Lane to the East of Downend Road, Portchester

Rebuttal Proof of Evidence on Transport of Mr T Wall

Client: Miller Homes

PINS Ref: APP/A1720/W/21/3272188

i-Transport Ref: TW/ITB12212-065

Date: 20 July 2021

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Appendices

SECTION 1 Scope of Evidence and Crux of the Case

1.1.1 This Rebuttal Evidence is provided to address transport matters raised by Mr Lewis of Glanville Consultants who is acting on behalf of the Council (FBC).

1.1.2 Whilst my Proof of Evidence (TW PoE) has already addressed many of the Council's concerns, until the exchange of evidence no detail or assessments had been presented to set out FBC's case. I therefore explain and identify how the matters raised by Mr Lewis are already properly addressed by the Appeal scheme and my Evidence, as well as address new matters raised in the Council's Evidence.

1.2 Crux of the Council's Case

1.2.1 In simple terms, the Council's case relies on an alternative forecast of how the Downend Road Bridge will operate, projecting significantly worse conditions than I forecast (AL PoE Table 14).

1.2.2 The Council's assessment relies upon a combination of a number of alternative appraisal parameters and assumptions coming together, comprising:

i **Development Traffic Demand** - forecasting higher traffic levels for the Appeal Site;

ii **Assessment Period** - considering a 15-minute period within the peak hour, and a future year assessment of 2031, rather than considering peak hour conditions in 2026;

iii **Traffic Signal Intergreen** - utilising a longer intergreen period in the model; and

iv **Pedestrian Crossings** – incorporating controlled pedestrian crossings in the scheme.

1.2.3 Within this Rebuttal PoE, I demonstrate why the Council's case is unsound, and that Mr Lewis is wrong to reach the conclusions that led to his alternative assessment.

1.2.4 In summary, I demonstrate that:

i **Development Traffic Demand** – Mr Lewis' approach to deriving a local trip rate is fatally flawed, using inappropriate sites affected by 'through traffic', and critically, incorrectly calculating the trip rates themselves. I rely on traffic forecasts derived from a robust assessment of the TRICS database, taking account of the accessibility of the site, and validated by local trip rate surveys. I address these matters in detail in **Section 2**;

ii **Assessment Period** – Mr Lewis' concerns about local traffic conditions demonstrating a different trip pattern are unfounded and not supported by any robust assessment. Concerns about an intensified '*peak within a peak*' are similarly baseless, and his findings, assessing only a 15-minute period, are misleading. I demonstrate why Mr Lewis is incorrect on these matters in **Section 3**;

iii **Traffic Signal Intergreen** – Mr Lewis applies a 16 second intergreen period to his assessment which is wholly contrary to the TSM guidance and would result in unsafe road conditions. The use of vehicle detection systems at the junction will ensure the safety of all road users, including cyclists, and confirms that the 10 second intergreen utilised in my assessment is appropriate. **Section 4** addresses this matter; and

iv **Pedestrian Crossings** – Mr Lewis includes controlled pedestrian crossings either side of the bridge operated under a separate pedestrian phase, on the basis that he considers the pedestrian refuge island crossing to be unsafe in relation to pedestrian visibility and the availability of gaps in traffic for safe crossing. Conversely, in **Section 5**, I demonstrate that the pedestrian refuge island is safe, that there is adequate visibility for pedestrians and sufficient gaps in traffic to enable safe crossing movements. On this basis, no pedestrian phase to the junction is needed.

1.2.5 Because of the significant failings in each of these parameters, Mr Lewis' forecast of junction operation is incorrect and unrealistic, and should be disregarded.

1.2.6 Mr Lewis raises various other criticisms of the Appeal Scheme, primarily related to highway design matters and environmental impact considerations, and I explain why these concerns are misplaced in **Section 7**.

SECTION 2 Development Traffic Demand

2.1.1 The Council contend (AL PoE 4.23) that development traffic forecasts should have been revisited in view of the 2019 Appeal findings on accessibility (i.e., that the site was '*reasonably accessible*'). In my PoE at Section 5.3, I have already explained why the travel demand forecasts on which I rely remain relevant for the assessment, and already take account of relative accessibility.

2.1.2 Mr Lewis then projects an alternative forecast of traffic demand for the Appeal Site deriving vehicle trip rates based on traffic data for two established residential areas of Portchester at:

- The Thicket; and
- Oysell Gardens.

2.2 The Thicket Trip Rate

2.2.1 Mr Lewis presents a traffic cordon assessment of traffic travelling along 'The Thicket', and from this derives a peak hour (07:30-08:30) vehicle trip rate.

2.2.2 There are fundamental issues with this assessment:

- The Thicket is a through road, providing a connection between Downend Road and The A27 corridor. Mr Lewis presents no evidence or surveys of the level of 'through traffic' at The Thicket and presents no sound basis to disaggregate traffic generated by properties served from The Thicket from wider traffic movements. Without an origin and destination survey, there is no credible means for this to be achieved; and
- Mr Lewis has miscalculated the number of dwellings served by The Thicket, assessing that there are 198 residential dwellings. Mr Lewis is incorrect and at **Appendix AA** I present a correct assessment of the number of residential properties served from The Thicket (268 dwellings). I have used all address points provided by the Post Office, and include various roads and dwellings that Mr Lewis omits, including Trent Walk, Avon Walk and two properties on Downend Road who access rear parking on The Thicket.

2.2.3 Mr Lewis calculated a peak hour trip rate for the Thicket of over 1.2 trips per dwelling (AL PoE Table 8). This is more than double what industry experience demonstrates time after time to be appropriate for a residential development of the scale proposed and in the location of the Appeal Site (i.e., 0.50-0.55 vehicle trips per dwelling in the morning peak hour).

2.2.4 **Appendix BB** presents two TRICS research reports which consider patterns of traffic demands:

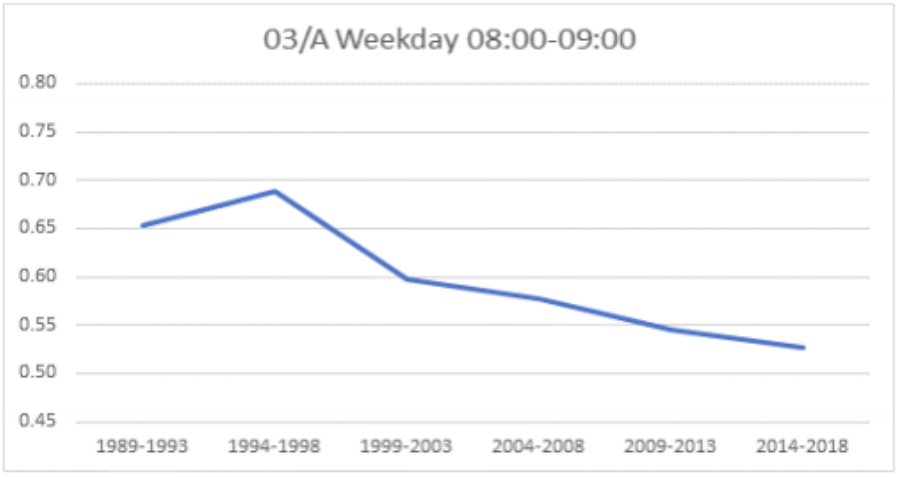
- '*Guidance Note on Changes in Travel Behaviour*' (Aug 2019)
- *'A Comparison of Vehicular Trip Rate Variation by TRICS Regions and Location Types'* (Oct 2019)

2.2.5 The TRICS *'Guidance Note on Changes in Travel Behaviour'* demonstrates how travel behaviours for various land uses have changed in the last 30 years. In relation to Private Residential (using 'Edge of Town Centre', 'Suburban Area' and 'Edge of Town' locations) the Report demonstrates a 12% decline in peak vehicle trip making, with average morning peak hour trips being 0.525 trips per dwelling. This considers only Private Housing, and not mixed or affordable dwellings.

Image 2.1 – Changes in Private Residential Vehicle Trips in Weekday Morning Peak Hour

Private Residential

2.32 For the morning peak there is a 12% decline in trip rates and this is the same for the all day residential trip rate. There is some variability between time periods in some of the cases but the weekday residential decline in trip rates is the most consistent trend.



Source: TRICS 'Guidance Note on Changes in Travel Behaviour' (Aug 2019)

2.2.6 The TRICS *'Comparison of Vehicular Trip Rate Variation by TRICS Regions and Location Types'* Report considers the variation in vehicular trip making by location and region, across a large sample of TRICS survey sites. Table 30 of the Report (**Appendix BB**) presents aggregated trip rates for each region, identifying the average peak hour trip rate for Private Housing in the South-East to be 0.534 trips per dwelling, against an All Region average of 0.593 trips.

2.2.7 Again, this relates to Private Housing (where no more than 25% of dwellings are 'affordable'), in comparison to the Appeal Site which would deliver 40% affordable provision, across a mix of tenures including flatted dwellings. The trip rates achieved at the Appeal site will be lower for these reasons.

2.2.8 Mr Lewis then adjusts his local trip rates to try to account for 'through traffic' which may seek to avoid congestion at the A27 / Downend Road junction (AL PoE Table 9). No surveys of through traffic are presented and this adjustment is based on a crude and course reduction of various turning movements on the basis of what he thought would reach '*representative levels*'.

