

Land at Water Lane, Angmering

Transport Assessment

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SECTION 1: INTRODUCTION

- 1.1 This report assesses the transport impact of the proposed development of 190 residential dwellings and 2,300sqm Gross Floor Area (GFA) employment uses on land west of Angmering. It is proposed to provide a main access to the site via Water Lane and a secondary access from Weaver's Hill.
- 1.2 The site is identified in the Arun Core Strategy Options for Growth Consultation Paper (2 April 2009) as part of Options 1 and 3 (Option 1: Sustainable Urban Extensions circa 500 homes around Angmering, Option 3: Mix of coastal and inland developments circa 1,500 homes around Angmering).
- 1.3 The scope and content of this report have been discussed with West Sussex County Council Highway Authority (WSCCHA) as part of formal pre-application discussions. **Appendix 1** contains details of these discussions.
- 1.4 The following sections are included:
 1. Introduction
 2. Existing Situation
 3. Proposed Development
 4. Transport Impact of Proposed Development
 5. Mitigation of Transport Impact
 6. Conclusion
- 1.5 The report concludes that there are no transport or highways reasons for objecting to the proposed development and access strategy.

SECTION 2: EXISTING SITUATION

Site Location

- 2.1 The site location is shown on **Figure 1**. The site is situated on the eastern side of Angmering between the existing built-up area and the A280 Angmering by-pass. The A280 connects with the A27 Trunk Road approximately 1.5km to the north-east of the site at a dumbbell grade-separated junction. The A27 runs east-west providing access to south coast towns. The A280 connects with the A259 approximately 1.5km to the south of the site. The A259 provides access to Littlehampton to the west and Worthing to the east.

Local Highway Network

- 2.2 The site is bounded by Water Lane to the north, the A280 to the east, The High Street and existing garden centre to the south and Weaver's Hill to the west. The site and surrounding local area is shown on **Figure 2**.
- 2.3 Water Lane has a width of 7.0m at its eastern end close to the A280. To the west it has a width of around 5.5m. No footways are provided. The eastern part of Water Lane is subject to a 40mph speed limit and the western section to a 30mph speed limit. No footways are provided along the section north of the site. The road is street lit. A road narrowing on its southern side (westbound) is provided approximately midway between the A280 and Angmering village. Westbound vehicles are required to give way to eastbound traffic but westbound cyclists are provided with a by-pass.
- 2.4 Water Lane forms a priority junction with the A280. The right turn out of Water Lane is not permitted. Traffic emerging from Water Lane and wishing to travel south on the A280 must turn left and u-turn at the southern dumbbell roundabout junction at the A27. Vehicles are permitted to turn right into Water Lane from the A280. A right turn lane is provided with a length of around 72m. This is sufficient to accommodate 12 cars.

- 2.5 A footway is provided along the northern side of Water Lane from Dapper's Lane west into the village. Weaver's Hill forms a priority junction with Water Lane at the north west corner of the site. A short section of footway is provided around the south-east of the junction. No footways are present on Weaver's Hill in the vicinity of the Water Lane junction. Visibility to the left for vehicles emerging from Weaver's Hill is restricted by the presence of a wall close to the carriageway edge some 16m from the junction. Weaver's Hill is subject to a 6' 6" width restriction. Weaver's Hill continues to the south past a number of properties on its western side whose residents park on street generally on the western side of Weaver's Hill.
- 2.6 Bus stops are provided on Water lane west of the Weaver's Hill junction. No shelters are provided. Footways are provided on both sides of Water Lane towards the centre of the village. Water Lane continues to the village centre that comprises a number of facilities including a post office, a pub, a fish and chip shop, a hairdresser, an electrical store, a Co-Op grocers, a vet, an off-license, a café, a dentist, a pub and an estate agent. These and other local facilities are indicated on **Figure 2**.
- 2.7 Water Lane continues to the west and south becoming Station Road to connect with the A259 at a roundabout junction situated immediately to the north of Angmering rail station. The station lies approximately 800m from the centre of the site via Water lane and Station Road.
- 2.8 The most direct route between Weaver's Hill and the village centre is via Cumberland Road, a residential road that is street lit with footways on both sides. From the south of the site it is possible to access the village centre via the High Street. A footway is provided on at least one side along the length of the High Street to Weavers Hill and beyond.

