire Council (SGC) has appointed WSP to review a technical note produced by Norman Rourke Pryme consultants (NRP) for Bloor Homes, “84/85 Alternative Bus Route Proposal (7909/TN03 Rev 0.1 31st May 2023)”.

1.1.2 The NRP note sets out technical modelling work which assesses whether an amended version of the 84 / 85 bus service between Wotton-Under-Edge and Yate via Wickwar could be commercially viable. The note has been prepared by NRP in support of a planning application from Bloor Homes to build 180 new homes on a site to the west of Sodbury Road in Wickwar, alongside a local shop and associated infrastructure.

1.1.3 The NRP note sets out:

- Options for changes to bus services; and
- Forecasts for demand, revenue, and operating costs for the preferred option.

1.1.4 NRP used the software package Podaris to model the demand of the new services, assessing changes in mode choice between the existing and proposed routes. Outputs of these modelling exercises have then been used to predict patronage for the proposed service which have been used in turn to model the financial viability of the scheme.

1.1.5 NRP’s conclusion is that the revised service could operate commercially, generating an operating surplus of approximately £145,000 per year.

1.1.6 SGC appointed WSP to review the NRP note and comment on the analysis it contains, as a rebuttal to the NRP note’s conclusion.

1.1.7 This rebuttal has been prepared by Julian Moss, BA (Hons) MSc PhD. I am an Associate Transport Planner with WSP, a multi-disciplinary engineering and built environment consultancy which employs 9,600 professionals in the UK. I am a Chartered Transport Planning Professional, Member of the Chartered Institution of Highways and Transportation and Member of the Transport Planning Society. I have 25 years’ professional experience across strategic and operational roles in transport, spatial planning and education. I am a member of the Steering Committee of WSP’s national Transport Planning Expertise Practice Group and lead WSP’s use of Podaris software. Prior to joining WSP in 2018, I worked in bus network planning and performance monitoring for Transport for Greater Manchester.

2 Population, employment and transport context

2.1 Background

2.1.1 This section outlines key data in respect of population, employment and travel to work which informs later analysis.

2.1.2 17% of South Gloucestershire's 183,200 16–64-year-old residents are currently classed as unemployed or economically inactive, according to the ONS Annual Population Survey and reported in the ONS / NOMIS Labour Market Profile, based on 2022/23 data. 83% of 16–64-year-olds in South Gloucestershire are in work (employed or self-employed).

2.1.3 The Labour Market Profile also reports that 70% of jobs in South Gloucestershire are full time, with 30% part time (where part-time is defined as 30 hours or less per week). (This excludes self-employed people.) This data is not available at a more local level.

2.1.4 2011 Census Travel to Work data quoted in the Transport Assessment for the proposed Bloor Homes development in Wickwar shows that approximately 17% of residents in the Wickwar area who work do so from home and therefore do not travel to work. This is likely to provide a more robust estimate of working from home than the 2021 Census, when Covid restrictions and guidance were in force and more people were therefore working from home.

2.1.5 Car ownership data from the 2011 Census is reported in the Transport Assessment for the development and shows that 5.6% of households in the Wickwar area did not have access to a car or van, compared with the average for England and Wales of 25.6%. 65.3% of households had more than one car or van, compared with the national average of 32.2%.

2.1.6 2021 Census data shows a reduction from the 2011 Census in the proportion of households with no car or van to 4.6% and a slight increase in multi-vehicle households to 65.6%.

2.1.7 According to the 2011 Census, of 137,271 people who travelled to work in South Gloucestershire, 6,686 (4.87%) did so by bus; this is skewed towards employment locations in Bristol and its suburbs. If we instead look at the Middle Super Output Areas (MSOAs) directly in the study area, the percentage of commuting by bus is 3.9% (725 people who travel to work out of 18,518).

2.1.8 I consider that it is reasonable to continue to use Census 2011 data for travel to work analysis; the question regarding workplace postcode was not asked in the 2021 Census and there is no robust equivalent national dataset yet available with more up-to-date data.

2.2 Current 84 / 85 bus service

2.2.1 The bus service proposed by NRP is a significant reworking of the existing 84 / 85 service.

2.2.2 The current 84 / 85 bus service runs between Yate and Wotton-under-Edge via Wickwar. It is operated by The Big Lemon bus company and supported by South Gloucestershire Council under its powers under the Transport Act 1985 to secure "socially necessary" bus services where the commercial market does not do so.

