



Wokingham Borough Council

BARKHAM BRIDGE EVALUATION AND MONITORING REPORT

Baseline and One-Year After Opening





Wokingham Borough Council

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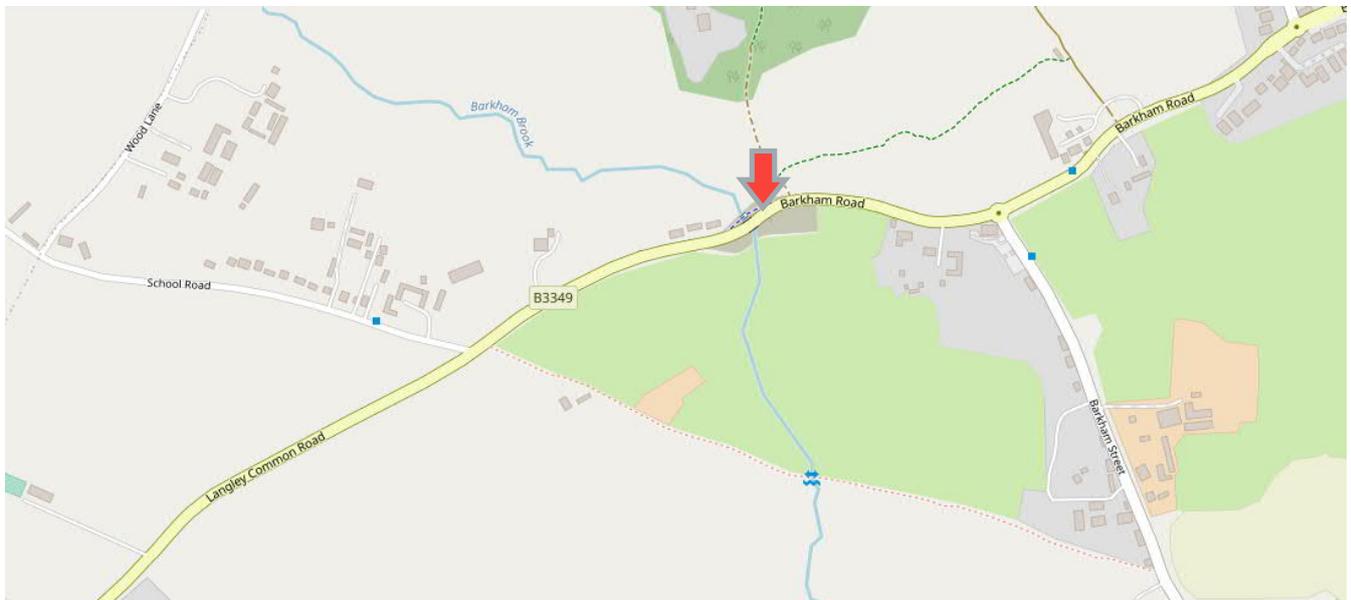
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1 INTRODUCTION

- 1.1.1. Barkham Bridge is located on Barkham Road (B3349) between Barkham Street and Langley Common Road, within Wokingham borough. Barkham Road continues to School Road B3349 which leads to Arborfield Cross and also to Langley Common Road which links to the former Arborfield Garrison, which is a Strategic Development Location (SDL). Barkham Bridge is at a mid-point of Barkham Road and carries through-traffic over a small river-tributary of River Loddon, Barkham Brook and the location of the Bridge is shown in **Figure 1-1**.
- 1.1.2. The B3349 Barkham Bridge scheme involved the construction of a new road bridge over the Barkham Brook, with the original single-lane bridge retained as a pedestrian and cyclist route. The B3349 Barkham Bridge scheme was funded by the Berkshire Thames Valley LEP Local Growth Fund and Wokingham Borough Council's Capital Funding programme.
- 1.1.3. Prior to the scheme's introduction Barkham Bridge was only wide enough to accommodate a single lane of traffic and the westbound traffic had priority over the eastbound and was regulated by a 'Give Way' priority sign on the eastbound direction on the Barkham Road. This created a bottleneck and caused severe delays and increased journey times along this route. The delays and journey times were expected to worsen as the Arborfield SDL is built out.
- 1.1.4. The scheme was expected to remove the existing bottleneck by facilitating continuous two-way traffic over the Barkham Brook and help to minimise further delays that otherwise might arise as the Arborfield SDL is built out.

