The local traffic impacts of the temporary closure of Chock Lane: Final report of survey

Summary: main outcome

The temporary four-day closure of Chock Lane had a major impact on local traffic flows, particularly during the morning peak hour, although this varied from road to road. In two (Priory Avenue and Eastfield Road South) this resulted in a substantial growth of diversionary traffic, and probably a greater proportion of vehicles then turning back into the Village at the Westbury Hill junction than when Chock Lane was open. For Waters Lane the impact was very different, and the build-up of an enormous morning peak queue resulted in much slower clearance of traffic on this stretch of road, as well as reducing the traffic volumes recorded in our survey hour then compared both to the mid-day hour counts in 'closure week' and also to all the survey periods when Chock Lane was reopened.

Preamble

On 10th January the Westbury Transport and Placemaking Group (TPM) agreed to run a survey, at short notice, to capture the local traffic impacts of the planned temporary closure of Chock Lane. It was to be closed from Monday 16th January for four days to complete a repair to the sewerage system. Notices had been posted to this effect to warn drivers for some days ahead and, in the event, the road blockage, at the entry to Chock Lane, was also

clearly visible from its junction with Eastfield Road (Figure 1)

Figure 1- the southern entrance to Chock Lane, 18th January

Chock Lane is a major rat-run for traffic heading westwards through Westbury Village, wishing to avoid delays and queuing on Waters Lane. Reducing traffic on it for the benefit of nearby residents and to improve pedestrian safety and environmental quality more widely has been the focus of various 'options' under review by TPM for local traffic reduction and reassignment.

So this impending closure presented a ready-made natural experiment, to investigate what would happen with such a major, albeit temporary, change to traffic flows on a road that raises significant existing traffic concerns locally. In particular, what would be the impacts on nearby alternative routes, namely Waters Lane, Eastfield/Priory Avenue and Eastfield Road South (the stretch of that road south of junction opposite The Mouse)?

It was also important to capture the comparable normal traffic flow patterns on the same roads as a 'control'. Doing so immediately after the reopening of Chock Lane seemed the best option here (there being no time before).

Methods

Traffic surveys are often best conducted mid-week, and in this instance this also allowed affected traffic to become familiar with the Chock Lane closure and adjust to it. As a result, traffic counts were conducted on the above roads on Wednesday 18th and Thursday 19th January on 'Week 1' (with Chock Lane closed) and again on Wednesday 25th and Thursday 26th January on 'Week 2' (Chock Lane reopened), at the following three common times:

- Morning peak: 8.00-9.00hrs
- Mid-day: 12.00 -13.00 hrs
- Evening peak: 17.00 – 18.00hrs

Counts were confined to all motorised vehicles downhill on Waters Lane, heading west on Priory Avenue and south on Eastfield Road South, and were grouped into 5-minute time slots. Some surveyors on Waters Lane were also sometimes able to note volumes of traffic that diverted onto Eastfield Road South when confronted with a Waters Lane queue which extended up to and beyond that junction, although counts were also made at the other end of that stretch, opposite the Post Office Tavern, along with those on Priory Avenue.

Surveyors there also noted the volume of Eastfield Road South and Priory Avenue traffic then turning right on Westbury Hill, when overall volumes allowed, as a further indication of whether this had diverted from Chock Lane or Waters Lane during the closure. However, this was not possible during the very busy peak morning hour surveys.

As the Chock Lane work was scheduled for completion on Thursday 19th it was unsurprising that the road reopened for traffic by the last survey period that day. No count had been scheduled there then, and other counts at 17.00-18.00hrs should be treated with caution (and are *italicised* in the Tables below). Traffic then on Waters Lane and Eastfield Road South would have been aware of the reopening, although that on Priory Avenue probably not.

In Week 2, counts were taken on Chock Lane, now re-opened, at the same times and days as above.

Additionally, the lengths of any downhill queue on Waters Lane and its eastern extension on Eastfield Road were noted over the same three time periods and at 5-minute intervals, using the following scale of marker points:

A- No queue on Waters Lane

B- Short queue, extending no further that No 5 Waters Lane (the 'half-way' house)

C- Queue beyond B but no further that the Eastfield Road South junction (opposite The Mouse)

D – Queue beyond C but no further than the footpath opposite the Chock Lane junction

E – Queue beyond D but no further than the Eastfield junction

F – Queue beyond the Eastfield junction

Some subjectivity was necessary in deciding quite where short queues ended (they were often rolling queues where traffic kept creeping forward to the bottom of Waters Lane before exiting), and sometimes queues were lengthened by the segmenting of stationary vehicles to allow flowing traffic in the other direction to pass (for example, on the upper part of Waters Lane). But in practice this scale proved a simple and practical way to capture the very different, and frequently rapidly changing, queue lengths at different times.