2.2.3 In July 2023 South Gloucestershire Council approved an 8-month extension to the contract with The Big Lemon to keep a reduced service operating from September 2023 to the end of April 2024, at a cost of approximately £190,000. This decision is attached to Ms Fitzgerald's Planning Proof of Evidence at Appendix 5.

2.2.4 Pro-rated, this means the current service requires a public subsidy of approximately £285,000 to operate for one year.

2.2.5 I do not have access to patronage or fare revenue data for the existing service.

3 Proposed Changes

3.1 Preferred option

3.1.1 NRP identified and assessed six options, with a view to considering their financial viability, the population served and the overall diversity of the route. All route options would serve Charfield railway station, for which a planning application was approved in March 2023.

3.1.2 NRP have identified their option 6 as their preferred option. I have not reviewed or tested all six options and have confined my analysis to option 6, as this is the option proposed by the Appellant as the most desirable, as a mitigation measure for the transport impacts of the proposed development.

3.2 Demand forecasts

3.2.1 NRP have used a logit model to assess potential demand for the revised routes, using Podaris software.

3.2.2 NRP have used population data as the main inputs for setting up and calibrating the model in Podaris. The modelled mode shares for trips to and from work are validated against travel-to-work mode shares from the 2011 Census. This validation shows that the model is reasonably accurate in modelling travel-to-work demand. NRP have then used the same model to forecast travel-to-work demand with the amended 84 / 85 service (option 6) in operation.

3.2.3 Podaris was launched in 2013 and is increasingly used for public transport planning and modelling by local transport authorities and consultants. WSP use Podaris for bus, light rail, heavy rail and multi-modal transport planning projects and I agree it is a reasonable choice for this type of analysis. The validation of the model in Podaris to 2011 Census data suggests that the model is providing reasonable forecasts of modal choice for trips to work.

3.2.4 The main body of the NRP note reports that the modelling shows an increase in the proportion of commuting trips made by bus from 3.3% to 8.73%, a 164% increase. The annex of the note shows that this represents 58 people travelling to / from work by bus now (based on 2011 Census data) and 160 people travelling to / from work by bus with the amended service in operation (a 176% increase).

3.2.5 While on the face of it this appears to be a very optimistic result, it is not unreasonable, given the significant increase in the frequency of the peak hour bus service.

Extrapolation and application to generate patronage forecast

3.2.6 The NRP analysis then extrapolates from this mode share for trips to / from work to attempt to establish a bus trip rate for all residents in the study area and then to make a forecast of patronage on the revised 84 / 85 bus service (option 6).

3.2.7 It does this in two steps:

- multiplying the daily rate from the model by 10 to give a weekly commuting trip rate and multiplying the weekly rate by 5.88, on the basis that 17% of all bus trips are commuting trips (to/from work), to give a trip rate for all trip purposes (extrapolation from commuting trip rate to all-purpose trip rate) (where 5.88 = 100 / 17)
- applying this derived trip rate to the population aged 5-59 who live within reasonable walking distance of bus stops on the route (application of derived trip rate to wider population).

3.2.8 The extrapolation in the first step is flawed in two ways, which significantly increase the estimated trip rate:

- it assumes all people who travel to work do so 5 days a week (hence 10 one-way trips to and from work)
  - an estimate of 3.5-4 days would be more reasonable, given rates of part-time work; as noted above, 30% of workers in South Gloucestershire work 30 hours or less per week and hybrid (office / home) working will be available to some residents of the area
- it assumes trips to/from work are 17% of all bus trips made by bus commuters
  - although 17% of bus trips are made for commuting purposes, it does ***not*** logically follow that 17% of trips made by a bus commuter are 17% of all their bus trips

3.2.9 The application of the derived trip rate to the wider population (the second step) is flawed in two ways, which significantly increase the patronage forecast:

- it assumes all people aged 5-59 travel to work
  - the 5-17 age group are in education (and trips to school are not counted as part of Census travel to work statistics) so do not travel to work (and are likely to outnumber the 60+ age group who are in employment but excluded from NRP's group)
  - as noted above, 17% of the working-age population of South Gloucestershire is economically inactive so do not travel to work
  - as noted above, 17% of the working population of the Wickwar area work from home
- it assumes all residents make bus trips at the same rate as bus commuters
  - it is self-evident that bus commuters use the bus for travel to work more than those who travel to work by other means. Bus use correlates with car ownership; bus use for non-work trips correlates with bus use for work trips. For example, people who do not have a car and travel to work by bus are more likely to travel by bus for other purposes than people who do have a car and commute to work by car. Also, people who commute by bus 5 days a week are likely to use a money-saving season ticket, which means additional bus trips for other purposes have an essentially zero marginal cost – again leading these people to use the bus more than other groups.