2.2.9 Whilst I consider the approach to be seriously flawed, amending the assessment to the take account of the correct number of dwellings accessed from The Thicket (268 dwellings) has a significant effect on the resultant trip rate (**Table 2.1**), with the morning peak hour trip rate reducing from Mr Lewis' assessment of 0.874 vehicle trips per dwelling, to 0.646 (-26%). Based on the TRICS research (**Appendix BB**), this would still represent a significantly high trip rate.

Table 2.1 – Corrected Trip Rate Assessment – The Thicket

Trip Rate	Morning Peak Period (07:30 – 08:30)			Evening Peak Period (17:00 – 18:00)		
	In	Out	Total	In	Out	Total
Vehicle Movements (AL Table 9)	61	112	173	70	50	120
Trip Rate (268 Dwellings)	0.228	0.418	0.646	0.261	0.187	0.448

2.3 Oysell Gardens Trip Rate

2.3.1 Mr Lewis also presents a trip rate analysis of Oysell Gardens which is a collection of mostly flatted development built to a much higher density than would be achieved on the Appeal site.

2.3.2 Oysell Gardens is 1.3ha, developed at a density of 57dph comprising mostly flats, whilst the Appeal site would be delivered at an average of around 34dph and comprise mostly houses. It is not a relevant comparator site to the Appeal Scheme.

2.3.3 Again, Mr Lewis has miscalculated the number of dwellings served by Oysell Gardens, omitting properties at Champneys Gardens (3 dwellings) and at Audley Close (5 dwellings). There are 72 dwellings not 64 dwellings accessed from Oysell Gardens (**Appendix AA**).

2.3.4 **Table 2.2** presents a corrected analysis, reducing the morning peak trip rate by 12% to 0.542.

Table 2.2 – Corrected Trip Rate Assessment – Oysell Gardens

Trip Rate	Morning Peak Period (07:30 – 08:30)			Evening Peak Period (17:00 – 18:00)		
	In	Out	Total	In	Out	Total
Observed Vehicles (AL Table 10)	8	31	39	21	11	32
Trip Rate (72 Dwellings)	0.111	0.431	0.542	0.292	0.153	0.444

2.4 Resultant Traffic Generation

2.4.1 Putting aside my views on the legitimacy of the assessment, correcting Mr Lewis trip rate calculations (and retaining Mr Lewis assumptions in relation to the use of the trip rates – 15% Oysell Gardens / 85% The Thicket) reduces the morning peak hour development traffic generation that would be expected at the Appeal Site from 292 vehicle movements (AL PoE Table 11) to 221 vehicle movements, a 24% reduction overall (**Table 2.3**). This consequently reduces peak hour traffic flows across the bridge by 50 vehicles.

Table 2.3 – Appeal Site Traffic Generation Using Corrected AL Trip Rates

Trip Rate / Vehicle Trips	Morning Peak Period (07:30 – 08:30)			Evening Peak Period (17:00 – 18:00)		
	In	Out	Total	In	Out	Total
Trip Rates						
The Thicket Trip Rate	0.228	0.418	0.646	0.261	0.187	0.448
Oysell Gardens Trip Rate	0.111	0.431	0.542	0.292	0.153	0.444
Traffic Estimates						
Appeal Site Vehicle Trips (350)	74	147	221	93	64	157
Appeal Site – Vehicles at Bridge (70%)	52	103	155	65	45	110

2.4.2 Mr Lewis relies on his erroneous trip rate calculation for the remainder of his assessments. On this basis alone, the assessment presented at AL PoE Table 14 should be disregarded.

2.4.3 Despite this, I have carried out a further Sensitivity Test to demonstrate that even using Mr Lewis' trip rates (as corrected), the junction will still operate comfortably within capacity. **Table 2.4** presents the traffic demands used for the LinSig assessment, **Table 2.5** presents the summary modelling results, with the full assessment presented in **Appendix CC**.

Table 2.4 – Traffic Demand at Downend Road Bridge – AL Trip Rates - Sensitivity Test

Time Period	2016 Baseline (Vehicles)	2026 Forecast (Vehicles)	Development Traffic (Vehicles)	2026 with Development (Vehicles)	2026 with Development (PCUs)
Southbound					
0730	76	80	26	106	109
0745	91	97	26	123	125
0800	70	74	26	100	102
0815	67	70	26	96	99
0730 - 0830	*304*	*321*	*104*	*425*	*435*

Time Period	2016 Baseline (Vehicles)	2026 Forecast (Vehicles)	Development Traffic (Vehicles)	2026 with Development (Vehicles)	2026 with Development (PCUs)
Northbound					
0730	115	122	13	135	136
0745	109	116	13	129	129
0800	116	122	13	135	136
0815	100	106	13	119	120
0730 - 0830	*440*	*465*	*52*	*517*	*521*

Table 2.5 – Downend Road Bridge Operation – A Lewis Local Trip Rates - Sensitivity Test

	Morning Peak Hour (07:30 – 08:30)			
	DoS (%)	MMQ (PCU)	Delay (Secs)	PRC (%)
Downend Road South (NB)	76.4%	9.0	26.5	+17.8%
Downend Road North (SB)	75.7%	8.1	31.7	

2.4.4 Using Mr Lewis' peak hour trip rates, the junction would operate comfortably within capacity, with a Practical Reserve Capacity of +17.8%.

2.5 Condor Avenue Trip Rate

2.5.1 I am surprised that Mr Lewis firstly found the need to consider a local trip rate, and also that he considered The Thicket and Oysell Gardens to provide suitable comparable sites.

2.5.2 In the TA (CD1.10) I had already presented local data collected from the residential areas served by Condor Avenue to validate the TRICS based trip rate. Condor Avenue is a collection 317 dwellings (**Appendix AA**) comprising of mostly family housing provided at a similar density (42dph) to the Appeal site proposals, located in a broadly similar location relative to Portchester, and is of a comparable scale to the Appeal Site.

2.5.3 **Table 2.6** presents the Condor Avenue vehicle trip rate, and associated Appeal Site forecasts.

Table 2.6 – Condor Avenue Trip Rate and Appeal Site Forecast

Trip Rate / Vehicle Trips	Morning Peak Period (07:30 – 08:30)			Evening Peak Period (17:00 – 18:00)		
	In	Out	Total	In	Out	Total
Observed Vehicles	42	118	160	114	37	151
Trip Rate (317 Dwellings)	0.132	0.372	0.505	0.360	0.117	0.476
Appeal Site Vehicle Trips (350)	46	130	177	126	41	167
Appeal Site – Vehicles at Bridge (70%)	32	91	123	88	29	117

2.5.4 Using the Condor Avenue trip rate, it can be estimated that the Appeal Site could generate 170-180 peak hour vehicle movements. Applying the agreed traffic distribution (70% traffic routeing across the bridge), a total of 123 vehicles would cross the bridge in the morning peak hour.

2.5.5 My LinSig assessment (TW PoE Table 3.1) has assumed 107 development vehicle movements across the bridge in the morning peak hour (07:30 – 08:30). When compared to the Condor Avenue peak hour trip rate, this represents 16 less vehicle trips across the peak hour, or 4 vehicles less in each 15 minute time period. In real terms, this is an immaterial difference and takes no account of the significant affordable dwellings (40%) that will be provided at the Appeal Site.

2.5.6 For completeness, I present a further modelling assessment of the Downend Road bridge applying the Condor Avenue morning peak hour trip rates (**Appendix DD**). **Table 2.7** presents the traffic flow forecast using these alternative trip rates which have then been modelled using the LinSig model, whilst **Table 2.8** presents the summary LinSig results.

Table 2.7 – Traffic Demand at Downend Road Bridge – Condor Avenue Sensitivity Test

Time Period	2016 Baseline (Vehicles)	2026 Forecast (Vehicles)	Development Traffic (Vehicles)	2026 with Development (Vehicles)	2026 with Development (PCUs)
Southbound					
0730	76	80	23	103	106
0745	91	97	23	120	122
0800	70	74	23	97	99
0815	67	70	23	93	96
0730 - 0830	*304*	*321*	*92*	*413*	*423*
Northbound					
0730	115	122	8	130	131
0745	109	116	8	124	124
0800	116	122	8	130	131
0815	100	106	8	114	115
0730 - 0830	*440*	*465*	*32*	*497*	*501*

Table 2.8– Downend Road Bridge Operation – Condor Avenue Sensitivity Test

	Morning Peak Hour (07:30 – 08:30)			
	DoS (%)	MMQ (PCU)	Delay (Secs)	PRC (%)
Downend Road South (NB)	73.5%	8.3	25.1	+22.2%
Downend Road North (SB)	73.6%	7.6	30.5	

2.5.7 The assessment demonstrates that the junction would continue to operate effectively, with substantial reserve capacity (+22%), even applying the Condor Avenue Trip Rates.

SECTION 3 Assessment Periods

3.1.1 The Council claim that; peak spreading occurs, altering the profile of traffic that should be forecast at the Appeal Site; that observed traffic profiles require assessment of conditions during a '*peak within the peak hour*'; and those conditions should be assessed for a further future year of 2031, rather than only in 2026.

3.2 Peak Spreading

3.2.1 Mr Lewis contends that '*peak spreading*' occurs in the local area which will affect the traffic patterns that will establish at the Appeal Site, based on an assessment of existing traffic movements on Downend Road. Mr Lewis then raises concern that the peak development traffic demand from the Appeal Site (08:00-09:00) is not applied to the network peak (07:30-08:30).