The Site

- 2.9 An initial assessment of the site constraints suggests that the site has a developable area of around 5.27Ha. It is from this area that the maximum number of dwelling has been derived for the purposes of assessing potential highways

impact. The part of the site that borders Water Lane is low lying and comprises a water course. To the south of the water course the land rises quite steeply to a point before falling again towards the A280. The topography of the land makes it difficult to provide a highway link between the main part of the site and the part that lies adjacent to Weaver's Hill.

- 2.10 The site is used for agricultural purposes at the present time.
- 2.11 The Arun Angling Centre lies to the south of Water Lane and to the east of Weaver's Hill. A large property including a listed building lies between the Angling Centre and the location of the proposed main site access.

Public Transport

Bus

- 2.12 There are existing bus stops located on Water Lane adjacent to Weavers Hill just over 100m from the proposed Weavers Hill access and on Weavers Hill adjacent to Cumberland Road within 20m of the proposed site access. These stops provide connections into Littlehampton, Worthing, Rustington, Bognor Regis, Arundel and Chichester. Service number 9 routes via the Weavers Hill stops and provides an hourly service between Littlehampton and Worthing from Monday to Saturday.
- 2.13 The stops on Water Lane are served by route numbers E, X4 and 84 and provide infrequent services to Rustington, Bognor Regis, Worthing and Chichester. Service E provides 1 service per day in each direction on a Monday and Wednesday. Service X4 provides 1 service per day in each direction on a Wednesday and Service 84 provides 2 services per day in each direction from Monday to Friday and 1 service per day on a Saturday.
- 2.14 A summary of the bus routes serving the site is provided within **Table 1** and the locations of the closest bus stops are shown on **Figure 2**. The route of the main number 9 service is shown in **Appendix 2**.

Table 1: Bus Services in the Vicinity of the Site

No.	Stop	Route	Weekday						Weekend	
			Frequency (per hour)				Time		Frequency (per hour)	
			AM Peak	Off Peak	PM Peak	Evening	First Service	Last Service	Sat	Sun
9	Weavers Hill	Littlehampton - Angmering - Worthing - Lancing - Holmbush Centre	1 Service	Hourly	1 Service	Hourly	0814	1916	Hourly	No Service
E	Water Lane	Rustington (Sainsbury's) - Storrington	1 per day each direction on Mon and Weds only				1125	1320	No Service	No Service
X4	Water Lane	Bognor Regis - Angmering - Holmbush Centre	1 per day each direction on Weds only				1024	1316	No Service	No Service
84	Water Lane	Worthing - Clapham - Arundel - Chichester	2 services per day in each direction				0649	1844	1 service each way	No Service

Source: Traveline

2.15 The location of Angmering rail station has been described above. This is shown on **Figure 2**. The number 9 bus service provides direct access to the railway station. This service operates during the weekday peak periods. This station has cycle parking for 46 cycles. Angmering is on the Littlehampton to Brighton to London line and has regular services throughout the day Monday to Saturday in each direction. This service is operated by Southern Railway.