3.2.10 The combined effect of the flaws in the extrapolation and application steps is a significant over-estimate of patronage for the revised bus service.

	NRP analysis	WSP analysis
Proportion of travel-to-work trips made by bus (current)	3.3%	3.3%
Proportion of travel-to-work trips made by bus (future)	8.73%	8.73%
Number of bus commuters (current)	58	58
Number of bus commuters (future)	160	160
Number of days each bus commuter travels to work	5	4
Number of weeks each year each bus commuter travels to work	52	48
Travel to work bus trips (annual)	83,200	61,440
Proportion of travel-to-work rate applied to whole 5-59 year-old population	100%	45% (note 1)
Other bus trips (annual)	614,172 this implies that commuting makes up 12% of all bus trips	299,972 assuming commuting still makes up 17% of all bus trips
Annual patronage	697,372	361,412
Proportion of all bus trips which are to / from work (future)	12% (note 2)	17% (note 3)

Note 1: I have set the rate at 45% so that travel to work is still 17% of all bus trips. This change accounts for 5–17-year-olds, economically inactive / unemployed 5–59-year-olds

and people who work from home (which reduces the proportion from 100%) but also accounts for economically active 60+ year-olds who travel to work (which increases the proportion).

Note 2: This figure is calculated by WSP. It is not stated in the NRP note. I have calculated it from the number of commuting trips (on NRP's calculations this is 160 people x 10 trips per week x 52 weeks per year = 83,200) divided by the total number of trips all purposes, 697,732. It thus implies that non-commuting bus travel would become more attractive as a result of the service changes to a greater extent than commuting bus travel. Commuting bus travel would see a patronage increase of 176% on the half-hourly service; non-commuting bus travel would see a patronage increase of 318%, likely to be concentrated on the hourly daytime service.

Note 3: My calculations of total patronage assume that all bus travel (commuting and other purposes) becomes more attractive at the same rate and thus the proportion of bus trips which are for commuting is maintained at 17%, in line with National Travel Survey results.

3.2.11 The NRP patronage estimate is thus approximately 93% higher than the WSP estimate.

3.2.12 As contextualisation, I now consider how the trip rates implied by the NRP forecasts compare with national and regional data on bus use.

3.2.13 Department for Transport (DfT) Bus Statistics include data on the average number of trips made per person (i.e. all age groups). This data is from DfT Bus Statistics tables BUS 01b and BUS 01f; 2018/19 is the last full pre-COVID year; 2022/23 data is not yet available.

- For English non-metropolitan areas the average rate in 2018/19 was 34 bus trips per person per year; in 2021/22 it was 22 trips per person per year;
- For South Gloucestershire the average rate in 2018/19 was 32.9 trips per person per year; in 2021/22 it was 18.8 trips per person per year.

3.2.14 The NRP patronage forecast implies that the average resident (all ages) would take 166 bus trips per year, matching the simple multiplication of the NRP-calculated trip rate of 3.2 trips per person per week. The highest rate of any English local authorities outside London in 2018/19 were 171 trips per person per year in Brighton and Hove, and 145 trips per person per year in Nottingham. In both of these cities there are dense networks of buses operating at high frequency (every 5-10 minutes on many routes), seven days a week and with some night buses, in areas with lower-than-average car ownership.

3.2.15 I believe it is implausible that a service running every hour (half-hourly at peak times), six days a week in rural South Gloucestershire, where car ownership levels are high, could generate similar patronage levels.

3.2.16 This reinforces my conclusion that the NRP analysis significantly over-estimates the likely patronage on the revised route.

3.3 Revenue forecasts

3.3.1 In order to calculate the potential revenue of the new service the NRP analysis multiplies the patronage estimate (discussed above) by an assumed average ticket price.

3.3.2 Assuming a £2.32 average fare, NRP's analysis shows an annual revenue of £1,617,534.01.

3.3.3 While the approach is sound, the revenue forecast has the following weaknesses:

- It builds on the over-estimated patronage forecast;
- It uses £2.32 as an average fare, which is higher than current conditions suggest is likely to be achievable.