The overall methodology worked well, aside from the unwelcome and unforeseen complication of the closure of Westbury Road in Week 2, north of the White Tree roundabout, for ongoing gas pipeline installation. This may have affected the use of Priory Avenue and Eastfield Road South as routes for traffic heading west and south from Westbury Village that week, as this would have faced a lengthy detour. If required, this part of the survey could be repeated when this installation is completed, as a double-check on the Week 2 results.

Results

1. *Overall counts and changes*

Table 1 shows the raw counts of vehicles for each survey hour and the percentage change from Week 1 to Week 2 for those roads open in both weeks.

On most roads the mid-day hour usually recorded fewer vehicles than the two peak hours, with the morning peak flow the greater of these. Chock Lane certainly conforms to this, once reopened. Predictably, the morning peak flows on the potential Priory Avenue and Eastfield Road South diversions were also far higher in Week 1 than when Chock Lane is open again, on Priory Avenue by about 50% and on Eastfield Road South by over 300% on one day and over 200% on the other. By inference, the Week 2 traffic there either used those roads as part of their regular route between 8 and 9hrs, or originated within them.

The maverick road is clearly Waters Lane. With Chock Lane closed it carried *less* downhill traffic in each peak hour period than the equivalents a week later, and its Week 1 mid-day totals *exceeded* the same-day morning peak flows.

Overall, in Week 2 flows were higher, often substantially so, since the greater recorded traffic on Waters Lane and the return of vehicles on Chock Lane then outweighed the growth of traffic in Week 1 on Priory Avenue and Eastfield Road South.

Table 1

Road	Wednesday					
	Week 1 (# vehicles)			Week 2 (# and % of Week 1)		
	8-9hrs	12-13hrs	17-18hrs	8-9hrs	12-13hrs	17-18hrs
Waters La.	252	375	275	345 (137%)	296 (79%)	314 (114%)
Priory Ave.	260	91	152	169 (65%)	96 (105%)	156 (103%)
Eastfield Rd. South	147	25	138	47 (32%)	25 (100%)	31 (22%)
Chock Lane				223	132	181
Total	**659**	**491**	**565**	**784 (189%)**	**549 (118%)**	**682 (121%)**
Road	Thursday					
	Week 1 (# vehicles)			Week 2 (# and % of Week 1)		
	8-9hrs	12-13hrs	17-18hrs	8-9hrs	12-13hrs	17-18hrs
Waters La.	263	317	*368 (*)*	353 (134%)	298 (94%)	307 (83%)
Priory Ave.	221	76	*133 (*)*	149 (67%)	74 (97%)	121 (91%)
Eastfield Rd. South	141	36	*50 (*)*	62 (44%)	28 (77%)	26 (72%)
Chock Lane				203	155	174
Total	**625**	**429**	***551***	**767 (122%)**	**555 (129%)**	**628 (100%)**

(*) Chock Lane reopens

2. Where has the Chock Lane flow gone?

So what happened to Chock Lane traffic in Week 1? A number of possibilities here:

i) it could have diverted to Waters Lane

ii) it could have diverted to Priory Avenue or Eastfield Road South (or caused regular Waters Lane traffic to be displaced there by road-space competition)

iii) *it could have diverted to non-local roads (such as Doncaster Road/Greystoke Avenue, Henleaze Road/North View) or caused other traffic to do so*

iv) *its drivers could have chosen to car share…*

v) *…or travel earlier or later to avoid anticipated peak time congestion*

vi) *…or travel by more sustainable means (bus, walk, cycle)*

vii) *…or work from home*

Our survey only directly measured i) and ii) – so nothing listed in *italics*. But we can at least calculate the overall difference between Week 1 and Week 2 on Waters Lane, Priory Avenue and Eastfield Road South combined, and compare that with the equivalent flows on Chock Lane as measured in Week 2. This is our best estimate of the normal Chock Lane flow to be accommodated in some other way in Week 1. Sometimes, Week 2 flows were greater than Week 1 on a particular road, so the overall differences are a mixture of pluses and minuses. Table 2 shows the results, and the percentage of the estimated Chock Lane traffic *not* accounted for in this way.

