

Appendix U: PV² Assessment of Spitfire Roundabout Wide Lane Pedestrian/ Cycle Crossing

To Hampshire County Council (HCC)
Cc
From Steer
Date 5 December 2025
Project Navigator Quarter, Southampton

Technical Memo

v2

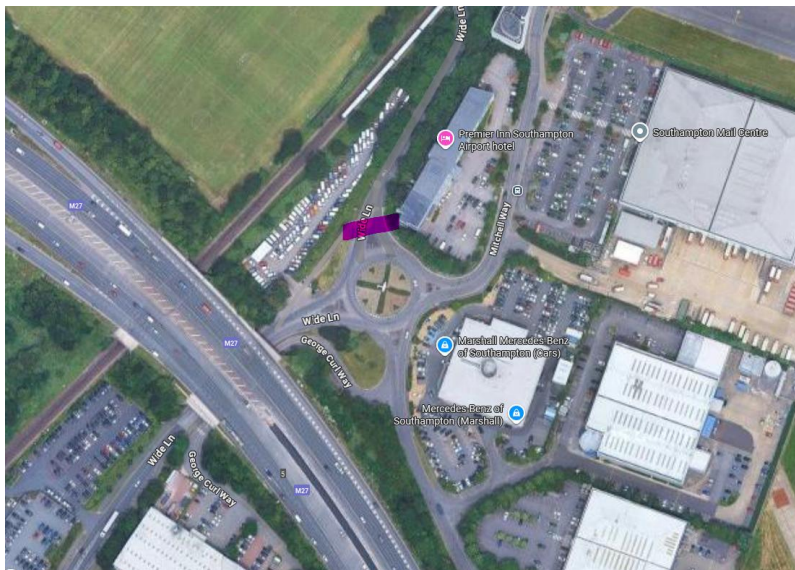
Project No. 24733101

PV² & PmV² Assessments – Spitfire Roundabout Proposed Toucan Crossing

Introduction

1. Steer has undertaken PV² and PmV² assessments to support the consideration of potential improvements to the existing cyclist and pedestrian crossing, on the northern Wide Lane arm of the Spitfire Roundabout to help serve the Navigator Quarter development. The proposed location of this facility is illustrated in **Figure 1**.
2. The crossing currently exists as an unsignalized crossing for pedestrians and cyclists with a central refuge island.

Figure 1: Location of proposed Spitfire Roundabout active travel crossing facility (approximate)



3. It has been confirmed by Hampshire County Council (HCC) that if a signalised crossing were to be considered further, a Departure from Standards (DfS) application would not be required to support this facility, on the proviso that the crossing stop line remains 36m away from the Spitfire Roundabout (and no closer).
4. PV² is a formulaic method used to determine the need for pedestrian crossing facilities at a given location. The calculation multiplies the number of pedestrians (P) crossing per hour by the number of vehicles (V) passing per hour in both directions. The resulting PV² value is compared against Department for Transport (DfT) thresholds to justify the type of crossing required (e.g. signalised, zebra, or refuge). Steer's assessment is therefore based upon peak hour data only, rather than daily vehicular and active travel flows.

5. In addition to the PV² calculation, Steer have also undertaken a PmV² calculation, following initial comments from HCC. This is a modified PV² calculation as set out in HCC's TG4-2 Technical Guidance Note, Signal Controlled Crossing. This uses pedestrian and vehicle flows as per the standard PV² calculation, but also includes additional data to introduce weighting factors.
6. Both assessments have been undertaken in accordance with HCC's Technical Guidance Note TG4-2 Signal Controlled Crossings.¹
7. This Technical Memo sets out the assumptions applied to both the PV² and PmV² assessments to inform Steer's design review for a potential improved crossing facility.

Assumptions applied

Vehicular flows

8. Steer utilised the following data sources to identify the existing and proposed vehicular traffic along this stretch of Wide Lane, where the improved crossing facility is proposed. This is one of the input criteria to the PV² assessment.
 - 2028 Baseline, 2036 Baseline, 2028 Baseline + Proposed Development and 2036 Baseline + Proposed Development vehicle flows for Wide Lane Bridge.

This data is presented in **Table 1** and was sourced from the Navigator Quarter Transport Assessment submitted in June 2025.