3.2.2 Firstly, I do not agree that Mr Lewis' analysis at AL PoE 4.24-4.27 demonstrates that peak spreading occurs; there is a clearly defined peak hour within the peak period. He has mislabelled the time periods AL PoE Figure 3, with the traffic flows for the first columns representing traffic flows for the time period 07:00-07:15 not 06:45-07:00 (**Appendix EE**). This error affects the remaining graph. Corrected, the graph demonstrates a defined peak hour (07:30 and 08:30).

3.2.3 Secondly, the LinSig assessments that I present (TW PoE Tables 3.2-3.2) demonstrate that all queued vehicles clear the Downend Road bridge junction within each cycle, even at the busiest times. Mr Lewis' concerns about the build up of queues across time periods are unfounded.

3.2.4 Stepping back, in my opinion using observations of traffic profiles on Downend Road to appraise the expected traffic profile of a residential development at the Appeal Site is unsound.

3.2.5 Downend Road carries a variety of traffic movements, comprising; vehicles generated within the local Portchester area seeking access to destinations outside of Portchester (i.e. Waterlooville, Havant, Chichester); traffic from the wider Fareham and Gosport peninsula area (and M27 corridor) seeking access to Portsdown Hill, Cosham and the QA Hospital; and traffic from the wider sub-region which is seeking access into Portchester, Fareham and Gosport. Traffic on Downend Road (and other local roads) will therefore be at various parts of their wider journey, some at the start of a journey having originated in the local area, some at the end where they are nearing their destination, and some part way through their wider journey.

3.2.6 To seek to apply a pattern of movement observed on an interurban road connection to the forecast traffic generation of a development site is unrealistic. Appeal site traffic affecting the bridge will either be at the very start or very end of their respective journeys.

3.2.7 To properly examine Mr Lewis' suggestion that traffic is concentrated in different time periods to my assessment, using the traffic surveys collected to support the TA I have considered the traffic profiles of two local established residential areas; Oysell Gardens and Condor Avenue, each a residential cul-de-sac. **Appendix AA** presents the assessment.

3.2.8 **Table 3.1** demonstrates the derived vehicular trip rates for the morning peak period (07:00 – 10:00) and compares this to the TRICS derived trip rates used in my assessments.

Table 3.1 – Trip Rate Analysis – Oysell Gardens and Condor Avenue

Hour Starting	Trip Rate Comparison				Proportion of Travel Demand		
	TA	Oysell Gardens	Condor Ave		TA	Oysell Gardens*	Condor Ave
0700	0.346	0.389	0.410		28%	31%	34%
0800	0.531	0.542	0.533		43%	43%	44%
0900	0.367	0.333	0.265		30%	26%	22%
0700-1000	1.244	1.264	1.208		100%	100%	100%

* *Whilst the trip rates for Oysell Gardens are not representative of the Appeal Scheme due to the differences in development form and density, the traffic profile is likely to be comparable.*

3.2.9 The trip rate patterns at the two established Portchester sites are almost identical to the trip rate pattern used in the TA, with the peak hourly trip rate occurring between 08:00 – 09:00 and representing 43/44% of total peak period (07:00-10:00) traffic demand. Between 0700-0800 the TA forecasts 28% traffic demand whilst the Portchester sites show 31-34%.

3.2.10 It is therefore entirely appropriate to apply the TRICS derived traffic demand profile used in my assessments to the junction assessments, which is the approach that I agreed with HCC.

3.2.11 Irrespective, at **Table 2.5** and **Table 2.8** I have already presented two Sensitivity Tests of the Downend Road bridge junction using the observed 07:30 – 08:30 vehicle trip rates from Condor Avenue and The Thicket / Oysell Gardens, both demonstrating the junction will work effectively.

3.3 Equivalent Peak Hour

3.3.1 Mr Lewis is also concerned that there may be a '*peak within the peak*', where traffic flows across the peak hour are concentrated on a particular 15-minute time period. Based on this assumption, Mr Lewis develops an '*Equivalent Peak Hour*' for his assessment (AL PoE Table 13).

3.3.2 In simple terms, Mr Lewis quadruples the traffic demand that is forecast in the busiest 15-minute period of the morning peak hour and represents this as what would occur for the whole peak hour period. This is an unsound approach which grossly overestimates total traffic demand moving through the junction.

3.3.3 Conventional assessment techniques, and indeed LinSig itself, consider average traffic conditions that will occur across the peak hour.

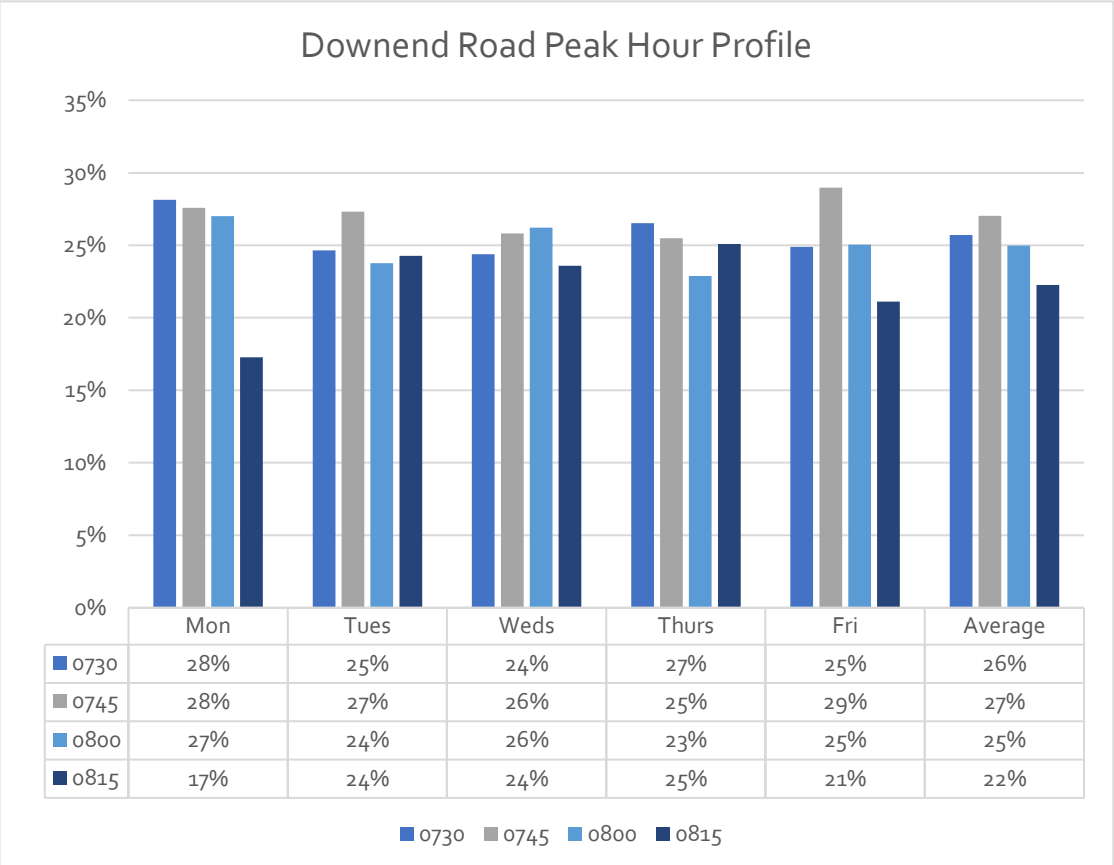
3.3.4 Whilst of course traffic is not spread precisely evenly across every hour, and there will be some fluctuations in demand between 15-minute periods of an hour, these fluctuations will change day-by-day, week-by-week.

3.3.5 Mr Lewis presents no substantive evidence of the concentration of traffic within a particular peak 15-minute period, or moreover to demonstrate that any concentrations of traffic in a particular time period is evidence of any long-term persisting behaviour in the area.

3.3.6 I have considered the traffic data on Downend Road in more detail and in **Graph 3.1** (**Appendix EE**) I present the peak hour traffic profile for each of the five individual weekdays of the ATC survey at Downend Road bridge, as well as the weekday average.

3.3.7 This demonstrates that traffic is evenly spready across the morning peak hour, with average traffic composition varying between 22-27% in each time period. There are no consistent concentrations of traffic in individual time periods and where daily fluctuations occur, these occur in different time periods on each of the survey days.

Graph 3.1 – Downend Road Daily Traffic Profile



	Mon	Tues	Weds	Thurs	Fri	Average
0730	28%	25%	24%	27%	25%	26%
0745	28%	27%	26%	25%	29%	27%
0800	27%	24%	26%	23%	25%	25%
0815	17%	24%	24%	25%	21%	22%

3.3.8 I have also considered whether there is any merit to Mr Lewis' concerns in relation to the generation of traffic from residential development sites, using Oysell Gardens and Condor Avenue, and considering the distribution of traffic movements across the time periods of the morning peak hour (07:30-08:30), accepting this provides only a single day's data (**Table 3.2**).

Table 3.2 – Traffic Generation of Established Residential Sites in Portchester

Period Starting	Time Period Trip Rate Comparison				Proportion of Travel Demand		
	Oysell Gardens	Condor Avenue	Average		Oysell Gardens*	Condor Avenue	Average
0730	0.139	0.117	0.128		26%	23%	24%
0745	0.097	0.114	0.105		18%	23%	20%
0800	0.111	0.161	0.136		21%	32%	26%
0815	0.194	0.114	0.154		36%	23%	29%
0730-0830	0.542	0.505	0.523		100%	100%	100%

* *Whilst the trip rates for Oysell Gardens are not representative of the Appeal Scheme due to the differences in development form and density, the traffic profile is likely to be comparable.*

3.3.9 Whilst inevitably there is some fluctuation of traffic demand within the peak hour, in real terms the traffic generated by the two sites is evenly spread across the peak hour, with the average traffic demand in each 15-minute period falling within 5% of the mean (25%).