2.16 The following table summarises the train services at Angmering station:

Table 2: Train Services

Operator	Route	Weekday						Weekend	
		Frequency (per hour)				Time		Frequency (per hour)	
		AM Peak	Off Peak	PM Peak	Evening	First Service	Last Service	Sat	Sun
Southern	London and Brighton to Shoreham by Sea, Worthing and Littlehampton	4 per hour	4 per hour	4 per hour	4 per hour	0550	2350	4 per hour	3 per hour
Southern	Littlehampton, Worthing and Shoreham by Sea to Brighton and London	6 per hour	4 per hour	4 per hour	4 per hour	0510	2347	4 per hour	3 per hour

Source: Southern Railways – 23 May to 11 December 2010 timetable, Southern Railways website

Highway Safety

- 2.17 Personal Injury Accident (PIA) data was obtained from Sussex Police for the adjoining road network for the most recent three year period for which the data was available, 1 June 2007 to 31 May 2010. A summary of the PIAs in terms of their location and severity is shown in **Figure 3**. Full PIA details are provided in **Appendix 3**.
- 2.18 The study area included Station Road and Water Lane between the A259 and A280 as well as High Street, Roundstone Lane and the A280 between the A27 and the A259. The study area also included the junctions of the A27/A280, the B2140/A259 and the A280/A259 as shown within **Figure 3**.
- 2.19 During the three year period, there were a total of 49 PIAs in the study area, seven of which resulted in slight injuries and 42 of which resulted in slight injury. There were no fatal injury accidents within the study area during the three year period. Nine injury accidents involved pedal cycles, six involved pedestrians, five involved motorcycles and one involved a HGV. 14 of the injury accidents involving vulnerable road users were slight injury accidents and six were serious injury accidents.

- 2.20 The seven serious injury accidents occurred at six different locations with four serious accidents occurring along the A259 and two occurring along the A280. Two occurred at the roundabout of the B2225 and A259. One of these accidents involved a collision between two vehicles entering the roundabout from the eastbound A259 and the other involved a cyclist being struck by a vehicle as they turned right from Roundstone Lane onto the A259. A serious accident occurred on the A259 at the roundabout with the A280 and involved a cyclist being struck from behind by a vehicle. Another serious accident occurred on the A259 between the A280 and Station Road and involved a head on collision between an overtaking vehicle and an oncoming vehicle.
- 2.21 A serious accident occurred on Station Road and involved a pedestrian crossing into the path of an oncoming vehicle. A further serious accident occurred on the A280 on the approach to the A27 westbound slip road, this involved a speeding motorcycle losing control. The remaining injury accident occurred on the A280 and involved a rear end shunt between a vehicle braking to turn right and the following vehicle.
- 2.22 There were two clusters of four or more accidents. The first cluster of six accidents occurred at the Water Lane/A280 junction. Four of the PIA's resulted from rear end shunts between vehicles exiting the junction from Water Lane, one PIA was the result of a collision between a right turning vehicle into Water Lane and an oncoming vehicle and the remaining injury accident was the result of a rear end shunt between a vehicle turning left into Water Lane and the following vehicle. All of the injury accidents at this junction were slight injury accidents.
- 2.23 The second cluster of injury accidents was at the roundabout of Station Road / A259. Although 11 accidents occurred at the roundabout just four are considered as an accident 'cluster' which were approximately 50 to 75 metres east of the roundabout on the westbound carriageway of the A259. These four accidents involved two cyclists and two pedestrians and all resulted from oncoming vehicles colliding with the cyclists/pedestrians crossing the A259. All accidents resulted in slight injuries.

2.24 There were no injury accidents at the site access and there were no fatalities within the three year period assessed. It is therefore concluded that there is no evidence of any safety deficiencies on the local highway network in the vicinity of the site that may be exacerbated as a result of the proposed development.

Existing Traffic Flows

2.25 Peak hour classified turning counts have been undertaken at the following junctions on Thursday 8th July 2010:

1. Water Lane/A280 priority junction;
2. A27/A280 dumbbell roundabouts;
3. A280/A259 roundabout.

2.26 Further 24 hr link flow information has been provided by WSCCHA for the A280 at a point north of the Water Lane junction.

2.27 The results of the surveys are attached as **Appendix 4** and summarised in **Figures 4** and **5** for the AM and PM peak hours respectively.