Figure 1-1 - Location of Barkham Bridge (source: Openstreetmap.org)

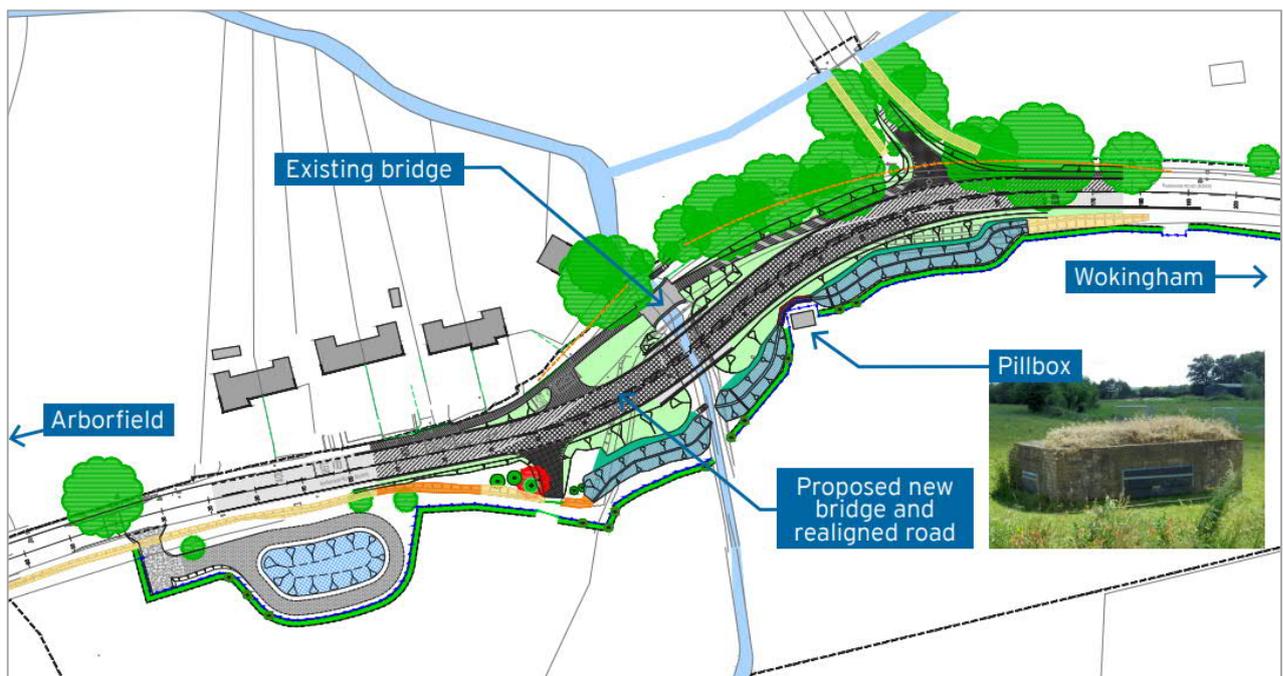


2 SCHEME DETAILS

2.1 OVERVIEW

- 2.1.1. The scheme consisted of a new bridge structure, which has been constructed just to the south of the former Barkham Bridge, as well as approximately 300 metres of associated carriageway realignment. The existing bridge structure has been retained and converted to a pedestrian footway, connecting the existing sections of footway to the east and west.
- 2.1.2. Highway drainage improvements to the Barkham Road up to School Lane were included in the project scope to reduce flood risk and improve water quality discharging into the brook. **Figure 2-1** depicts the scheme details.

Figure 2-1 - Proposed New Bridge



2.2 SUPPORTING MEASURES

TRAFFIC MANAGEMENT

- 2.2.1. During various phases of construction temporary traffic signals were in operation either side of the bridge construction works on Barkham Road, covering a road length of 300m.

COMMUNICATIONS

- 2.2.2. The project was supported by a communications programme to keep residents and motorists advised of the works and associated disruption. The communications took the form of press releases, newsletters and information on the Wokingham Borough Council (WBC) website. Overall, there was widespread patience and acceptance of the disruption in expectation of the wider benefits that would arise from the new road layout.

