

Investigation into the accident on  
Cambridgeshire Guided Busway (near to  
Hills Road bridge) on 21<sup>st</sup> June 2017



Figure 1: Google Earth image showing the general area between the Brookgate development at Cambridge rail station, the Guided Busway southern section, including Hills Road bridge

## SUMMARY

- 1 At 1547 on Wednesday 21<sup>st</sup> June 2017, a bus operated by Whippet Coaches Ltd. between Madingley Road Park & Ride and Addenbrooke's Hospital on the southern section of the Cambridgeshire Guided Busway transitioned from an access roadway leading from Cambridge Rail Station onto the southbound guideway south of Hills Road bridge. At this point, the bus left the southbound guideway and crossed the northbound guideway and maintenance track, where it collided with an adjacent metal staircase and a lighting column, before colliding with a retaining wall of a neighbouring housing development.
- 2 Three people were aboard the bus at the time of the accident. Cyclists and pedestrians were also in the vicinity of the accident, in the roadway and on the Busway maintenance track
- 3 Analysis of the bus's on-board CCTV and data recording system shows that the bus was travelling between 24 and 25mph as it entered the southbound guideway. A speed limit of 15mph is in place on the access roadway up to the guideway entry point.
- 4 An examination of the guideway entry flares (which align buses with the guideway track) and the guideway sections of both tracks show evidence of collision damage from tyres, bus guidance components and bodywork.

## BACKGROUND INFORMATION

### Involved persons

- 5 There were two passengers on board the bus. The driver was the only member of the bus company staff on board.

### **Ownership**

- 6 Cambridgeshire Guided Busway ("the Busway") is owned and operated by Cambridgeshire County Council.
- 7 Whippet Coaches Ltd. is one of two bus operating companies licenced to operate on the Busway.

### **Route and location of the accident**

- 8 The mainline southern section of the Busway comprises two parallel sections of directional guideway track restricted to suitably equipped and licenced buses, and an adjacent surfaced track for emergency and maintenance vehicle use. Pedestrians and cyclists are also permitted to access the maintenance track. The mainline Busway runs between the Cambridge central rail station and the Trumpington Park & Ride site, with a spur section providing a connection to the Addenbrooke's Hospital site.
- 9 A road provides vehicle access from Cambridge rail station to the mainline Busway. South of the rail station, the road forms part of the Brookgate development, where a number of bus stops have been constructed on both sides of the road to form a bus interchange area. Beyond the development, a separate side road takes non-Busway buses out of the area, while the road continues towards the mainline Busway and passes under Hills Road bridge. This section of the road is restricted to Busway-equipped vehicles, maintenance and emergency vehicles less than 3.7 metres (12 feet 1 inch) in height (due to the height of the bridge deck) and pedestrians and cyclists. A shared use pathway is provided on the western side of the road for non-vehicular traffic.
- 10 On the road section from the junction of the side road in the Brookgate development to the mainline guideway a speed limit of 15 mph is in force in both directions as a safety feature, and statutory signage is in place to inform drivers of the speed limit. Apart from general usage throughout the day, the road is heavily used at peak periods by cyclists travelling in either direction, and the road is used to transition to and from the Busway maintenance track.
- 11 The road curves to the right as it leaves the Brookgate development towards the Busway, falling on a gradient as it approaches and passes under Hills Road bridge. Between the bridge and the entry into the guideway, the roadway alignment is broad, straight and level. The alignment allows the bus driver to adjust the bus's approach to ensure the correct engagement with the entry flares at the start of the guideway.