SECTION 3: PROPOSED DEVELOPMENT

Site Layout

- 3.1 The proposed development comprises up to 190 dwellings and 2,300sqm GFA of B1 office development. An indicative site plan is attached as **Appendix 5**.

Site Access

- 3.2 The main vehicular site access comprises a priority junction on the southern side of Water Lane, approximately 200m west of the A280/Water Lane junction. The layout of this access is shown in **Figure 6**. No pedestrian facilities are proposed adjacent to this access since all pedestrian movements are expected to be to and from Angmering village. The vehicular access has been located to minimise the potential environmental impact of the access on the watercourse on the southern side of Water lane and to meet relevant visibility standards. It is necessary to remove approximately 50m of existing hedgerow on the southern side of Water Lane to achieve visibility of 59m to left and right at the access from 2.4m back from the stopline in accordance with West Sussex County Council's Design Guide based on vehicle speeds of 37mph. The existing hedgerow is of poor quality and it is proposed that it will be reinstated at the back of the visibility splays.
- 3.3 It is expected that speed surveys will be undertaken on Water Lane at the detailed design stage to confirm the required visibility to left and right.
- 3.4 The proposed vehicular access on water Lane has been submitted to the Environment Agency (EA) for comment. The EA response is attached as **Appendix 6**. It can be seen that the EA have a preference for a clear span bridge rather than a culvert and have noted that the access would require flood defence consent from the Environment Agency since it is within 8m of the Black Ditch that is classified as a 'main river'.
- 3.5 An additional vehicular access is proposed on Weavers Hill. This is located 120m south of the Weaver's Hill/Water Lane junction. This is shown in **Figure 7**.

SECTION 4: TRANSPORT IMPACT OF PROPOSED DEVELOPMENT

Trip Generation Rates

4.1 The TRICS (Trip Rate Information Computer System) 2010(b) database has been used to derive peak hour and daily trip generation rates for the proposed development. The following criteria have been used to select appropriate sites within the TRICS database:

Residential:

- Sites with between 50 and 200 dwellings;
- All private housing;
- In edge of town / town centre or suburban areas locations;
- In the south of England excluding Greater London

Employment:

- B1 office sites with gross floor areas under 5,000sqm;
- In edge of town / town centre or suburban areas locations;
- In the south of England excluding Greater London;

4.2 The application of the above selection criteria yields 6 residential sites and 7 B1 office employment sites. The relevant site details are provided in **Appendix 7**. The trip generation rates resulting from an analysis of the observed rates at the selected sites are summarised in the following table:

Table 3: Trip Generation Rates

Light Vehicles	AM Peak 08:00-09:00			PM Peak 17:00-18:00			12 Hr (07:00-19:00)		
	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot
Residential	0.143	0.373	0.516	0.342	0.179	0.521	2.511	2.586	5.097
B1 Office	1.835	0.236	2.071	0.329	1.624	1.259	6.733	6.554	13.287
Heavy Vehicles	AM Peak 08:00-09:00			PM Peak 17:00-18:00			12 Hr (07:00-19:00)		
	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot
Residential	0.002	0.002	0.004	0	0	0	0.016	0.015	0.031
B1 Office	0.006	0.006	0.012	0	0	0	0.048	0.048	0.096
All Vehicles	AM Peak 08:00-09:00			PM Peak 17:00-18:00			12 Hr (07:00-19:00)		
	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot
Residential	0.145	0.375	0.52	0.342	0.179	0.521	2.527	2.601	5.128
B1 Office	1.841	0.242	2.083	0.329	1.624	1.259	6.781	6.602	13.383

4.3 The application of the above trip generation rates to the proposed development gives the following vehicle trip generation:

Table 4: Trip Generation

Light Vehicles	AM Peak 08:00-09:00			PM Peak 17:00-18:00			12 Hr (07:00-19:00)		
	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot
Residential (190units)	28	71	99	65	34	99	477	491	968
B1 Office (2,300sqm GFA)	42	6	48	8	37	45	155	151	306
Total	70	77	147	73	71	144	632	642	1,274
Heavy Vehicles	AM Peak 08:00-09:00			PM Peak 17:00-18:00			12 Hr (07:00-19:00)		
	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot
Residential (190units)	0	0	0	0	0	0	3	3	6
B1 Office (2,300sqm GFA)	0	0	0	0	0	0	1	1	2
Total	0	0	0	0	0	0	4	4	8
All Vehicles	AM Peak 08:00-09:00			PM Peak 17:00-18:00			12 Hr (07:00-19:00)		
	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot
Residential (190units)	28	71	99	65	34	99	480	494	974
B1 Office (2,300sqm GFA)	42	6	48	8	37	45	156	152	308
Total	70	77	147	73	71	144	636	646	1,282

Trip Distribution and Assignment

4.4 Trips have been distributed according to the observed travel to work movements surveyed as part of the 2001 Census. Trips have been assigned according to the most convenient routes. The results are summarised below:

- 0.5% to the north via the A280
- 11.4% to the north via the A280 and then west on the A27;
- 26.0% to the north via the A280 and then east on the A27;
- 13.7% west on Water lane into Angmering (local traffic).
- 23.6% to the south-east. Trips from the main site access on Water Lane are split between those that travel north on the A280 to u-turn at the southern A27 dumbbell to travel south and then turn east on the A259 and those that use Titnore Lane to travel to the east from the southern dumbbell. From the Weavers Hill access it is assumed that traffic to the south-east travels south on Weavers Hill and Roundstone Lane and then east on the A259;
- 20.7% to the south west. This traffic is split equally between those travelling south on Weavers Hill and Roundstone Lane to turn right on the A259 at the Roundstone roundabout and those that travel west through Angmering to access the A259 at the Station Road roundabout.
- 2.6% to the south via the A280 and then the B2140 at the A280/A259 roundabout.

4.5 The assignment of development traffic is shown in **Figures 8** and **9** for the AM and PM peak hours respectively.

Future Year Flows

4.6 The surveyed 2010 traffic flows have been factored to 2013, the first possible year of full occupation using TEMPRO. The resulting future year base traffic flows are shown in **Figures 10** and **11** for the AM and PM peak hours respectively.

4.7 WSCCHA have requested that further assessments are undertaken for a further future year 2021, 10 years after the possible registration of the planning application. The factored flows are shown in **Figures 12** and **13** for the AM and PM peak hours respectively.

Committed Development

- 4.8 WSCCHA have advised that traffic associated with major development at West Durrington should be taken into account in assessing the impact of the proposed development. Traffic associated with this development has been derived from information available on the Arun planning website. The associated traffic flows on the local highway network are shown in **Figures 14** and **15** for the AM and PM peak hours respectively.
- 4.9 The future year flows with committed development are shown in **Figures 16** and **17** for the AM and PM peak hours in 2013 and **Figures 18** and **19** for the AM and PM peak hours for 2021.

Future Year Flows with Development

- 4.10 Future Year Flows with Committed and Proposed Development are shown in **Figures 20** and **21** for the AM and PM peak hours in 2013 and **Figures 22** and **23** for the AM and PM peak hours in 2021.

Operational Assessments

- 4.11 Operational assessments have been undertaken for the AM peak hour (08:00-09:00) and PM peak hour (17:00-18:00) for the future year situations without and with the proposed development at the following junctions:
1. Site Access/Water Lane priority junction;
 2. Water Lane/A280 priority junction;
 3. A27/A280 dumbbell roundabouts;
 4. A280/A259 roundabout.
- 4.12 The priority junction on Weaver's Hill has not been operationally assessed since both the site generated traffic and the background traffic flows on Weaver's Hill are significantly less than those at the Main site access junction on Water Lane.