3 FUNDING DETAILS

3.1.1. Barkham Bridge was funded through the Thames Valley Berkshire Local Enterprise Partnership (TVBLEP) Local Growth Fund and WBC's Capital Funding programme. **Table 3-1** below shows a summary of the estimated costs, the costs to date and the expected final cost. These are interim reported costs at this stage awaiting completion of the full contract and a cost conciliation being completed.

Table 3-1 – Barkham Bridge Estimated, Interim and Final Cost Forecast

Cost items	Estimate	Costs to date (up to 31/03/22)	Final cost forecast
Land	£290,000	£393,451	£420,000
Part 1 Claims	£250,000	£250,000	£250,000
Core Team, Construction, Inflation & Risk	£6,122,508	£5,908,339	£6,500,000
Surveys	£132,683	£132,683	£132,683
Enabling Works	£131,609	£131,609	£131,609
Utilities	£749,822	£512,973	£685,000
Total	£7,676,622	£7,329,056	£8,119,292
Difference	-	-£347,566	+£442,670

- 3.1.2. The forecast project cost increase was caused by several factors, the main one was a Compensation Event (CE) as a result of the Virgin Media delay causing contractor delay. This CE was originally £380,000 but the final agreed value was £348,000. WBC are following up with Virgin Media to try to secure recovery of this extra spend.
- 3.1.3. The two other main CEs were £86,000 for a Thames Water main redesign and delay and £20,000 for COVID-19 related extra costs which included enhanced cleaning regimes. There were six further CEs each at a cost of less than £10,000 each with the total extra cost of CEs adding up to £486,000.
- 3.1.4. In summary the project is forecast to cost £8,119,292, which is £442,670 (5.7%) more than planned at the business case stage, though the final costs will be confirmed once the full contract and cost conciliation exercise has been completed.

4 SCHEME PROGRAMME

KEY DATES

- 4.1.1. Construction on the bridge began in Autumn 2019 with a proposed completion date of 9th February 2021, however the final completion date slipped by a month to 12th March 2021. While snagging and planting activities did extend beyond this date, this was the date when the completion certificate was issued for the scheme.

PROGRESS AND MONITORING

- 4.1.2. WBC held weekly risk reduction meetings covering all schemes being delivered by Balfour Beatty within Wokingham under their SCAPE Civil Engineering Framework.
- 4.1.3. Specific Barkham Bridge monthly meetings were also held with the project manager, Balfour Beatty and their traffic management subcontractors. Regular contract monitoring and scheme progress reports were provided by Balfour Beatty and discussed with the Council.
- 4.1.4. WBC engineers regularly attended the works site along with fellow project team members in order to monitor progress and to check adherence to technical plans and specifications.

CONSTRUCTION AND PROGRAMMING PROBLEMS

- 4.1.5. There was a two-week site shutdown due to the initial COVID-19 lockdown in April 2020 and the design of the thrust blocks also caused a three-week delay to the water main diversion. However, neither of these elements had an impact on overall project programme delivery.
- 4.1.6. The bridge was opened to two-way traffic before Christmas 2020, so some activities took place after this up to the completion date.
- 4.1.7. There was a significant delay to programme caused by Virgin Media cancelling/postponing their required diversion at very short notice (one day before they were due on site). The delay in this activity was 2-3 months, however some time was recovered, for example, by building bridge abutments at the same time as the delay, and the programmed completion date slipped by approximately one month.

ROAD SAFETY AUDITS

- 4.1.8. Road Safety Audits were carried out at each stage of the project and a Departure from Standard request relating to the horizontal alignment was submitted by the Design Organisation. The request was approved as the proposed changes to the horizontal alignment did not introduce any significant safety concerns.
- 4.1.9. Following RSA stage 3, the site was considered to be compliant with road safety guidelines.

5 DELIVERED SCHEME

- 5.1.1. **Figure 5-1** shows an image of Barkham Bridge before the improvements whilst, for comparison, **Figure 5-2** shows the completed scheme.