3.3.10 Where there are minor fluctuations, these occur in different 15-minute time periods. There is no established pattern of travel concentration within a particular part of the peak hour.

3.3.11 In practical terms, the time that an individual decides to travel will be influenced by very many reasons and will not be consistent day to day. To consider only a peak time interval within the peak hour is entirely inappropriate, unverified, and fails to account for daily variation in travel.

3.3.12 The TRICS data on which I rely is both appropriate and consistent with local travel patterns.

3.4 2031 Forecast Year

3.4.1 Mr Lewis considers that an assessment of the operation of the bridge in 2031 is necessary.

3.4.2 Whilst I explain why a 2031 Assessment is not needed at Paras 3.66-3.69 of my PoE, at Table 3.4 of my PoE I also present a 2031 Assessment as a Sensitivity Test. This confirms that the scheme will operate acceptably, with reserve capacity (+24%).

FBC 2031 Traffic Forecasts

3.4.3 Mr Lewis presents an alternative traffic forecast for 2031 to mine, which uses his assumptions in relation to development trip rates and traffic growth forecasts to 2031 conditions.

3.4.4 I have tried to confirm how the Council derives its 2031 forecast, but Mr Lewis confirmed he did not keep detailed records of how this was derived.

3.4.5 However, he did explain the approach he used to be as follows:

- Peak interval data (for the busiest 15 minute period) taken from my 2026 Forecast;
- Removing development trips (as I estimated);
- Adjusting the data to account for traffic growth between 2026-2031 using TEMPro; and
- Re-applying development trips using Mr Lewis' trip rate estimates, with development demand spread evenly across the peak hour (25% in each 15 minute time period).

3.4.6 I requested copies of Mr Lewis calculations of his 2031 traffic scenario in order that I could verify how these have been derived but was advised that these were "*not easy to share*" as some of the calculations were carried out manually using a calculator. The calculations do not appear to have been recorded, or certainly not in a form that could be provided to me.

3.4.7 I have also requested sight of Mr Lewis' TEMPro traffic growth dataset, but again Mr Lewis has not been able to provide this, explaining that this was manually applied with figures *'rounded'*.

3.4.8 I have therefore sought to '*reverse-engineer*' the Council's 2031 forecasts and whilst I cannot exactly match the numbers presented, I estimate that Mr Lewis applies a traffic growth rate of around 10% to the junction between 2016-2031 in the morning peak hour. In my Evidence (TW PoE Appendix H) I demonstrate that the correct growth rate in this period is 5%.

3.4.9 To forecast growth of this magnitude (10%) means that no account has been made to remove the effect of double counting development traffic, and this results in overestimating traffic growth at the junction by around 200%. This is despite acceptance at AL PoE 4.2 that TEMPro parameters can be used to avoid double counting. Mr Lewis confirmed that *"I pondered making a similar adjustment to growth rates [As you did in Appendix H] but I don't think I did"*.

3.4.10 On this basis, I conclude that the 2031 Forecasts that Mr Lewis relies on are flawed. An overestimate of traffic growth by 5% equates to 50 peak hour trips and is a significant part of why Mr Lewis forecasts that the junction will operate poorly.

Appellant Traffic Flow Forecasts

3.4.11 In view of various unfounded criticisms of the ability to understand my traffic flow profiles for Downend Road, at **Appendix FF** I present a version of the traffic demand spreadsheet used to assess the bridge.

3.4.12 For absolute clarity, this uses the following steps to forecast traffic demand:

1. 2016 Observed Traffic Flows (in vehicles) obtained from the November 2016 ATC survey at the bridge (using weekday average data), with vehicles classified as light, medium and heavy vehicles, identified by direction (northbound and southbound), and presented in 15-minute time periods;
2. 2026 Future Year Traffic flows (in vehicles), comprising the 2016 Traffic Flows (Step 1) adjusted to 2026 conditions by using the TEMPro database to derive background traffic growth factors for the local area (as outlined in the TA CD1.10);
3. Development Traffic Demand (in vehicles), obtained from the TRICS database, assuming 70% of traffic demand travels over the Downend Road bridge, and with the hourly traffic estimates equally split across the four 15 minute periods of each hour;
4. 2026 Future Year 'with Development' Traffic Flows (in vehicles) – this comprises the 2026 Future Year Traffic Flows (Step 2), with the addition of Development Demand (Step 3);
5. 2026 Future Year 'with Development' Traffic Flows (in PCUs) - this converts the 2026 Future Year with Development Flows (Step 4) to PCU's using the TSM (CD8.16) factors of 1.0 PCU for light vehicles, 1.5 PCU for medium vehicles and 2.3PCU for HGVs.

SECTION 4 Intergreen Periods to Address Cycling

4.1.1 Throughout its Evidence, the Council alleges that the proposed scheme at Downend Road does not properly address cycling requirements. Mr Lewis introduces longer intergreen times in his assessment to address this, which significantly and inappropriate affects the operation of the junction. There is no sound basis to assume that cyclists are at risk and that longer intergreen periods are needed at all times.

4.2 Use of Downend Road by Cyclists

4.2.1 Mr Lewis has agreed the forecasts of cycling at Downend Road (AL PoE Table 4 / TSoCG). This demonstrates that there are currently around 9 cyclists using Downend Road in peak hours. The development will generate limited cycling demands to Downend Road, with 1 additional cycling trip at Downend Road expected to occur in peak periods.

4.2.2 Whilst the promotion of alternative travel modes is fundamental to delivering sustainable development, in the context of Downend Road, cycling use is already very limited and the development will not materially impact on cycling demands. I do not dispute the need to ensure the safety and convenience of cyclists at Downend Road, but this must be considered in the context of the levels of use forecast, and the alternative route options available.

4.2.3 Table 1 of AL PoE presents my forecasts of total travel demand from the site by walking and cycling. This forecasts that there will be significantly greater use of Route B (Cams Bridge) and Route C (Upper Cornaway Lane) by cycling trips from the development, than using Downend Road. Each of these routes is designed to prioritise cycling and walking, and each offer traffic free connections that will be subject to significant improvement (ASoTM). Mr Lewis does not dispute this.

4.3 Consideration of Cycling in the Scheme Design

4.3.1 At paragraphs 6.8-6.9, Mr Lewis raises criticisms of HCC's review of the scheme, the Road Safety Auditor's assessment and also JCT's review of the scheme model. This is based on Mr Lewis misunderstanding of the scheme, which assumes that no provisions would be made in the design for detecting slow moving vehicles, including cyclists.

4.3.2 I have explained on more than one occasion to Mr Lewis in discussions around the TSoCG that the scheme will include vehicle detection (infrared, radar or loops), including for cyclists, such that on a cycle by cycle basis the junction intergreens can be extended to allow vehicle clearance. Neither I, nor HCC, nor JCT nor the Road Safety Auditors have ever been under any other impression. My PoE provides detail on the detection equipment that would be likely to be included at the detailed design stage at TW PoE 3.6.35.

4.3.3 Furthermore, suggestions that HCC and the RSA did not consider cycling are simply wrong. Appendix M of the TA sets out HCC comments in relation to cycling. More latterly this is confirmed in a supplementary letter that I obtained from the Road Safety Auditor in response to Mr Lewis' criticisms of the scheme (TW PoE Appendix U), and by HCC in their correspondence directly to Mr Lewis (TW PoE Appendix T).

4.4 Calculating Intergreen Period

4.4.1 The intergreen period is based on the time it takes for vehicles to clear the junction if travelling through the stop line at the end of the green phase. The TSM (CD8.16) sets out that intergreen periods should be calculated by determining the *'x-distance'*, which is the distance opposing vehicles will travel between a likely collision point (*'conflict point'*), subtracted from each other.

4.4.2 I present my assessment of the conflict point at TW PoE Appendix E which identifies a collision area of 52-54m, and an x-distance of 38-42m. I confirmed my assessment with JCT and HCC. When considered against the TSM Table 6-1 requirements, an intergreen of 9 seconds is needed. In my assessments I assume a 10 seconds intergreen as an average across the hour.

4.4.3 Mr Lewis presents an alternative assessment of the conflict point (drawing 8210511/6104) where he determines the collision area to be 64m, assessing the conflict point to be at the location of his proposed pedestrian crossings, in a location that a collision could not occur. This is contrary to TSM Chapter 6 para 6.6.2 which states the conflict point should be the '***probable collision points'*** between opposing traffic streams.

4.4.4 Mr Lewis then seeks to base his intergreen period not on an 'x-distance' calculation, but on the clearance time for a cyclist travelling through the junction (AL PoE 6.16). He concludes that a 16 second intergreen period should be applied, and then applies this intergreen period in each and every cycle of the junction irrespective of whether a cyclist will be present.

4.4.5 Mr Lewis' approach is incorrect; he assumes that a cyclist is accelerating from stationary. The intergreen period occurs after the green phase, and which point any cyclist will be travelling at full speed. The correct assessment assumes a cyclist passing through the stop line at 20kph (5.55m/s), which means the cyclist clears the collision area (52m-54m) in 10 seconds.