3.3.4 Current fare levels on the 84 / 85 are:

- Adult single fare £2
- Adult return fare £3.50
- Child / student single fare £1
- Child / student return fare £2 (sold as two single tickets)

3.3.5 Some passengers, especially those travelling beyond the study area and / or changing onto other services, may use AvonRider multi-operator passes (day: £5.30-£7; week £22.50-£30), where the 84 / 85 operator will receive a proportion of the fare.

3.3.6 The estimate of £2.32 is therefore too high as the average fare yield for a single trip. Many trips are return trips, so half of the adult return fare is a more realistic starting point for estimating average fare yield. Half of the adult return fare is £1.75; with multi-use tickets and child fares, an average yield per trip of £1.50 is more realistic.

3.3.7 The revenue forecasts are therefore likely to be significantly overestimated.

3.3.8 Using my patronage estimate and the reduced average fare yield, I estimate that the revised 84 / 85 service would generate annual revenue of £542,100.

	NRP analysis	WSP analysis
Annual patronage	697,372	361,412
Average fare yield per one-way trip	£2.32	£1.50
Total revenue	£1,617,534	£542,118

3.3.9 I thus conclude that the NRP average fare yield per trip is approximately 55% higher than the WSP estimate. Combined with the difference in patronage estimates, NRP's overall revenue estimate is approximately 198% higher than the WSP estimate.

3.4 Operating costs

3.4.1 NRP estimate operating costs by combining driver wages (based on ONS data from 2020), estimates of the cost of buying new vehicles (sourced from Stagecoach) and operating costs from DfT Bus Statistics (2021).

3.4.2 This leads to an over-estimate operating costs. The National Bus Statistics values for operating costs per km include all costs (driver and other wages; vehicle purchase, maintenance and depreciation; energy [diesel or other fuel]; back-office costs and overheads; small assumed profit margin).

3.4.3 NRP's estimate of costs £1,472,921 equates to £3.91 per km operated.

3.4.4 I would reduce this to match the relevant value from the latest DfT National Bus Statistics. The value for 2012/22 for non-metropolitan areas of England is £2.56 (DfT Bus Statistics 2022, table BUS04gi_km). Adding an allowance of 15% for inflation since March 2022 gives a rate of £2.94 per km.

3.4.5 At this rate, the operating cost calculated using a per-km rate would be £1,107,516.

3.4.6 As a validation, it is a common rule of thumb in the bus industry that the cost to run one vehicle on the road is in the order of £150,000-£200,000 per year, depending on the specifics of the service (route length and profile, timetable efficiency, distance from depot, local pay rates for drivers, ease or difficulty in recruiting and retaining drivers etc). The revised 84 / 85 timetable (option 6) can be operated with a maximum of 6 vehicles on the road in the peak hours (not the 8 which NRP calculate). At £175,000 per vehicle per year this would imply an annual cost of £1,050,000. This suggests that using the WSP per-km rate is reasonable.

	NRP analysis	WSP analysis
Distance operated each year	376,706 km	376,706 km
Operating cost per km	£3.91	£2.94
Total operating cost	£1,472,921	£1,107,516

3.4.7 NRP's operating cost estimate is therefore approximately 33% higher than the WSP estimate.

4 Conclusion

4.1.1 I bring through key conclusions from this rebuttal and summarise them below.

	NRP analysis	WSP analysis
Number of bus commuters (current)	58	58
Number of bus commuters (future)	160	160
Future patronage (one-way trips per year, all purposes)	697,372	361,412
Revenue (future)	£1,617,534	£542,118
Operating costs (future)	£1,472,921	£1,107,516
Operating surplus / (deficit) (future)	£144,613	(£565,398)

4.1.2 I conclude that:

- NRP significantly over-estimate patronage – by around 93%;
- NRP significantly over-estimate revenue – by around 198% (in part by building on the over-estimate of patronage, in part by over-estimating the likely fare revenue per passenger);
- NRP over-estimate costs – by around 33%.

4.1.3 I consider NRP's overall conclusion that the revised 84 / 85 service could be operated with a surplus of £145,000 per year to be unsound and unrealistic.

4.1.4 My estimate is that the service proposed by NRP would be likely to operate at a loss of approximately £565,000 per year.

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