Figure 5-1 - Barkham Bridge - Pre-construction Westbound approach (Source: Google Images)



Figure 5-2 - Barkham Bridge - Post construction Westbound approach (Source: Google Images)



- 5.1.2. Whilst there were several elements that had to be altered during construction due to the proximity of existing utilities the overall design layout remained unchanged. The altered elements were:
- The north east and south east wing walls were re-designed due to the location of a Thames Water sewer.
 - A water mains diversion was required to link two existing mains. which were also discovered to be of different pipe material. This required thrust blocks to be designed in order to keep the diverted mains in place.
- 5.1.3. Additionally, to offer added value in terms of biodiversity an existing pillbox structure was repurposed for use by bats and otter fencing and measures were installed. The stream bed was profiled to have stepped banks so that the stream bed would be narrower, and water would be deeper in periods of low-level flow in drier/summer months thus assisting aquatic life in those periods.

6 REVIEW AND EVALUATION OF THE OUTCOMES

- 6.1.1. As part of the proposed framework for the monitoring and evaluation of the new Barkham bridge project the business case identified several objectives along with the expected targeted outputs to be measured after one-year of scheme opening. These are summarised within **Table 6-1** and explained in detail in the sections below. In addition, collision analysis is included at the end of the chapter.

Table 6-1 – Objectives and target outputs

Measure	Data to be Used	Target Output
Travel times	Overall route journey time including time on links and at junctions. Travel time surveys between specified timing points along the route.	Up to 10% reduction in peak hour journey time
Support the 2026 Local Plan housing delivery in the Borough	Housing completion figures	Build rate within 10% of planned build
Travel demand	Traffic flows in the corridor, forecast flows versus actual. Pedestrian and cycle flows; pre-construction and post construction.	Increase in throughput in the peak hour, up to 25 to 30% one year after scheme opening. 10 to 15% increase in pedestrians and cyclists one year after scheme opening.

TRAVEL TIMES

- 6.1.2. The new bridge layout accommodates two-way traffic. The objective of this was to reduce journey travel times over the original single lane give-way arrangement, which led to bottlenecks and significant delays. The target for the scheme was up to a 10% reduction in journey times during the peak hour.
- 6.1.3. To compare the journey times before and after the scheme opening, TomTom Global Positioning System (GPS) journey time data was obtained from vehicles travelling between Arborfield Green and Wokingham. The data focused on two journey time routes along Langley Common Road and Barkham Road. Maps of the two journey time routes are attached within **Appendix A**.
- 6.1.4. The first journey time route is approximately 4.9km and runs from the Langley Common Road/Eversley Road Roundabout (Arborfield Green) to the Barkham Road/Molly Millars Lane junction (Wokingham), whilst the second journey time route runs from the B3349 School Road to Barkham Street and is approximately 0.7km.
- 6.1.5. The journey times were extracted from the following weekday time periods listed below:
- Pre-scheme opening 4th – 15th February 2019 and 25th February – 1st March 2019
- 6.1.6. Post-scheme opening: 31st January – 13th February 2022 and 28th February - 7th March 2022 **Table 6-2** and **Table 6-3** show the average eastbound and westbound weekday journey times, respectively between the Langley Common Road/Eversley Road Roundabout and the Barkham Road/Molly Millars Lane junction.

Table 6-2 – Journey time between Wokingham and Arborfield Green (eastbound)

Time Period	Pre-scheme opening 2019 (hr:mins:secs)	Post-scheme opening 2022 (hr:mins:secs)	Journey time difference (hr:mins:secs)	Journey time difference (Percentage)
0700-0800	00:07:47	00:06:14	00:01:33	-20%
0800-0900	00:11:27	00:07:15	00:04:12	-37%
0900-1000	00:06:48	00:06:01	00:00:47	-12%
1000-1100	00:06:15	00:06:00	00:00:15	-4%
1100-1200	00:06:22	00:06:13	00:00:09	-2%
1200-1300	00:06:25	00:06:10	00:00:15	-4%
1300-1400	00:06:21	00:06:08	00:00:13	-4%
1400-1500	00:06:26	00:06:10	00:00:15	-4%
1500-1600	00:06:39	00:06:23	00:00:16	-4%
1600-1700	00:06:50	00:06:16	00:00:34	-8%
1700-1800	00:07:11	00:06:16	00:00:55	-13%
1800-1900	00:06:35	00:06:06	00:00:29	-7%

Table 6-3 - Journey time between Wokingham and Arborfield Green (westbound)