4.13 The site access junction and the Water Lane/A280 junction have been operationally assessed using the PICADY computer program. The A27/A280 dumbbell roundabouts and the A280/A259 roundabout have been operationally assessed using the ARCADY computer program. Details of the operational assessments are attached as **Appendix 8**. The results are summarised below:

Table 5: Results of Operational Assessment of Site Access/Water Lane Priority Junction

Link	2013 with Committed Development				2013 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
Site Access	N-A				0.165	0	0.185	0
Right into Site	N-A				0.050	0	0.051	0

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

Link	2021 with Committed Development				2021 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
Site Access	N-A				0.170	0	0.194	0
Right into Site	N-A				0.064	0	0.058	0

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

4.14 It can be seen that the proposed site access on Water Lane operates well within capacity in both the opening year and in 2021 with all maximum queues less than 1 vehicle.

4.15 The following table summarises the results of the operational assessment of the Water Lane/A280 junction:

Table 6: Results of Operational Assessment of Water Lane/A280 Priority Junction

Link	2013 with Committed Development				2013 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
Water Lane left out	0.567	1	0.313	1	0.641	2	0.383	1
Right into Water Lane	0.363	1	0.667	2	0.405	1	0.710	2

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

Link	2021 with Committed Development				2021 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
Water Lane left out	0.639	2	0.354	1	0.714	2	0.426	1
Right into Water Lane	0.410	1	0.752	3	0.453	1	0.797	4

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

4.16 It can be seen that The Water Lane/A280 junction operates well within capacity in both 2013 and 2021 with the proposed development.

4.17 The following table summarises the results of the operational assessment of the A27/A280 Dumbbell North Roundabout:

Table 7: Results of Operational Assessment of A280/A27 Dumbbell North Roundabout

Link	2013 with Committed Development				2013 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
A27 from West	0.348	1	0.325	1	0.356	1	0.333	1
Arundel Road	0.100	0	0.117	0	0.102	0	0.119	0
A280	0.398	1	0.571	1	0.402	1	0.583	1
A280 from Southern dumbbell	0.559	1	0.475	1	0.573	1	0.488	1

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

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Link	2021 with Committed Development				2021 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
A27 from West	0.400	1	0.371	1	0.409	1	0.379	1
Arundel Road	0.127	0	0.101	0	0.131	0	0.149	0
A280	0.452	1	0.626	2	0.457	1	0.664	2
A280 from Southern dumbbell	0.618	2	0.527	1	0.632	2	0.540	1

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

4.18 It can be seen that all arms on the northern A27 dumbbell roundabout operate within capacity in 2013 and 2021 with the proposed development. The maximum queue length is 2 vehicles on the A280 north during the PM peak hour and on the A280 from the southern dumbbell during the AM peak hour in 2021 both without and with the proposed development.

4.19 The following table summarises the results of the operational assessment of the A27/A280 Dumbbell South Roundabout:

Table 8: Results of Operational Assessment of A280/A27 Dumbbell South Roundabout

Link	2013 with Committed Development				2013 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
A280 from North	0.611	2	0.873	6	0.617	2	0.880	7
A27 from East	0.190	0	0.201	0	0.202	0	0.215	0
B2700 Titnore lane	0.331	1	0.372	1	0.335	1	0.378	1
A280 Water Lane	0.470	1	0.362	1	0.494	1	0.385	1

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

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TRANSPORT ASSESSMENT**

Link	2021 with Committed Development				2021 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
A280 from North	0.679	2	0.968	18	0.686	2	0.976	20
A27 from East	0.222	0	0.241	0	0.235	0	0.257	0
B2700 Titnore lane	0.378	1	0.442	1	0.383	1	0.449	1
A280 Water Lane	0.536	1	0.415	1	0.560	1	0.439	1

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

4.20 It can be seen that most arms on the southern A27 dumbbell roundabout operate within capacity in 2013 and 2021 with the proposed development. The link road between the two roundabouts (A280 north) is seen to be operating around capacity in the PM peak period in 2013 both without and with the proposed development. The situation is worsened in 2021 with the addition of background traffic growth. The proposed development is shown to increase the maximum queue on this arm during the PM peak period by 1 vehicle in 2013 and 2 vehicles in 2021.