Table 1: Existing and proposed vehicular flows along Wide Lane Bridge (2-way)

Scenario	AM peak (08:00 - 09:00)	PM peak (17:00 - 18:00)
2028 Baseline	1,757	1,732
2036 Baseline	2,017	1,980
2028 Baseline + PD flows	2,089	2,033
2036 Baseline + PD flows	2,349	2,280

Source: Navigator Quarter Transport Assessment (2025)

Active Travel Flows

9. As there are no existing pedestrian/ cycle counts on the existing Wide Lane crossing (north of the Spitfire Roundabout), Steer have forecast potential users of the crossing based on an existing pedestrian/ cycle count on Wide Lane Bridge and proposed Navigator Quarter development trip pedestrian/ cyclist forecasts.

Existing pedestrian/cyclist count data for Wide Lane Bridge

10. Table 2 overleaf identifies the existing number of pedestrians/ cyclists using Wide Lane Bridge based on surveys on Friday 6 December 2024.

¹ Hampshire County Council (2021) TG4-2 Signal Controlled Crossings. [online] Available at: <https://www.hants.gov.uk/transport/developers/technical-guidance> (Accessed: 27 October 2025)

Table 2: Existing pedestrian/cyclist count data for Wide Lane Bridge – Friday 6 December 2024

Time period	Volume (2-way flow)	
	Pedestrians	Cyclists
AM Peak (08:00 – 09:00)	11	37
PM Peak (16:00 – 17:00)	17	23

Source: Pedestrian / cyclist count surveys undertaken on Friday 06/12/2024. Pedestrian and cyclist flows were surveyed on Wide Lane, approximately at the location that Wide Lane passes over the railway lines.

11. It is noted that Storm Darragh brought strong winds and heavy rain to western parts of England and Wales on the weekend of the 7th and 8th December 2024. Adverse weather conditions were experienced on the second day of the survey (Saturday 7th December 2024), however weather conditions were unaffected on Friday 6th December 2024. The Friday data presented above is therefore considered to be significantly more robust (than the other days) and suitable for use as part of the PV² assessment, in the absence of other data. The surveys were undertaken in December due to the original proposed planning submission timescales.
12. It is important to consider the existing pedestrian desire lines at Spitfire Roundabout, to understand the number of users from Wide Lane Bridge that potentially use the existing crossing facility. Of these existing flows, the following distribution assumptions were applied:
 - 40% of active travel users would travel to/from Mitchell Way, and would therefore not utilise the proposed crossing facility (as they would only need to route to Mitchell Way along the eastern side of Wide Lane and the northern side of the Spitfire Roundabout).
 - 15% of active travel users would travel to/from George Curl Way, and would therefore not utilise the proposed crossing facility (as they would only need to route to George Curl Way along the eastern side of Wide Lane and the northern side of the Spitfire Roundabout).
 - The remaining 45% of active travel users would travel to/from the Wide Lane western arm of the Spitfire Roundabout to access Southampton locations. These users would utilise the proposed crossing facility. This equates to the volume of trips presented in **Table 3**.
13. The above are high level assumptions, as opposed to being based on any origin and destination information.

Table 3: Forecast volume of existing pedestrian/cyclists using the existing Wide Lane crossing facility

Time period	Volume (2-way flow)	
	Pedestrians	Cyclists
AM Peak (08:00 – 09:00)	5	17
PM Peak (16:00 – 17:00)	8	10

Proposed Development pedestrian/cyclist trips for the relevant section of Wide Lane

14. It is important to consider the future potential users of the crossing. This has been forecasts based on the Navigator Quarter Proposed Development trip generation (for Scenario 1 – the worse-case) outlined in Chapter 7 of the Navigator Quarter Transport Assessment (June 2025). The key assumptions that have been made to determine this are detailed below.
15. The Proposed Development pedestrian and cycle trips are outlined in **Table 4**. These were originally presented in Table 7.22 of the submitted Navigator Quarter TA (June 2025).

Table 4: Navigator Quarter Proposed Development – Scenario 1 - Pedestrian and Cycle Trips

Time period	Volume (2-way flow)	
	Pedestrians	Cyclists
AM Peak (08:00 – 09:00)	87	23
PM Peak (17:00 – 18:00)	71	19

16. It is assumed that 40% of the Proposed Development active travel users will route to/from the development via Mitchell Way (the remaining 60% would route towards the north via the proposed active travel connection to Chickenhall Lane). The number of Proposed Development active travel users that would travel along Mitchell Way are presented in **Table 5**.