4.4.6 To account for the occasional use of Downend Road by cyclists I have already made a conservative assumption in my evidence (TW PoE 3.6.29 (6)) that during a junction cycle when a cyclist is present (one in every 6-7 cycles – ~10-15%), vehicle detection would call an 'All-Red' extension of the intergreen period to 18 seconds. TW PoE 3.6.40-3.6.50 demonstrates that this will be sufficient to clear vehicles in the queue when a cyclist is positioned at the stop line at the start of the green phase. My Evidence (TW PoE Appendix K) demonstrates that this results in an average intergreen period of 10.25-10.50 seconds, assuming the extension is always called.

4.5 Impact of a 16 Second Intergreen Period

4.5.1 The application of a 16 second intergreen period for every cycle of the junction is totally inappropriate, defies the TSM Ch6, is contrary to how the junction would be set up on the ground practically, and critically, would be unsafe. The TSM (CD8.16) at para 6.5.6 identifies that:

> ***"6.5.6. A short intergreen period is potentially dangerous but equally a period that is too long leads to delay, frustration and disobedience, again potentially encouraging drivers to ignore the red signal."***

4.5.2 The junction area (between stop lines) is 66m, with the collision area being 52-54m. **Table 4.1** demonstrates, at various vehicle speeds, the time that it will take vehicles to clear the junction area if crossing the stop line at the start of the intergreen period (end of green light), as well as the time taken to clear the collision area, at which point opposing traffic can enter the junction.

Table 4.1 – Junction Clearance Time for Vehicles

Speed		Time taken for vehicle to clear junction area (66m)	Time taken for vehicle to clear collision area (54m)
20mph	8.94m/s	7.4	6.0
25mph	11.18m/s	5.9	4.8
30mph	13.41m/s	4.9	4.0

4.5.3 At 20-25mph, a realistic speed for vehicles traversing the bridge, a vehicle will take 5-6 seconds to clear the collision area and 6-7.5 seconds to clear the whole junction. At 30mph (the speed limit) it would take a vehicle 5 seconds to clear the whole junction.

4.5.4 Assuming a 10 second intergreen period, this will mean a safety margin of some 2.5-5 seconds at the end of each intergreen period will be available where traffic has left the junction area before the opposing traffic stream gains priority (green light).

4.5.5 Under Mr Lewis' assessment (using a 16 second intergreen), there would be a period of 11 seconds at the end of each intergreen period where no vehicles are present on the junction.

4.5.6 Quite apart from introducing unnecessary delay, this is an excessive period of time for vehicles to sit idle with no opposing traffic flow, and would lead to driver frustration, and probably regular instances of vehicles ignoring the red signal and entering the junction.

4.5.7 In simple terms, the use of on junction detection (TW PoE 3.6.35) negates the need to include a higher intergreen period in the LinSig model for all junction cycles and is sufficient to balance cycle safety and junction operation. The use of a 10 second intergreen in the model already considers the impacts of occasional extensions to intergreen periods when cyclists are present. HCC agree (**Appendix GG**)

SECTION 5 Pedestrian Crossing Provision

5.1.1 The Council raises concerns relating to the safety of the proposed pedestrian refuge island crossing, particularly in relation to pedestrian visibility and gap seeking, and on that basis consider a dedicated pedestrian phase at the traffic signal junction to be necessary.

5.1.2 There is common ground on the forecast levels of pedestrian and cycle demands at Downend Road (AL PoE Table 4). Both pedestrian and cycle demands are, and will remain, low.

- Morning peak hour (07:30-08:30) - 9-22 pedestrians and 8-9 cyclists; and
- Evening peak hour (17:00-18:00) - 5 pedestrian movements and 9 cyclists.

5.1.3 Mr Lewis seeks to diminish the role of PmV^2 assessment in validating the decision to provide a pedestrian refuge crossing. Whilst there are different methodologies available to consider pedestrian crossing provision, HCC's policy (TM7) remains to apply a PmV^2 assessment. My assessment of crossing need against PmV^2 demonstrates that a controlled crossing is not justified, and that an alternative solution, such as a pedestrian refuge, is appropriate.

5.2 Gap Acceptance

5.2.1 There is agreement with the Council on the level of gaps in traffic that most pedestrians require to safely cross a road (4-6 seconds), and the assumed crossing speed (1.2m/s). The traffic lanes at the refuge island are 3m wide, ~3.5m between kerbs, meaning it will take a pedestrian less than ~3 seconds to cross Downend Road either side of the refuge island.

5.2.2 In my PoE (TW PoE Table 3.8), I explain that the vehicle frequency northbound and southbound at Downend Road at the point of the pedestrian crossing refuge is one vehicle every 7-9 seconds, each in excess of the TSM gap acceptance requirements (4-6 seconds) and in excess of the crossing time required. Moreover, vehicles do not arrive uniformly and instead travel in platoons which creates longer gaps in traffic for pedestrians to cross. This will be particularly prevalent here due to the interaction with the adjacent traffic signal junction.

5.2.3 Mr Lewis presents an alternative assessment of the availability of gaps in traffic on Downend Road, adapting the TSM approach by adding in a further 2 seconds to the crossing time for *'thinking time'*. Mr Lewis refers to para 6.7.2 of the TSM (CD8.16) to support this.

5.2.4 This is an incorrect approach and conflates two very separate matters:

1. The time taken for a pedestrian to judge a gap in traffic sufficient to cross the road, which occurs prior to the decision to cross the road; and
2. The gap in traffic needed to safely cross the road.

5.2.5 Paragraph 6.7.2 of the TSM provides information on pedestrian to traffic intergreen times for the configuration of traffic signal installations and advises that an additional 2 seconds should be added to the intergreen as a '*safety buffer*'. This is not '*thinking time*' or reaction time, but a safety buffer in a traffic signal staging and has no relationship to informal crossings as proposed.

5.2.6 Whilst on a practical basis pedestrians will of course need a period of time (perhaps even 2 seconds) to observe traffic conditions and establish the presence of a sufficient gap in traffic, this has no bearing on the size of the gap in traffic needed to cross the road. What Mr Lewis does in effect is take the TSM advice on gap acceptance of 4-6 seconds, which he agrees with (TSoCG), and extends this into a gap requirement of 6-8 seconds, quite unreasonably.

5.2.7 Mr Lewis raised his concerns on the availability of gaps to HCC, who at **Appendix GG** confirm:

> ***"the HA have no concerns that pedestrians would have difficulty crossing this road given the forecast traffic flows on Downend Road. At the northern crossing point, there will be gaps caused by the close proximity to the bridge signalisation (there will be generous periods when vehicles won't be passing the refuge in at least one direction) and a refuge island is to be provided, allowing pedestrians to cross in two stages. At the southern uncontrolled crossing there will be substantial periods for pedestrians to cross after the last northbound vehicle has passed; this time will comprise of the intergreen period and the time taken for the southbound vehicle to reach the southern crossing. The HA are comfortable that the operation of the signals and provision of a refuge will provide appropriate and safe opportunities for all pedestrians to cross."***

5.3 Pedestrian Visibility

5.3.1 Mr Lewis' erroneous approach to determining gap acceptance then follows through to his assessment of pedestrian visibility at the informal crossings on Downend Road. He continues to apply a 2 second '*thinking time*' in his further calculations to determine a visibility requirement at the bridge of 75m (based on an assumed traffic speed of 55kph (34mph)). Mr Lewis uses this in combination with his Drawing 8210511/6101 to seek to demonstrate that inadequate visibility can be achieved at the pedestrian crossing refuge island.

5.3.2 I consider Mr Lewis' approach to be incorrect on the basis that:

- This assumes vehicles will always be present at the right turning lane (affecting visibility north of the refuge island) and at the southbound stop line (affecting visibility south of the refuge island). I have addressed this in TW PoE 3.6.60;
- It assumes vehicles travelling in both directions will be travelling at 34mph. My PoE demonstrates the scheme will be successful in reducing traffic speeds on both approaches to the crossing. To base visibility calculations on existing speeds is irrelevant.
- The use of a 2 second *'thinking time'* is contrary to TSM.

5.3.3 To demonstrate that Mr Lewis' approach is defective, one only needs to look at the TSM itself, which is where Mr Lewis bases much of his assessment. Section 15.3 considers uncontrolled or informal crossings (such as refuges) and Section 15.5 identifies the minimum pedestrian visibility distances needed for crossings based on approach speeds, presented in Table 15-1.

Table 15-1 Recommended visibility distances for pedestrian crossings

85th percentile speed (mph)	20	25	30	35	40
Recommended Stopping Sight Distance (m)	22	31	40	51	80

5.3.4 Mr Lewis applies a pedestrian visibility requirement of 75m for a 34mph speed. TSM advises a 51m visibility requirement for a 35mph speed, not 75m. The difference between Mr Lewis and the TSM lies in the 2 second '*thinking time*'. If it was intended that an additional 2 seconds were applied in the calculations, it would be reflected in TSM Table 15-1, but it is not.

5.3.5 For a pedestrian to cross the live traffic lane at the refuge island (3m) will take a crossing time of 2.5 seconds, or a crossing time of 2.9 seconds kerb to kerb (3.5m). This is less than the TSM gap acceptance of 4-6 seconds because the crossing refuge allows two-stage crossing of Downed Road, and pedestrians only need to locate gap in one direction of traffic flow at a time.