Time Period	Pre-scheme opening 2019 (hr:mins:secs)	Post-scheme opening 2022 (hr:mins:secs)	Journey time difference (hr:mins:secs)	Journey time difference (Percentage)
0700-0800	00:06:34	00:06:03	00:00:30	-8%
0800-0900	00:07:18	00:06:30	00:00:48	-11%
0900-1000	00:06:27	00:06:07	00:00:19	-5%
1000-1100	00:06:15	00:06:15	00:00:00	0%
1100-1200	00:06:33	00:06:11	00:00:22	-6%
1200-1300	00:06:22	00:06:12	00:00:10	-3%
1300-1400	00:06:13	00:06:09	00:00:05	-1%
1400-1500	00:06:14	00:06:28	00:00:14	4%
1500-1600	00:06:40	00:06:33	00:00:07	-2%
1600-1700	00:06:45	00:06:18	00:00:27	-7%
1700-1800	00:06:58	00:06:26	00:00:32	-8%
1800-1900	00:06:36	00:06:07	00:00:29	-7%

6.1.7. **Table 6-2** and **Table 6-3** show that there were significant journey time reductions between Wokingham and Arborfield Green during both peak hours. For eastbound vehicles there has been a 37% decrease in journey times in the AM peak hour (0800-0900) and a 13% decrease in the PM peak hour (1700-1800). Similarly, for westbound vehicles there has been a reduction of 11% in the AM peak hour and 8% in the PM peak hour.

6.1.8. **Table 6-4** and **Table 6-5** show the average eastbound and westbound weekday journey times, respectively, between the B3349 School Road and Barkham Street.

Table 6-4 – Journey Time from the B3349 to Barkham Street (eastbound)

Time Period	Pre-scheme opening 2019 (hr:mins:secs)	Post-scheme opening 2022 (hr:mins:secs)	Journey time difference (hr:mins:secs)	Journey time difference (Percentage)
0700-0800	00:02:03	00:00:58	00:01:05	-53%
0800-0900	00:04:09	00:01:32	00:02:37	-63%
0900-1000	00:01:17	00:00:54	00:00:23	-30%
1000-1100	00:01:00	00:00:53	00:00:07	-11%
1100-1200	00:01:02	00:00:55	00:00:07	-12%
1200-1300	00:01:03	00:00:53	00:00:10	-15%
1300-1400	00:01:02	00:00:56	00:00:06	-10%
1400-1500	00:01:03	00:00:57	00:00:06	-9%
1500-1600	00:01:12	00:01:00	00:00:12	-17%
1600-1700	00:01:22	00:00:56	00:00:25	-31%
1700-1800	00:01:41	00:00:57	00:00:44	-44%
1800-1900	00:01:15	00:00:55	00:00:20	-27%

Table 6-5 – Journey Time from Barkham Street to the B3349 (westbound)