Table 2 Accommodating Chock Lane traffic

	Wednesday		
	8-9hrs	12-13hrs	17-18hrs
Chock Lane flow Week 2	223	132	181
Increased overall flow on Waters Lane, Priory Avenue and Eastfield Road South Week 1 over Week 2	125	58	87
% Chock Lane flow unaccounted for	44%	56%	48%
	Thursday		
	8-9hrs	12-13hrs	17-18hrs
Chock Lane flow Week 2	203	155	*174 (*)*
Increased overall flow on Waters Lane +Priory Avenue +Eastfield Road South Week 1 over Week 2	141	131	*77 (*)*
% Chock Lane flow unaccounted for	46%	16%	56%

(*) Chock Lane reopens

On this basis, other than at mid-day on Thursday, significant proportions of the presumed Chock Lane traffic in Week 1 cannot simply be accounted for by the net changes on the three nearby local roads at the corresponding times. Something else was happening.

3 Queueing

A further significant complication here, and a major outcome of our survey, was the build-up of substantial traffic queues on Waters Lane and its eastwards extension into Eastfield Road during the Week 1 peaks hours, as starkly illustrated in Figure 2.

Figure 2 – Traffic queueing on Eastfield Road, 8.16am Wednesday 18th January (photo taken opposite the junction with Eastfield)

Given the very slow traffic speeds resulting, cars took much longer to travel a given stretch of Eastfield Road/Waters Lane than in Week 2, with the implication that traffic that otherwise would have cleared that section of road in normal traffic conditions by, say, 8.45, may not have reached our counters there within the survey hour. Admittedly, our counts may equally have caught snarled-up traffic that previously would have cleared by 8.00 but was delayed, say, to 8.20. But if the queue builds up steadily over the morning peak then average speeds would fall and clearance times increase, so depressing Waters Lane peak

counts in Week 1, as in Table 1. They were not just lower than the equivalents in Week 2 but also than the normally lighter traffic at mid-day. This could also explain at least some of the 'unaccounted for' Chock Lane traffic in Table 2.

Table 3 shows the queue lengths on Waters Lane/Eastfield Road on the scale outlined earlier, giving the median queue length recorded for each hour and day (ie the 7th length of the 13 recorded each hour when ranked in order), and also showing how many queues, if any, fell into the two extreme scale points of A (no queue) and F (beyond Eastfield).

Table 3

	Wednesday					
	Week 1			Week 2		
	8-9hrs	12-13hrs	17-18hrs	8-9hrs	12-13hrs	17-18hrs
Median queue segment	E	B	C	B	B	B
No. of times when no queue (A)	0	1	0	1	5	5
No. of times when queue beyond Eastfield (F)	5	0	0	0	0	0
	Thursday					
	Week 1			Week 2		
	8-9hrs	12-13hrs	17-18hrs	8-9hrs	12-13hrs	17-18hrs
Median queue segment	E	B	*B (*)*	B	A	B
No. of times when no queue (A)	0	1	*3 (*)*	1	7	4
No. of times when queue beyond Eastfield (F)	2	0	*0 (*)*	0	0	0

Clearly, Week 2 is much easier to negotiate than Week 1, where the queues at morning peaks were particularly dreadful. This is the only time when the queue was recorded as stretching beyond Eastfield (F), and the median queues were at E - between Chock Lane and

Eastfield - both days that week. At mid-day, in contrast, the median queue was B (not beyond No 5 Waters Lane) and at times on both days in Week 1 no queue was observed, despite the Wednesday vehicle mid-day flow being the highest of all those recorded on Waters Lane. It seems that high traffic volumes can still clear Waters Lane quite quickly when traffic on Westbury Hill is light, compared to the two peak hours.

Higher volumes, more queueing and more blocking of Waters Lane at the Westbury Hill junction also led to bad driver behaviour. A number of the survey team noted how cars intending to descend Waters Lane in peak hours would suddenly decide to divert into Eastfield Road South, sometimes beyond the last safe moment, preserving the end of the Waters Lane queue at or near the start of the Waters Lane descent, as if acting as an overflow pipe for the traffic-full section of Waters Lane below. At the peak hours, when Chock Lane was known to be closed, flows recorded on Eastfield Road South were 50% or more of the equivalent Waters Lane volumes, but otherwise were never above 20% and sometimes below 10%.

Similarly, traffic on Eastfield Road South coming the other way, towards The Mouse, often found difficulty in safely exiting, while more than one vehicle resorted to a three-point turn by the Village Hall in exasperation and two cars on Wednesday evening overtook the patiently(?) waiting queue on Eastfield Road to head down Chock Lane, before having to reverse, ignominiously, into the same stream of traffic they had queue-jumped.

4. Which way at Westbury Hill?

Other than for the morning peaks, we obtained data on the direction taken at the Westbury Hill junction of traffic from Eastfield Road South and Priory Avenue. If significant numbers were using one or both roads to bypass the Waters Lane queue (and Table 1 shows volumes here considerably higher in Week 1, particularly in the morning peak) we would expect these vehicles then to turn right to resume their intended journey towards the War Memorial. Table 4's data necessarily exclude the morning peak hours, but show only a modest rise in the proportion of right-turners in Week 1 compared to Week 2.