5.3.6 Using Mr Lewis' assumed 55kph (34mph) traffic speed (15.3m/s), the spatial gap in traffic needed to cross the road (2.9 secs) would be 45m (**Table 5.1**), below the 51m TSM visibility requirement.

Table 5.1 – Gap in Traffic Required to Cross Downend Road (Refuge Island)

Vehicle Speed		**Visibility (m) required for gap crossing**		**TSM Visibility Requirement**
		2.5 second	2.9 second	Table 15-1
20mph	8.94m/s	22	26	22
25mph	11.18m/s	28	32	31
30mph	13.41m/s	34	39	40
35mph	15.65m/s	39	45	51

5.3.7 I believe that approaching traffic will be moving significantly slower than 34mph in any event. Northbound vehicle speeds through the bridge will be reduced because of the road narrowing, and southbound speeds reduced because of the speed limit change, horizontal alignment, traffic islands and the approach to the signal junction. I believe southbound vehicles approaching the refuge island will be travelling under 30mph, northbound vehicles across the bridge will be travelling between 20-25mph.

5.3.8 Under these more realistic speed estimates, a gap in traffic equivalent to 40m southbound and 26-32m northbound would need to be visible to a crossing pedestrian.

5.3.9 In my PoE at 3.6.59, I have demonstrated that even during those limited periods of time that a vehicle is present within the right turn lane seeking access to the Appeal Site, a visibility splay of 1.5m x 51m is still achievable to the north, sufficient to determine a gap in traffic adequate to cross the road (39m) and to comply with the TSM Table 15-1 requirements (40m). In practice, there will be relatively small periods of time that a vehicle will impede visibility to the north with the forecast queue at the right turn lane being 0.1-0.2 vehicles and average delays of 7 seconds.

5.3.10 There will be more prolonged periods where a vehicle will be queuing in the southbound approach to the bridge. However, I have already demonstrated (TW PoE Appendix N) that when a vehicle is queueing in this location, visibility is reduced to 1.5m x 40m, which offers sufficient visibility for a 30mph traffic speed based on the TSM requirements. Based on northbound speeds of 20-25mph, a gap in traffic of 26-32m is needed.

5.3.11 In practice, most pedestrians examine gaps in traffic to cross at a position much closer to the road than 1.5mback, which equates to a pedestrian being located at the rear of the footway. Most pedestrians actually determine visibility from a position towards the kerb-edge. Drawing ITB12212-GA-079 (**Appendix HH**) presents a further assessment of visibility, confirming:

a At a 1.5m set back, a pedestrian can see 40m to the centre of the bridge;

b At a 0.8m set back, a pedestrian can see >80m to the opposing stop line; and

c At a 0.4m set back, a pedestrian has clear sight across the bridge deck.

d A northbound vehicle benefits from good forward visibility (>80m) to the refuge island to understand the presence of a pedestrian seeking to cross the road.

5.3.12 At para 5.21 Mr Lewis states his belief that, in due course, the Highway Authority and Road Safety Auditors will insist on the provision of a controlled crossing. This is nothing but conjecture. The Road Safety Auditors have considered the scheme thoroughly and raise no such safety issues with the proposed junction. Mr Lewis has been repeatedly advised by HCC that this matter has been considered in detail and over a prolonged period, and that they are satisfied with the scheme, including in his most recent exchanges with HCC provided at **Appendix GG**.

5.3.13 I would expect the Appeal scheme to be constructed in the manner proposed if planning permission is achieved.

5.3.14 As a result of his conclusion on the safety of the pedestrian crossing provision, Mr Lewis includes a pedestrian stage in his junction assessment. Mr Wilkinson provides a separate Rebuttal note which addresses deficiencies in the way Mr Lewis has then modelled the pedestrian crossings in his LinSig assessment.

SECTION 6 Conclusion on FBC Alternative Assessment

6.1 At Table 14, Mr Lewis presents an alternative assessment of the operation of the Downend Road bridge, using LinSig, and making various critical changes to my assessment by:

- Including a pedestrian phase to the junction;
- Increasing intergreen periods to 16 seconds for each and every junction cycle;
- Increasing development traffic demand, based on the (erroneous) local trip rates; and
- Applying the highest observed 15-minute period traffic flows to all periods of the model and considering conditions in 2031.

6.2 As I have explained, Mr Lewis' alternative assessment (AL PoE Table 14) is based on various critical errors, unsafe assumptions, and incorrect modelling processes. For that reason, it should not be considered as a reasonable assessment basis.

SECTION 7 Other Matters

7.1.1 Whilst the core of the Council's Case relates to the assessment parameters explored in preceding Sections, Mr Lewis makes various other criticisms of the Appeal Scheme in his PoE. Much of this relates to the design of the access to the Appeal Site, which sits squarely outside of the RfR, and various other concerns are also raised in relation to the assessment of environmental impacts.

7.2 Highway Design Considerations

7.2.1 Mr Lewis makes various criticisms about the design of the access and bridge improvement, and of the assessment of the scheme by HCC and the Road Safety Auditors. These are addressed in my PoE and I don't seek to repeat this. What I do address are the various detailed points Mr Lewis raises in his evidence to demonstrate that these points are without merit.

Design Standards and Approach

7.2.2 The main difference between myself and Mr Lewis centres on his strict application of DMRB standards to the scheme. That is not the correct approach, and I (and HCC) have consistently advised Mr Lewis that it is MfS / MfS2 that provide the relevant design guidance. DMRB provides advice to inform the design, not the standard against which the scheme is to be strictly assessed.

7.2.3 Plainly, as he identifies in paragraph 2.17, MfS2 provides guidance for local network (non-trunk) roads where speeds for most of the day are below 40mph, as is the case at Downend Road.

Design Speed / Speed Limit Relocation

7.2.4 Mr Lewis seeks to apply a different design speed to the access works (70kph) and the bridge improvement (60kph), despite the two schemes adjoining each other. Key to this conclusion is his concern that the potential relocation of the speed limit will be ineffective or not be achieved.

7.2.5 Mr Lewis stands alone on this point:

- I have explained (TW PoE para 5.2.30) that the observed speeds on Downend Road, both south of the bridge, north of the bridge and north of the access, already support the use of a 60kph design speed (37mph), irrespective of the speed limit. The highest 85%ile speed is the southbound approach towards the access, which at a point 150m north of the Appeal site, records observed 85%ile speeds of 58kph; and
- HCC has confirmed that the scheme should be considered using a 60kph Design Speed (TW PoE App T and **Appendix GG**) and that they support the speed limit relocation.

7.2.6 Mr Lewis' reference to Circular 1/13 to support his point is unreasonably narrow. Circular 1/13 provides a summary for where speed limits may apply, and he appears to hang his case on a single sentence at Table 1 that states ***"[30mph speed limits apply] .... In other built-up areas (where motor vehicle movement is deemed more important), with development on both sides of the road."*** This is not a legal requirement, a mandate or even a recommendation.

7.2.7 I do not rely on the movement of the speed limit to demonstrate the scheme is acceptable.

7.2.8 Irrespective, the Appeal scheme includes various physical measures that will be delivered, and which will, in combination with the movement of the speed limit, reduce vehicle speeds:

i a gateway feature at the speed limit transition;

ii introduction of horizontal deflection at the site access;

iii the change in character of the area resulting from the access works and development;

iv physical features comprising the pedestrian refuge and traffic island; and

v the introduction of traffic signals at the bridge.

7.2.9 The existing southbound speeds at the proposed speed limit transition are 31mph average, or 36mph 85%ile. At the bridge average speeds are 29mph and 34mph 85%ile (TW PoE Table 5.1).

7.2.10 In my opinion, it is reasonable to assume that the changes described above will generate a meaningful speed reduction on the southbound approach to the site access of around 5-6mph, delivering an 85%ile speed of around 30mph or less. Northbound speeds will be more significantly reduced due to the narrowing of the bridge to single working operation and inclusion of traffic signal operation, in my opinion to a likely speed of 20-25mph.

7.2.11 Conversely, at 2.57 Mr Lewis presents a case that the works will increase vehicle speeds by 6mph, on the basis that the works comprise widening of the road, and by referring to MfS research.

7.2.12 Whilst I do not dispute that there is a relationship between road width and vehicle speeds, in this case the 'widening' of the road is to create a right turning lane. This does not increase the space available for vehicles travelling through the scheme (which remains 3m in line with the existing lane widths).

7.2.13 Moreover, drivers will be aware of vehicles slowing to enter the turning lane on the northbound approach and vehicles slowing for the signals on the southbound approach.

Departures from Standard

7.2.14 At paragraph 2.44 Mr Lewis confirms that the access arrangement broadly follows DMRB. Criticisms are then raised in relation to potential *'Departures from Standard'* (from DMRB) in the design. Appendix A of Mr Lewis' PoE presents a list of the Departures he considers exist within the scheme design, comprising:

a Ghost Island Taper Lengths
b Verge Width / Gradients
c Turning / Deceleration Length
d Pedestrian Refuge Island Depth
e Pedestrian Visibility at Crossings
f Lane Width at approach to signals
g Intervisibility Zone
h Horizontal Radii

7.2.15 As both I and HCC have confirmed to Mr Lewis, it is unlikely that, when properly assessed against MfS/MfS2, not DMRB, and taking account of existing observed speeds (setting aside Mr Lewis' criticisms on the prospect of the speed limit change), there are no likely '*Departures from Standard*' in either the access design or traffic signal junction, individually or in combination.