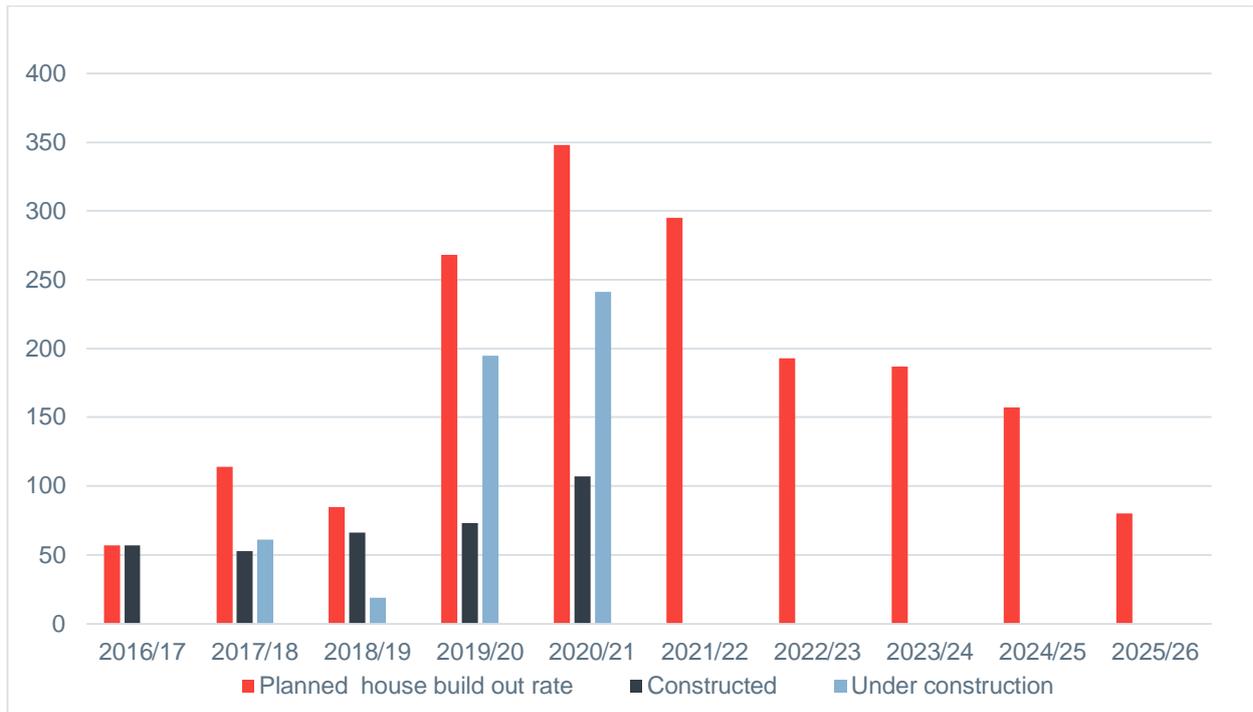
Time Period	Pre-scheme opening 2019 (hr:mins:secs)	Post-scheme opening 2022 (hr:mins:secs)	Journey time difference (hr:mins:secs)	Journey time difference (Percentage)
0700-0800	00:00:55	00:00:51	00:00:04	-8%
0800-0900	00:00:59	00:00:53	00:00:06	-10%
0900-1000	00:00:54	00:00:51	00:00:03	-5%
1000-1100	00:00:53	00:00:52	00:00:01	-3%
1100-1200	00:00:53	00:00:51	00:00:02	-4%
1200-1300	00:00:52	00:00:50	00:00:02	-4%
1300-1400	00:00:53	00:00:50	00:00:03	-4%
1400-1500	00:00:53	00:00:52	00:00:01	-2%
1500-1600	00:00:55	00:00:52	00:00:03	-5%
1600-1700	00:00:54	00:00:51	00:00:03	-5%
1700-1800	00:00:56	00:00:53	00:00:03	-5%
1800-1900	00:00:56	00:00:52	00:00:04	-8%

- 6.1.9.** **Table 6-4** and **Table 6-5** show that there were significant journey time reductions between the B3349 and Barkham Street. For eastbound vehicles there has been a 63% decrease in journey times in the AM peak hour (0800-0900) and a 44% decrease in the PM peak hour (1700-1800). Similarly, for westbound vehicles there has been a reduction of 10% in the AM peak hour and 5% in the PM peak hour.
- 6.1.10.** For both journey time routes the scheme has exceeded its target of achieving up to a 10% reduction in one or both peak hour journey times set out in the business case.

HOUSING BUILD OUT RATES

6.1.11. To help understand if the scheme supported the delivery of planned development in Wokingham, housing completion figures from sites in the scheme area (Arborfield SDL and Barkham) were obtained from the WBC planning team. **Figure 6-1** below shows the yearly planned house build rate up to 2025/26 and the number of constructed and completed houses up to 2020/2021, which is the latest available house build out data set.

Figure 6-1 - House Build Out Rates in Barkham Bridge area



6.1.12. **Figure 6-1** shows that in 2020/2021 period the total number of houses constructed (107) and under construction (241) matched the planned house build rate (348). Therefore, the scheme has achieved its target output of supporting a housing build rate within 10% of planned build rates within the first year of the scheme opening.

6.1.13. As the scheme is aimed at supporting the 2026 local plan housing delivery the full benefits will only be realised at the end of this period. The house build out rate will continue to be monitored and reviewed again during the 5-year post scheme evaluation.