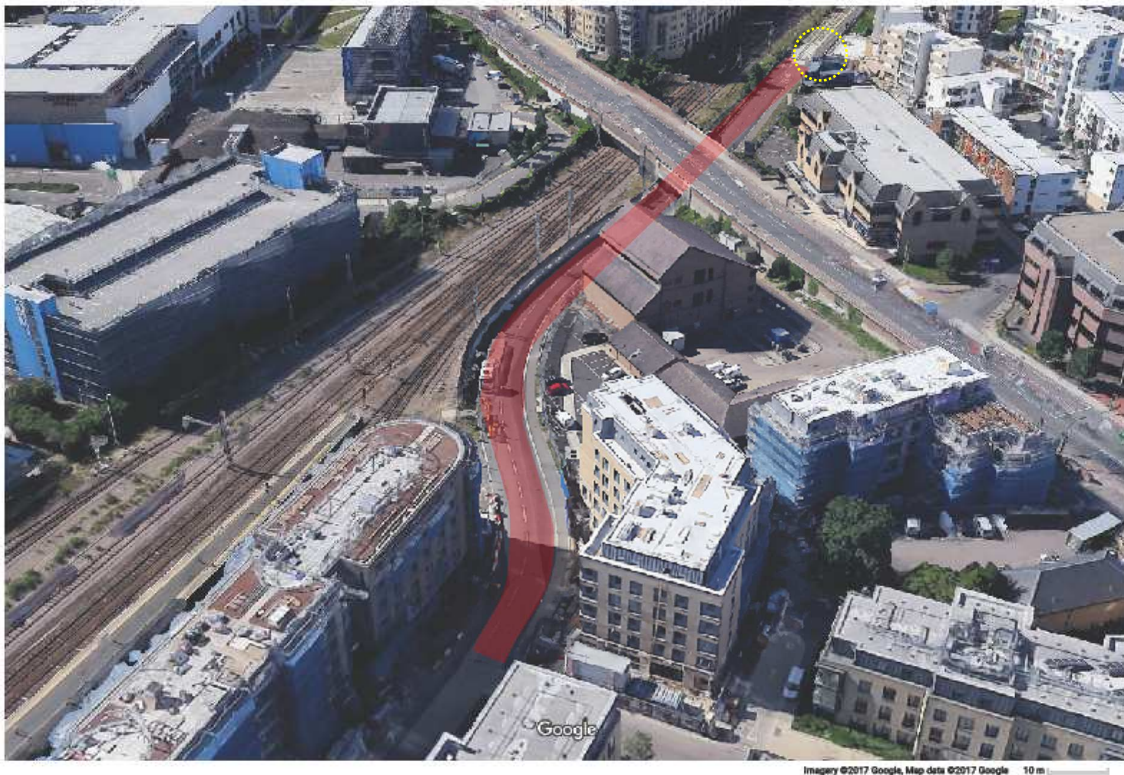


Figure 2: Google Earth image showing the single carriageway road between the Brookgate development and the mainline guideway where a 15 mph speed limit (shaded) is in force. The accident site is also marked.

- 12 The shared use pathway's alignment allows traffic to continue on to the Busway maintenance track, and a section of dropped kerb allows non-guideway traffic to transition from the road on to the maintenance track.

### Initial factors

- 13 The bus involved in the accident was operating on Whippet's Universal service between Madingley Road Park & Ride and the Addenbrooke's Hospital site, and using the southern section of the Busway to travel from Cambridge rail station to the hospital site. The bus was equipped with on-board CCTV cameras linked to the data recorder which records parameters such as the bus's speed and the driver's operation of braking and signal controls.
- 14 On the day in question the weather was dry and sunny, and visibility was good.
- 15 All drivers operating buses on any section of the Guided Busway receive instruction on the various techniques and protocols to be followed in respect of every aspect of the Guided Busway as part of their initial training. This includes the correct method for entering and exiting the guideway, and all of the correct operating procedures are contained in the Busway Operations Handbook issued to all drivers as a follow on from the initial training. The Handbook is updated from time to time to reflect changes in operating procedures or safety protocols, in order to maintain the safe and economic operation of the Guided Busway.
- 16 Prior to the accident, the Busway infrastructure was in good order.



## **Investigation process**

- 17 The County Council's Busway Operations team was notified at 1552. Staff immediately deployed to the scene to co-ordinate emergency service attendance and recovery of the bus from the scene. A documentary record of physical evidence was made by the team during this time.
- 18 The County Council has since:
  - reviewed the physical evidence gathered at the time of the accident
  - reviewed the footage and associated data recovered from the bus, in co-operation with the bus operator.

## **FINDINGS**

### **Infrastructure**

- 19 An assessment of the sector of the Busway in which the accident occurred did not reveal any deficiencies in terms of street furniture, signage or road markings, nor was there evidence that the condition of the roadway or the guideway was a contributory factor to the events which took place.

### **Witness testimony**

- 20 In the immediate period following the accident, the driver stated that he had been avoiding cyclists who were in front of his bus to prevent colliding with them.