7.2.16 In simple terms:

a The access works and bridge improvement have been designed based on a realistic design speed of 60kph (using observations of vehicle speeds);

b Applying the correct Design Speed means that MfS/MfS2 principles are to be applied to the works, not DMRB standards;

c Against MfS, the scheme is entirely acceptable. There are unlikely to be any *'Departures from Standard'* required, but if there were, HCC has confirmed these are in principle acceptable (**Appendix GG**);

d The scheme has been subject to scrutiny and review for a prolonged period of time by professional highway engineers, traffic signal engineers and safety officers at HCC, who agree the works are acceptable (CD3.4.1 and ASoTM);

e An independent Road Safety Audit has been carried out of the scheme. All matters raised are addressed satisfactorily in the Designer's Response (CD 1.10 – Appendix K);

f I have obtained a letter from the Auditor to confirm, unequivocally, that the scheme raises no residual safety concerns, in light of Mr Lewis concerns (TW PoE Appendix U).

Ghost Island Taper Lengths

7.2.17 Mr Lewis' most significant concern is raised in relation to the tapers used to form the right turn lane at the access. I have explained in my evidence that the DMRB advice on tapers is not a '*Standard*' (i.e. not a mandatory requirement) and that no '*Departure from Standard*' is needed.

7.2.18 I demonstrate that the resulting horizontal alignment is natural, flowing and conforms to MfS2 Guidance for a 60kph road, verified by preparing swept path analysis. HCC has considered the alignment formed by the tapers and is satisfied, as has an independent Road Safety Audit.

Verge Width / Gradients

7.2.19 Mr Lewis considers that there is a departure from DMRB standards in relation to the verge widths, focussed on the area of verge north of the Appeal Site access. DMRB Guidance (CD 8.12) on verges simply does not apply to Downend Road which is not a trunk road. HCC provide local guidance on verges / margins which I address in my PoE at 5.2.80, confirming that the verge complies with HCC requirements in the MfS Companion Guide, and there is no Departure from Standard. Whilst there may be a need for a small retaining structure in this location, that can be achieved in the limits of the public highway and is a matter for the detailed design stage.

7.2.20 Mr Lewis raised this concern directly to HCC who advise (**Appendix GG**) that:

> ***"All the land is either dedicated highway or within the control of the appellant; as such the HA are satisfied that any issues arising in this regard at the detailed design stage can be satisfactorily addressed should the development come forward."***

Turning / Deceleration Length

7.2.21 Mr Lewis identifies a '*Departure from Standards*' in relation to the turning and deceleration length for the ghost island right turning lane. Despite this no safety concerns are raised with the proposed configuration.

7.2.22 At TW PoE 5.2.57, I explain that, even if the scheme is assessed against DMRB (CD 8.11), the deceleration length and direct taper conform to DMRB when using the correct design speed (60kph), and therefore there is no Departure from Standard. The turning length has always met the DMRB requirement (for 10m) for both a 60kph and 70kph speed limit.

Pedestrian Refuge Island Depth

7.2.23 Mr Lewis identifies a '*Departure from Standard*' in relation to the depth of the pedestrian island.

7.2.24 DMRB CD143 (CD 8.13) Table E/4.7identifies a desirable minimum depth of 2.0m, and an absolute minimum depth of 1.5m. The scheme provides a refuge depth of 1.8m, and there is therefore no Departure from Standard.

7.2.25 The TSoCG confirms that the refuge island complies with TSM requirements (CD 8.16). HCC is happy with the proposed design. Irrespective, if it was necessary to increase the island depth by 200mm at the detailed design stage, this can be achieved within the formation of the taper.

Pedestrian Visibility at Crossings

7.2.26 I have addressed Mr Lewis' concerns in relation to pedestrian visibility in earlier sections of this Rebuttal PoE. Pedestrian visibility is provided in line with both the TSM requirements and in line with HCC'S TG3 Policy, as confirmed by HCC (**Appendix GG**) who also confirm that this was reviewed '*in detail at the application stage*' and has the support of HCC's Principal Road Safety Engineer and HCC's Chief Engineer. Therefore, there is no Departure from Standard needed but if this was considered a Departure, it would be approved.

Lane Width at approach to signals

7.2.27 Mr Lewis identifies a '*Departure*' in relation to the lane widths on approach to the signals.

7.2.28 In prescribing lane widths for trunk roads, DMRB CD123 (CD8.11 - para 7.6) confirms that the straight ahead lane widths at signal junctions shall be a minimum of 3.0m at new junctions, which is what is delivered in the scheme. Therefore, there is no Departure from Standard.

7.2.29 Mr Lewis refers to para 7.6.4 of CD123, which advises a 4.0m minimum width "*between physical islands where cyclist demand indicates a need*". Cycling use of Downend Road is light and cyclists will not be located between physical islands. This is again, not a Departure from Standard.

Intervisibility Zone

7.2.30 A potential *'Departure'* is identified in relation to the Intervisibility Zone, again compared to DMRB. The Appeal Scheme is not a conventional traffic signal junction, and it is inappropriate to seek to apply the intervisibility requirements in the same manner.

7.2.31 Drawing ITB12212-GA-049 **F (CD 2.2.2)** demonstrates the intervisibility to and through the bridge junction, demonstrating that this complies with HCC's TG3 requirements.

7.2.32 I note that this is significantly better than many of the shuttle signal examples that Mr Lewis refers to in his evidence (AL PoE Appendix C).

7.2.33 Again, this would not be considered a Departure from Standard, but if it were, it is plainly acceptable.

Horizontal Radii

7.2.34 Finally, Mr Lewis also identifies a concern with the horizontal alignment of the scheme. This is addressed in my evidence which demonstrates the horizontal alignment conforms to MfS2 (CD 8.9) requirements for a 60kph approach speed, which is in line with existing observed speeds, and which identifies a minimum curve radius of 64m is required.

7.2.35 On the southbound approach and through the approach to the signals the minimum radius for approaching vehicles will be 180m.

7.2.36 Therefore, there is no Departure from Standard in relation to the horizontal alignment.

7.2.37 In addressing further questions from Mr Lewis, HCC confirms (**Appendix GG**) that:

> ***"We do not consider there are any significant alignment issues and are confident that the works proposed can be safely delivered should the development progress."***

7.2.38 Suggestions that Design Standards and DfS procedures have changed are misleading. Whilst the DMRB has recently been overhauled, modernised and consolidated, the DMRB Design Standards in CD109, CD123 and CD143 provide ostensibly the same advice and guidance as the versions they replaced (TD9, TD42/95, TA91/05) in relation to horizontal alignment, ghost island right turn lane junctions and tapers. There are no material changes to DMRB standards that should concern the consideration of the safety of the works.

Road Safety Audit / HCC Assessment

7.2.39 Mr Lewis alleges that the Road Safety Auditors were not aware of the potential Departures from Standard in considering the scheme. I exhibited at TW PoE Appendix U a letter from Fenley Road Safety who carried out the Audit to demonstrate this is mis-founded.

7.2.40 Mr Lewis then identifies that the RSA identified two matters in the Audit pertinent to the horizontal alignment, and issues related to the splitter island. The RSA includes a Designer's Response on all matters raised, as well as the Auditor's comment on the Design Response. In each and every case, the Auditors are satisfied that the Design Response provided is acceptable. There is no foundation to these concerns.

7.2.41 At 2.51 Mr Lewis repeats his allegation that the HCC PADR [CD 1.10 Appendix B / APP B] for the site access makes no mention of Departures from Standard. As I have directed Mr Lewis to on more than one occasion, the concluding paragraph of the PADR does exactly that:

> ***"Departures from Standard could be required with regards to DMRB; as a result of restricted sight lines to the south due to the Railway Bridge and geometric layout of the right turn lane; however the speed checks provided indicate MfS Standards could be applied in this instance and potentially support the departures."***

7.2.42 HCC has confirmed to Mr Lewis that they have at all stages been aware of the potential departures (TW PoE Appendix T), and the latest correspondence that Mr Lewis has had with HCC has confirmed that the scheme remains acceptable, even in light of his concerns (**Appendix GG**).

7.3 Environmental Assessment of Transport Related Matters

7.3.1 Mr Lewis makes various comments in relation to the environmental assessment of the scheme. This centres on his belief that the TA (CD1.10) should have assessed the environmental effects of the proposal in relation to transport matters, and could have considered matters such as pedestrian amenity, delay and severance.

7.3.2 To consider the need for EIA, the Appellants followed due process and a Screening Opinion was submitted to FBC alongside an EIA Scoping Report.

7.3.3 In relation to transport matters, the EIA Scoping Report considered the likely impacts of the scheme against the IEMA '*Guidelines for the Environmental Assessment of Road Traffic*' (1993) (CD8.17) which identifies that assessment is required where traffic increases by 30% or more (or by 10% where there are sensitive receptors nearby). The Scoping Report assessed that the development impacts fall below the threshold requiring assessment in relation to environmental effects. FBC determined that environmental assessment was not required.

7.3.4 Whilst not a requirement for the application, in view of the Council's concerns raised in its PoE, I detail below an assessment of the environmental impacts at Downend Road, in relation to pedestrian amenity, delay and severance and fear and intimidation.

Pedestrian Severance

7.3.5 Whilst severance effects are complex and relate to the site specifics being considered, three main indicators for the assessment of severance have been formulated from studies of changes in traffic flow on observed links, discussed in the IEMA Guidelines and comprising:

- Change in flow of up to 30% - slight separation impacts;
- Change in flow of up to 60% - moderate separation impacts; and
- Change in flow of up to 90% - substantial separation impacts.