TRAVEL DEMAND

- 6.1.14. To compare before and after scheme opening travel demand, data for the week of 28th March - 3rd April 2022 was extracted from the WBC Vivacity traffic monitoring system. An average of the peak hour traffic flows and daily 12-hour Non-Motorised User (NMU) flows were obtained from Vivacity cameras located at the Barkham Road/B3349 School Road junction and the Barkham Road/Barkham Street junction.
- 6.1.15. Additionally, the Wokingham strategic transport model (WSTM4) was used to estimate the before scheme opening (baseline) travel demand scenario, as no pre-construction traffic surveys were able to be conducted due to the rapid installation of temporary traffic management very soon after funding was provided.

Vehicle demand

- 6.1.16. **Table 6-6** and **Table 6-7** present a traffic flow comparison of the 2021 (scheme opening year) WSTM4 Do Minimum (DM) forecast model and the 2022 Vivacity traffic monitoring system for the section of Barkham Road between B3349 School Road and Barkham Street.

Table 6-6 – Traffic flow comparison (PCUs) - eastbound

	2021 DM model scheme opening year forecast (PCU)	2022 Vivacity traffic count (PCU)	Flow Difference (PCU)	Flow Difference (percentage)
AM peak hour	580	668	88	15%
PM peak hour	530	494	-36	-7%

Table 6-7 - Traffic flow comparison (PCUs) - westbound

	2021 DM model scheme opening year forecast (PCU)	2022 Vivacity traffic count (PCU)	Flow Difference (PCU)	Flow Difference (percentage)
AM peak hour	410	544	134	33%
PM peak hour	680	528	-152	-22%

- 6.1.17. **Table 6-6** and **Table 6-7** show that there was 15% increase in eastbound flows and 33% increase in westbound flows in the 2022 AM peak hour when compared to the 2021 DM forecast model. In contrast that there was a 7% decrease in eastbound flows and a 22% decrease in westbound flows during the PM peak hour. The scheme has met/exceeded its target to increase throughput up to 25 to 30% in the AM peak hour one year after scheme opening, but not met the target in the PM peak.
- 6.1.18. Whilst the full reasons for the changes in traffic flows are not understood at this time, the increased flow in the AM peak could potentially be attributed to the Barkham Bridge scheme. The decrease in the PM peak hour traffic levels could potentially be attributed to change in traffic flows and travel behaviour due to the COVID-19 pandemic, as there has been a significant increase in companies implementing hybrid and flexible working arrangements, resulting in a spreading of the PM peak traffic from 3.00 PM– 7:00 PM.

6.1.19. Additionally, the WSTM4 was modelled based on pre-COVID 19 forecasts therefore it could be expected that the forecast model flows could also be higher than actual flows. The comparison of actual and modelled data should be considered as a proxy in the absence of collected data

NMU demand

6.1.20. **Table 6-8** shows the average 12 hr weekday pedestrian and cyclist flow along Barkham Road.

Table 6-8 – Average 12hr weekday NMU flows along Barkham Road

Time period	Pedestrian flows	Cyclist flows
0700-1900	16	21

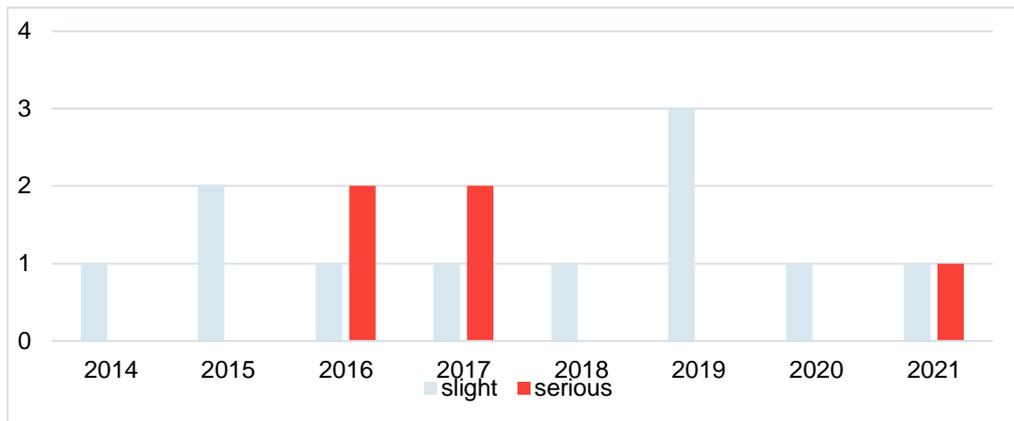
6.1.21. As noted above, no NMU surveys were carried out pre-construction

6.1.22. It should also be noted that Vivacity has identified issues with the camera sensors not picking up NMUs within the far extreme of their field of view and during hours of darkness at the Barkham site. Vivacity is currently working on a software update to address this and this is expected to be deployed in Autumn 2022.