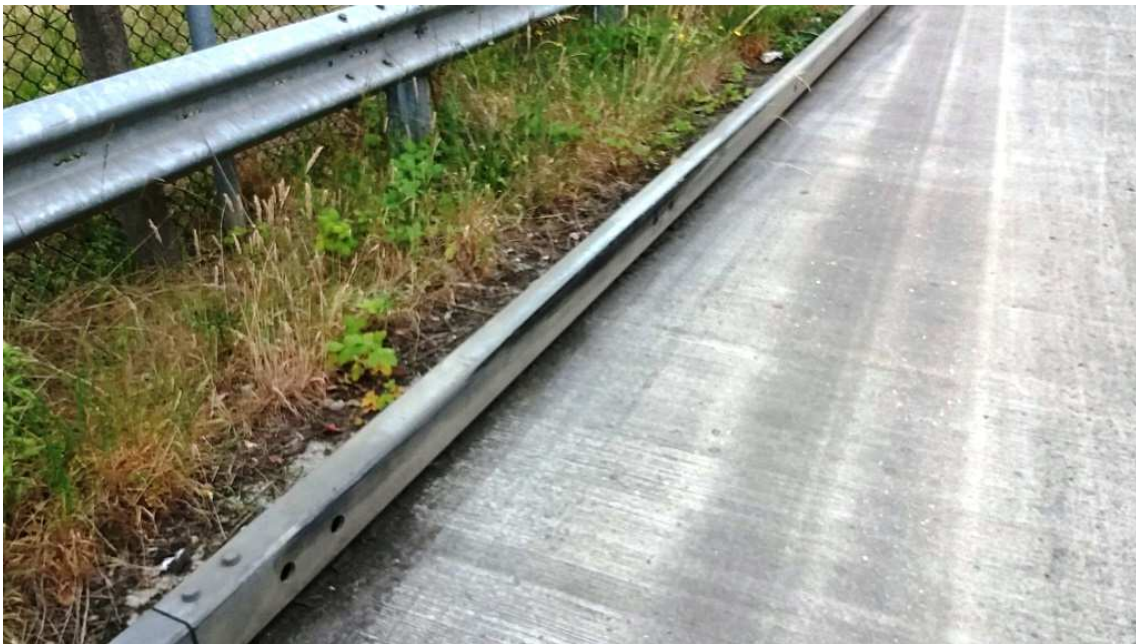
### **CCTV**

- 21 Footage obtained from the bus's on-board CCTV system showed that:
  - as the bus approached Hills Road bridge, it was registered as travelling at 26 mph
  - as the bus approached Hills Road bridge two cyclists were visible, riding in the same direction as the bus and on the same side of the road
  - as the bus approached the cyclists just after it passed under Hills Road bridge, it was registered as travelling at 13 mph, at a point where the two cyclists were manoeuvring across the opposite lane to reach the beginning of the section of maintenance track on the right hand side
  - once the cyclists were clear of the lane in which the bus was travelling, the bus was registered as travelling at 14 mph, increasing to 22 mph at the point at which the front of the bus reached the guideway entry flare
  - no avoiding action was taken by the driver in respect of the two cyclists, either on the approach to them or once they had manoeuvred into the opposite lane of the roadway
  - the bus was positioned to the right of the approach lane as it entered the entry flare
  - the bus shook violently as it entered the entry flare
  - the driver was partially thrown from his seat after the bus had begun to enter the guideway
  - the bus was registered as travelling at 24 mph as it entered the flare, increasing to 25 mph immediately before it came to rest after colliding with an adjacent wall

## Photographic assessment of busway and associated structures



a: Right hand entry flare, showing evidence of tyre rubber deposit



b: Left hand entry flare, showing evidence of tyre rubber deposits



c: Right hand entry flare, showing evidence of damage further along from entry point



d: Final position of bus in relation to guideway and maintenance track



## CONCLUSIONS

Based on the evidence provided by CCTV and the assessment of the accident location, the report has reached the following conclusions:

- The bus was driven into the approach to the Busway in excess of the designated speed limit of 15 mph.
- The presence of cyclists in the roadway on the approach to the guideway was a momentary hazard, but not sufficient to warrant the driver manoeuvring the bus to avoid a collision with them; the deceleration of the bus was sufficient to avoid such a collision.
- Once the approach to the guideway was clear, the bus accelerated towards the entry point while still within the area of the 15mph limit.
- The bus was not sufficiently aligned with the guideway entry flares to permit it to engage correctly with them as designed, nor in accordance with the instructions contained within the Operations Handbook.
- As a result of a misaligned entry into the guideway, the bus was deflected (first by the right hand flare and then by the left hand flare) into a trajectory which directed its travel across the guideway and adjacent maintenance track
- The misaligned entry caused the driver to be thrown from the seat to a degree where the forward motion and direction of travel of the bus could not be controlled

In the light of the foregoing, and evidence gathered from previous incidents of this nature documented elsewhere, the report has reached the following further conclusion:

- Having entered the approach to the guideway at excessive speed, the driver was required to decelerate to avoid colliding with the two cyclists from the rear. There was no requirement to manoeuvre the bus to avoid a collision, as the cyclists were crossing towards the maintenance track, out of the path of the approaching bus. For reasons which are not evident, the driver positioned the bus to be misaligned with the right hand entry flare as it entered the guideway. The misalignment caused the offside front wheel to strike the right hand entry flare, so as to deflect the path of the front of the bus towards the left hand side of the entry flare. At the same time, the offside rear wheels of the bus were forced to climb over the right hand flare, preventing them from engaging correctly within the guideway. The subsequent deflection from the left hand flare was of sufficient force to cause the bus's front offside and nearside wheels to climb over the right hand side of the entry flare and guideway, and to dislodge the driver from their seat. With the driver unable to retain control of the bus, its momentum and trajectory carried it over the central part of the guideway, across the adjacent guideway and maintenance track, where its travel was halted by the collision with a lighting column and a neighbouring section of wall.

It is the overall conclusion of this report that the accident was wholly caused by driver error, both in the speed of approach to the guideway and the misaligned entry into it. There is no evidence to support the assertion of the driver at the time of the accident.

## ACTIONS



Subsequent to the incident the driver of the bus involved was sacked by the bus company. A speed indicator device (SID) is to be installed at the entrance to the flare. The visual display will pick up the speed of the bus as it passes under Hills Road bridge before it enters the Busway and the visual display on the device warns the driver, passengers and users of the maintenance track of the speed of the vehicle.