7.3.6 The impact of the Appeal Scheme at Downend Road (at the point of the pedestrian refuge) is that daily traffic flows will increase by 22% (**Table 7.1**), comfortably below the IEMA threshold where Pedestrian Severance effects will be 'slight' as a result of the scheme.

Table 7.1 – Assessment of Downend Road in relation to IEMA Severance Thresholds

Morning Peak			Evening Peak			Daily		
2016 Baseline	Development		2016 Baseline	Development		2016 Baseline	Development	
	Flow	%		Flow	%		Flow	%
744	107	14%	533	143	27%	6808	1,488*	22%

*Daily Development Flows based on 12hour TRICS data uplifted by 22.5% to convert 0700-1900 flows to 24 hour flows

7.3.7 Whilst this approach considers the *change* in severance effects, rather than total severance, it serves to demonstrate that the changes in traffic flows expected as a result of the Appeal Scheme are below levels that the IEMA would consider to be significant.

7.3.8 In more practical terms, the scheme delivers improved opportunities for pedestrian crossing, through the delivery of the pedestrian crossing refuge and speed reduction. This will mitigate the '*below slight*' severance impacts and will improve community connectivity.

Interpretation of LA112

7.3.9 To consider the severance effects of Downend Road at paragraph 5.4 onwards and at Table 4, Mr Lewis mis-interprets LA112 guidance (CD8.15) and seeks to portray this as providing severance thresholds which may be applicable to the Appeal Scheme.

7.3.10 LA112 relates to reporting of environmental effects, applicable to projects requiring environmental assessment and affecting the motorway / trunk road network.

7.3.11 Downend Road does not form part of the Trunk Road network and an environmental assessment is not required, as confirmed by the Council itself.

7.3.12 Moreover, a proper reading of Table 3.11 of LA112 confirms that this does not seek to present a severance threshold for local roads at all, but instead identifies how various land uses should be classified in relation to the sensitivity of the receptors (i.e., low, medium, high).

7.3.13 Whilst Table 3.11 of LA112 identifies various assessment criteria used to determine the sensitivity of WCH routes (walkers, cyclists and horse-riders – formerly non-motorised users), this is not the same as identifying a severance threshold, nor does it purport to be. Table 3.11 does reference severance at various places but identifies no assessment or significance threshold.

Pedestrian Delay

7.3.14 The IEMA Guidelines suggest that pedestrian delay at an individual link (i.e. the time a pedestrian has to wait before crossing a road) should not exceed 40 seconds where no crossing facilities are available, which it equates to a two-way traffic flow of approximately 1,400 vehicles per hour.

7.3.15 At Downend Road, the highest hourly 2026 traffic flow (with Development) will be 894 vehicles (**Appendix FF**). This is far below (63%) the IEMA threshold where Pedestrian Delay could be considered significant.

7.3.16 Moreover, as part of the Appeal proposals, pedestrian crossing facilities are to be provided which will enable two-stage crossing of Downend Road. In combination with the operation of the traffic signal control of the bridge, there will be regular and significant gaps in traffic for pedestrians to cross efficiently, to ensure that delay is limited.

Pedestrian Amenity

7.3.17 The IEMA Guidelines broadly define Pedestrian Amenity as *'the relative pleasantness of a journey'*. It is affected by traffic flow, traffic composition, pavement width and separation from traffic. IEMA identify a significance threshold for where traffic flows are 'halved' or 'doubled'.

7.3.18 In the case of the Appeal Site, daily traffic flows are projected to increase by 22% (increasing by 14% in the morning peak hour), far below this IEMA threshold.

7.3.19 Moreover, the Appeal scheme fundamentally improves Pedestrian Amenity on Downend Road, delivering a footway across the bridge where no footway currently exists which will provide segregated and formal pedestrian facilities, as well as speed reduction in the vicinity.

7.3.20 The Council agree that the delivery of a footway provides a significant benefit to pedestrian safety and the attractiveness of the route, compared to the existing situation (TSoCG).

Fear and Intimidation

7.3.21 The IEMA Guidelines identify thresholds for determining the level of Fear and Intimidation arising on the highway network, based on average 18 hour traffic flows (06:00-00:00). **Table 7.2** identifies the baseline and development scenarios at Downend Road against these thresholds, using the average hourly 2026 traffic flows from **Appendix FF**.

Table 7.2 – Assessment of Downend Road against IEMA Fear and Intimidation Guidance

IEMA Significance Criteria (vpd)		2026 Baseline		2026 With Development	
Extreme	1,800+	392	Below Moderate	460	Below Moderate
Great	1,200 – 1,800				
Moderate	600-1200				

7.3.22 Under both the Baseline and 'With Development' conditions, the IEMA significance thresholds in relation to traffic flows are not met. Levels of Fear and Intimidation will be '*below moderate*'.

7.3.23 The IEMA thresholds also identify a speed threshold, stating that anything greater than a 20+ miles per hour average speed should be considered to represent an Extreme hazard.

7.3.24 Whilst I am not seeking to downplay the role of traffic speed in contributing to levels of fear and intimidation, practically there are very few roads which exhibit <20mph average speeds outside of small residential streets. Importantly, the Appeal Scheme will reduce traffic speeds on Downend Road relative to the existing situation (TW PoE) reducing fear and intimidation.

Environmental Assessment Summary

7.3.25 The Appellant's followed the correct processes and carried out an EIA Screening with FBC, which confirmed assessment of environmental effects was not required. Despite this, I have prepared an assessment against the IEMA Guidance which that demonstrates that:

- Traffic increases as a result of the Appeal Scheme fall well below a level that requires an assessment of the environmental impacts;
- Impacts of the Appeal Scheme on pedestrian severance will fall below the 'slight' IEMA thresholds. The Appeal scheme delivers pedestrian improvement to Downend Road, delivering the missing footway, reducing speeds, and providing crossings;
- Levels of pedestrian delay fall far below the IEMA thresholds of significance;
- The Appeal scheme will improve pedestrian amenity on Downend Road, providing a footway where none exists across the bridge, reducing speeds and providing crossings;
- Both with and without the development, the IEMA significance thresholds relating to Fear and Intimidation are not met, with below moderate levels of Fear and Intimidation. In practical terms, the pedestrian environment will be improved.

7.4 Shuttle Working Traffic Light Examples

7.4.1 Mr Lewis presents numerous examples of traffic signal shuttle working operations across the Country. I assume his intention is to demonstrate that the Appeal Scheme has not considered cycling and other vulnerable road users properly. The examples provide provisions including:

- Alternative signed routes for vulnerable users;
- Wider shuttle working arrangements (to allow cars and cyclists to travel side-by-side);
- Advanced Stop Lines; and
- Vehicle Detection Systems.

7.4.2 I have examined the arrangements presented by Mr Lewis and would firstly note:

- The Appeal scheme will include vehicle detection systems (TW PoE 3.6.35) like many of the examples. This will allow an 'All-Red' phase extension to be called if cyclists, or other slow moving vehicles, have not cleared the junction in the intergreen period; and

- There are alternative routes available at the Appeal Scheme that users may choose to use including at Cams Bridge which connects directly to National Cycleway NCN236 at The Thicket, to footways on each side of The Thicket connecting to the wider area, and to the pedestrian and cycling infrastructure at the A27 corridor. The distance to the A27 / Downend Road junction are equidistant using Cams Bridge and Downend Road.

7.4.3 In relation to the examples presented, I conclude that these collectively serve to demonstrate how the Appeal scheme is entirely acceptable and consistent. The alternatives generally provide similar or lesser provisions for cyclists, and lesser pedestrian provision.

7.5 Cycle Environment

7.5.1 Mr Lewis presents various research documents on cycling behaviour and environment. At 6.20 he correctly notes that the Appeal scheme has already addressed cycle use of the bridge by providing a width sufficient to facilitate safe movement by all vehicles, but through the use of edge of carriageway markings, not sufficiently wide to allow drivers to overtake cyclists.

7.5.2 The same approach is presented at the traffic islands as part of the access with the kerb-to-kerb width being ~3.5m but narrowed to 3.0m by lining and road markings. LTN 1/20 (para 7.2.5 - CD8.18) identifies that road widths beside obstructions (such as traffic islands) should be less than 3.2m or more than 3.9m. The scheme complies with this, and it will be clear to users that cyclists cannot be overtaken on the bridge or through the traffic islands.

7.5.3 Mr Lewis is concerned that, because of the elongated section of carriageway, drivers will not be able to overtake cyclists, leading to driver frustration and in his opinion, unsafe overtaking. I disagree with Mr Lewis and note:

- Cycle use of Downend Road is low and will remain low. A cyclist will be present in the junction one in every 6-7 cycles (10-15%), in a single direction. Cyclists will be appreciated and understood, but are not so prevalent to create driver frustration;
- My assessment (TW PoE 3.6.40-3.6.50) demonstrates that the presence of a cyclist at the junction will have no practical difference to the passage of a vehicle through the junction. Detection equipment will elongate intergreen periods to ensure the same number of vehicles clear the junction. MOVA will optimise the use of the junction; and

  Whilst overtaking opportunities are limited within the area of works, there are clear and appreciable opportunities for drivers to overtake cyclists safely both north of the scheme access and south of the bridge. The good visibility through the scheme will mean drivers following a cyclist will be able to readily understand upcoming overtaking opportunities.

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