COLLISION ANALYSIS

6.1.23. Collision data was obtained from WBC for all reported incidents between 1st January 2014 until 31st December 2021. **Figure 6-2** shows a summary of the collisions that have occurred along Barkham Road, within 1km of the Barkham Bridge, whilst the locations and collision severity are also provided within **Appendix B**.

Figure 6-2 - Reported collision data near Barkham Bridge 2014-2021



6.1.24. Figure 6-2 shows that between 2014 and 2021 there was a total of 5 serious and 11 slight collisions and no fatal collisions. Further analysis of the data also showed that collisions involving cyclists accounted for 44% of all collisions. the one slight collision located on the bridge related to a Heavy Goods Vehicle colliding with a Light Goods Vehicle due to carelessness in 2019.

6.1.25. Collisions will continue to be monitored and reviewed again during the 5-year post scheme evaluation.

7 LESSONS LEARNED AND SUMMARY CONCLUSION

LESSONS LEARNED

7.1.1. The following lessons learned were obtained from WBC:

- The contractor performance was generally good.
- The build quality, quality management and workmanship were all considered to be good by WBC. However, towards the end of the project, the contractor did progress some activities without instruction as they were keen to complete the works. They subsequently raised retrospective CEs which caused some disagreement.
- The contractor's team were inexperienced in terms of handover documentation and what was required in terms of DMRB requirements for bridgeworks. They needed guidance from WBC.
- The "Works Information" produced as required under the NEC contract was generic/lacking in some detail at that stage. More detail was required when it came to deciding on whether items were covered by the original contract/design or were compensation events. The lesson learned is that the "Works Information" needs to be produced once more detailed understanding of the scheme is known.

SUMMARY

- 7.1.2. The Barkham Bridge project was commissioned by WBC to address the bottleneck and delays on the Barkham Road (B3349) between Barkham Street and Langley Common Road caused by the previous single lane/give way bridge layout. Barkham Road also continues to School Road B3349 which leads to the Arborfield Green. The improvements were also needed to help support major new developments in Wokingham borough, in particular the Arborfield SDL development. The scheme sought to remove the existing bottleneck by facilitating continuous two-way traffic over the Barkham Brook and help to minimise further delays that otherwise might arise as the Arborfield SDL is built out.
- 7.1.3. The scheme involved the construction of a new two-lane bridge located south of the existing bridge, with the current bridge converted into a pedestrian footway with supporting highway drainage improvements to reduce flood risk and improve water quality discharge into the brook.
- 7.1.4. Construction began in Autumn 2019 and whilst there were some minor delays, it was completed in March 2021 approximately a month later than the projected date. Scheme costs were however higher than planned, with a 5.7% overspend due primarily to utility related delays/costs, some of which the Council is actively trying to recover.
- 7.1.5. The scheme offers actual and potential benefits to network users, commuters, and residents through the provision of significantly reduced journey times. While the traffic levels for the last two years have been affected by the COVID-19 pandemic it is expected that the full raft of benefits will be realised over the next five years. This time period is considered realistic, not least, to allow the re-establishment of what might be considered 'normal' conditions, in terms of both traffic and development patterns.
- 7.1.6. WBC would like to express its appreciation to the TVBLEP for the Growth Fund financial contribution and various other forms of LEP/Berkshire Local Transport Body support enabling the delivery of this project. The Council is also grateful for the patience and understanding of motorists and residents during the work.

Appendix A

JOURNEY TIME ROUTES





**Journey Time Route 1:
Arborfield Green to Wokingham**



**Journey Time Route 2:
B3349 School Road to Barkham
Street**

Appendix B

COLLISION DATA







2 London Square
Cross Lanes
Guildford, Surrey
GU1 1UN

wsp.com