Table 5: Proposed Development active travel users using Mitchell Way

Time period	Volume (2-way flow)	
	Pedestrians	Cyclists
AM Peak (08:00 – 09:00)	35	9
PM Peak (17:00 – 18:00)	28	8

17. The following assumptions were then made to forecast the number of Proposed Development Mitchell Way users that would then use to the Wide Lane crossing to travel towards Southampton.
- 15% of the total Proposed Development active travel users (12.5% of those using Mitchell Way) would travel to/from the eastern side of Wide Lane Bridge to access locations like Lakeside Country Park and Wide Lane Sports Ground, and would therefore, not utilise the proposed crossing facility.
 - 5% of the total Proposed Development active travel users (37.5% of those using Mitchell Way) would travel to/from George Curl Way and would therefore not utilise the proposed crossing facility.
 - The remaining 20% of total Proposed Development active travel users (50% of those using Mitchell Way) would travel to/from Wide Lane western arm of the Spitfire Roundabout to access Southampton locations. These users would, therefore, utilise the crossing facility to reach the western side of Spitfire Roundabout. This equates to the volume of trips presented in **Table 6**.

Table 6: Forecast volume of Proposed Development pedestrian/cyclists using the potential Wide Lane crossing facility

Time period	Volume (2-way flow)	
	Pedestrians	Cyclists
AM Peak (08:00 – 09:00)	17	5
PM Peak (16:00 – 17:00)	14	4

Forecast Volume of Future Crossing Users

18. The total forecast number of active travel users that could use the Wide Lane crossing facility, following Navigator Quarter Site occupation, has been forecast by combining the total flows within **Table 3** and **Table 6**. This is presented within **Table 7**. It should be noted that this could potentially be an underestimation of flows, as it does not consider the potential increase in flows associated with Airport users.

Table 7: Forecast volume of future active travel users utilising the potential Wide Lane crossing facility

Scenario	Volume (2-way flow)			
	AM Peak (08:00 – 09:00)		PM Peak (16:00 – 17:00)	
	Pedestrians	Cyclists	Pedestrians	Cyclists
Existing users	5	17	8	10
Proposed Development users	17	5	14	4
Total future users	22	21	22	14

19. The total future users volume from the above table has subsequently been incorporated into the PV² assessment to understand the type of crossing facility that would be suitable at this specific location.

PV² Calculation

20. Based on the traffic and pedestrian/cycle figures detailed in this note, the resultant PV² calculation is set-out as follows:

PV² = (pedestrians/cycles per hour) x (2-way vehicle flow per hour)², where:

P = 43 (AM Peak flows, 22 pedestrians + 21 cyclists)

V = 2,349 (AM Peak flows)

*Note: AM Peak figures used in both instances, as these represent the busiest peak hour.

Therefore:

$$\begin{aligned}
 PV^2 &= 43 \times (2,349)^2 \\
 &= 237,265,443 = \mathbf{2.37 \times 10^8}
 \end{aligned}$$

21. During initial discussions with HCC, HCC advised that the calculation should also be run to calculate the volume of pedestrians/cycles required to meet values of 0.5×10^8 and 1.0×10^8 . The figures above show that both of these markers are exceeded based on the future pedestrian/cycle demand, and therefore, a signal-controlled crossing is theoretically required at this location.

Further calculations to set-out the above request from HCC are as follows:

AM Peak

V = 2,349 (AM Peak flows); therefore P is calculated as:

$$0.5 \times 10^8 = P \times (2,349)^2$$

$$P = (0.5 \times 10^8) / (2,349)^2$$

$$= \mathbf{9 \text{ pedestrians/cycles per hour (rounded up to the nearest whole number)}}$$

$$1.0 \times 10^8 = P \times (2,349)^2$$

$$P = (1.0 \times 10^8) / (2,349)^2$$

$$= \mathbf{18 \text{ pedestrians/cycles per hour (rounded up to the nearest whole number)}}$$

PM Peak

$$\begin{aligned} V &= 2,280 \text{ (AM Peak flows); therefore P is calculated as:} \\ 0.5 \times 10^8 &= P \times (2,280)^2 \\ P &= (0.5 \times 10^8) / (2,280)^2 \\ &= \mathbf{10 \text{ pedestrians/cycles per hour}} \text{ (rounded up to the nearest whole number)} \end{aligned}$$

$$\begin{aligned} 1.0 \times 10^8 &= P \times (2,280)^2 \\ P &= (1.0 \times 10^8) / (2,280)^2 \\ &= \mathbf{19 \text{ pedestrians/cycles per hour}} \text{ (rounded up to the nearest whole number)} \end{aligned}$$