Table 4

	Wednesday					
	Week 1			Week 2		
	8-9hrs	12-13hrs	17-18hrs	8-9hrs	12-13hrs	17-18hrs
Priory Avenue + Eastfield Road South flow		116	290	216	121	187
% turning right.	NA	44%	50%	47%	41%	36%
	Thursday					
	Week 1			Week 2		
	8-9hrs	12-13hrs	8-9hrs	8-9hrs	12-13hrs	17-18hrs
Priory Avenue + Eastfield Road South flow		112	*183 (*)*	211	102	147
% turning right	NA	36%	*40% (*)*	27%	37%	37%

However, although there were no specific 8-9hrs counts in Week 1, the surveyor at post then on Wednesday estimated that about two-thirds of the Priory Avenue +Eastfield Road South traffic turned right down Westbury Hill, substantially higher than the percentages recorded in Table 4 and consistent with the 'diversion' expectation.

The knock-on effect of this would be to increase downhill flows on Westbury Hill, compounding the clearance of the same queues on Waters Lane from which the diverted vehicles had recently escaped.

No comments were received from any surveyors here of difficulties encountered by traffic turning *into* WH, whether left or right. Rather, the traffic problems at this junction were caused more by a build-up of north-bound traffic turning *from* Westbury Hill into Priory Avenue and Eastfield Road South, and, in the morning peak, by random and inconsiderate parking by parents dropping off at Redmaids High School.

We could obviously run a further 'Week 2' count now that the gas installation is finished, to include the morning peak and with the help of an extra pair of eyes at this site to capture on turning directions. But there's no way to generate a second 'Week 1' scenario, short of another convenient sewerage problem in Chock Lane, so no way also to factor in the closure of that major rat-run on local traffic flows and its impact on onwards directions of travel at this same junction.

Finally…

- Our surveys have some obvious limitations – we recorded traffic at a limited number of sites, at a limited number of times and on a limited number of days. But still better than nothing, and enough for some useful results.
- As expected, the closure of Chock Lane had a major impact on traffic flows while in force, particularly during the morning peak hour, although an impact that varied from road to road. In two (Priory Avenue and Eastfield Road South) this resulted in a substantial growth of diversionary traffic, with probably a greater proportion of vehicles turning back into the Village at the Westbury Hill junction than when Chock Lane was reopened. For Waters Lane the impact was very different, and the build-up of an enormous morning peak queue resulted in much slower clearance of this stretch of road, as well as reducing the traffic volumes counted then compared both to the mid-day hour counts of 'closure week' and also to all the survey hours in Week 2 when Chock Lane was reopened.
- This additional queueing also complicates any estimates we can make about how much of the 'otherwise Chock Lane' traffic diverted locally, rather than being lost in other ways we've listed in the report.
- TPM has been exploring permanent options to disincentivise rat-running on Chock Lane, short of outright closure. It seems clear that the impacts of these on other local roads, while less severe than those recorded here, would still likely to be significant.

The balance of the combined diversions via Eastfield Road South and Priory Avenue would also probably shift in 'favour' of the latter: Eastfield and Priory Avenue are better suited to higher traffic volumes than the narrow stretch of Eastfield Road South, and vehicles taking the former diversion can leave the Eastfield Road queue much earlier, while our observers at the Village Hall noted that diversions into Eastfield Road South were often last-minute decisions. With more permanent arrangements in place than in Week 1, drivers would be better prepared and logical in their responses.

- The other major impact – on the Waters Lane/Eastfield Road queue – does seem to justify the sorts of responses that the TPM group has been considering at the junction with Westbury Hill – either a mini-roundabout or traffic lights, certainly for the morning peak and potentially for the evening one too.
- The case for repeating the Priory Avenue/Eastfield Road South count, to record more precisely the turning direction for the morning peak when the direct route to White Tree is open, appears marginal at best. It does appear that the reduction of traffic on Chock Lane would lead to proportionately more such traffic there turning north, down Westbury Hill, but this seems unlikely to be a major cause of delay and congestion.

Acknowledgements:

Thanks are due to many local residents, freely giving up an hour of more of their time, and at very short notice, to undertake the surveys:

Lorna Renshaw, Myra Jones, Kate Hoare, Bev Kelly, David McGregor, Richard Pedlar, Alan Morris, Derek Jones, Adrian Ailes, Keith Yeandel, Martin Crouch and Andy Renshaw.

AGH, March 7th, 2023