PmV² Calculation

22. Subsequent to the PV² calculation, Steer has undertaken a PmV² calculation based on additional comments from HCC. This is a modified PV² calculation as set out in HCC's TG4-2 Technical Guidance Note, Signal Controlled Crossing. This uses pedestrian and vehicle flows as per the standard PV² calculation but also includes additional data to introduce weighting factors.
23. Please refer to the excel spreadsheet included in **Appendix A** which provides full details of this calculation.
24. The outcome of this assessment is as below, which provides a higher number than the PV² calculation, however as the PV² calculation was already over the threshold for a signal crossing, a signal-controlled crossing is theoretically required at this location based on the PmV² calculation.
25. However, it is important to recognise that the ultimate feasibility of providing a signal-controlled crossing on the northern Wide Lane arm of the Spitfire Roundabout, also needs to be weighed up in the context of junction capacity modelling results for the Spitfire Roundabout and Wide Lane junctions and whether a signalised crossing in this location would cause unacceptable levels of queuing on the Wide Lane arms of the Spitfire Roundabout.

$$\mathbf{P_m V^2 = 3.9E+08 \text{ (3.9x10}^8\text{)}}$$

Appendix A - PmV^2 Calculation

Navigator Quarter	Date:	26-Nov-25
Spitfire Roundabout - Proposed Toucan Crossing	Version:	v0

P_mV² Calculation

1. This calculation follows HCC's TG4-2 Technical Guidance Note, Signal Controlled Crossing, setting out the PmV2 calculation for the proposed Toucan crossing on Wide Lane, the northern arm of the Spitfire Roundabout junction.

P_mV² = Modified PV² calculation for pedestrian crossings, where:

P_m = Modified pedestrian/cyclist/equestrian value (1-hour peak period)
V = Two-way traffic flow (1-hour peak period)

V = 2,349 (1-hour AM peak period, 2036 dev flows)

P_m = P_A x Q x A, where:

P_m = Modified pedestrian/cyclist/equestrian value (1-hour peak period)
P_A = Number of pedestrians/cyclists/equestrians adjusted for vulnerability
Q = Average value of the barrier effect of a busy or difficult to cross road
A = Accident weighting factor

P_A = (P^{<16} x 4) + (P^E x 4) + (P^H x 4) + (P^D x 6) + (P^T), where:

P_A = Number of pedestrians/cyclists/equestrians adjusted for vulnerability
P^{<16} = Number of pedestrians and cyclists aged up to 16 years
P^E = Number of older pedestrians and cyclists aged 65 years or above
P^H = Number of equestrians
P^D = Number of pedestrians with a disability
P^T = Total number of users crossing minus P^{<16}, P^E, P^H, P^D, P^T

For this analysis, we have pedestrian/cycle counts and future flows based on the development, however we do not have any data on vulnerable users, therefore for the purpose of this analysis we have assumed zero. There are no equestrian routes so the number of equestrians is also taken as zero. Therefore:

P_A = 43 (total combined pedestrian & cycle flow in the 1-hour AM peak period, 2036 dev flows)

Q = Average value of the barrier effect of a busy or difficult to cross road

Speed = 40mph (based on speed limit on Wide Lane where the proposed crossing will be)
= 1.5 Weighting factor for 40mph

Width = 10.2m Measured from drawing 24733101-STR-HGN-100-SK-D-011
= 1.5 Weighting factor for >7.4m & <10.2m

Q = 1.5 Average of Speed & Width factors

A = (1+N/10) Where N = the number of pedestrian injury accidents in the last three years
(1+1/10) One injury accident was recorded at the Spitfire roundabout junction involving a cyclist; there were no pedestrian collisions (the cycle collision has been included for the purposes of this calculation given that the proposed crossing is a Toucan crossing).
1.1

P_m = 70.95 Therefore:

P_mV² = 3.9E+08 (3.9x10⁸)

TG4-2 advises that a crossing is considered justified where P_mV² equals or exceeds 1x10⁸

Therefore, a signal controlled crossing is theoretically needed in this scenario.

END