4.21 The following table summarises the results of the operational assessment of the A280/A259 Roundabout:

Table 9: Results of Operational Assessment of A280/A259 Roundabout.

Link	2013 with Committed Development				2013 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
A280 Angmering Bypass	0.403	1	0.430	1	0.415	1	0.439	1
Minor Access Road	0.000	0	0.000	0	0.000	0	0.000	0
A259 Littlehampton Road	0.490	1	0.683	0	0.497	1	0.690	2
Minor Access Road	0.000	0	0.000	0	0.000	0	0.000	0
B2140 Old Worthing Road	0.414	1	0.208	0	0.419	1	0.212	0
A259 Roundstone Bypass Road	0.939	12	0.842	5	0.948	13	0.847	5

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

Link	2021 with Committed Development				2021 with Committed and Proposed Development			
	AM		PM		AM		PM	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
A280 Angmering Bypass	0.478	1	0.515	1	0.487	1	0.525	1
Minor Access Road	0.000	0	0.000	0	0.000	0	0.000	0
A259 Littlehampton Road	0.548	1	0.767	3	0.555	1	0.775	3
Minor Access Road	0.000	0	0.000	0	0.000	0	0.000	0
B2140 Old Worthing Road	0.492	1	0.254	0	0.497	1	0.259	0
A259 Roundstone Bypass Road	1.060	66	0.940	12	1.068	71	0.946	13

RFC: Ratio of Flow to Capacity
Max Q: Maximum queue length

4.22 It can be seen that most arms of the A280/A259 roundabout operate within capacity in 2013 and 2021 both without and with the proposed development. The A259 approach from the west is shown to be operating at capacity during the AM peak hour in 2013 and slightly under capacity during the PM peak hour in 2013. The addition of development traffic increases the queue on this arm by one vehicle during the AM peak hour in 2013. Development traffic is not predicted to change the queue length during the PM peak hour in 2013. In 2021 the situation on this arm is worsened as a result of background traffic growth and committed development traffic. The arm is shown to be over capacity during the AM peak hour and at capacity during the PM peak hour. It should be noted that during the AM peak hour when the proposed development has maximum impact at this point in the network the increase in hourly traffic flows is 4 vehicles or one vehicle every 15 minutes. This is a negligible level of impact and the results of the modelling exercise should be treated with caution.

Impact on the Centre of Angmering

4.23 **Figures 8 and 9** show development traffic on the local highway network during the AM and PM peak hours. For the purposes of assessing the impact of the development, 90% of traffic to Angmering itself is assigned along Water Lane through the centre of the village and 10% along Weavers Hill and Roundstone Lane. Vehicle movements to and from areas accessed via the A259 west have

been split 50:50 between Water Lane and Roundstone Lane. The assumption is that traffic to and from areas further to the west is split between the Roundstone Lane and Station Road roundabouts.

- 4.24 On this basis the proposed development is predicted to lead to an increase of 34 vehicle movements through the centre of the village during the AM peak hour and an increase of 33 vehicle movements through the centre of the village during the PM peak hour. This equates to one additional vehicle movement approximately every 2 minutes during the peak hours. It should be noted that the majority of these movements are associated with local trips from the new development to other areas within Angmering. If trip from the new development to areas outside of Angmering are considered the impact is significantly reduced to one additional trip every 4 minutes during the peak hours. On the basis on this assessment it is concluded that the proposed development will have a negligible impact on the centre of Angmering.
- 4.25 The following section identifies measures that will reduce vehicle trip generation at the proposed development, particularly for shorter and local trips.

SECTION 5: MITIGATION OF TRANSPORT IMPACT

Site Location and Layout

- 5.1 The site has been designed to maximise opportunities for travel on foot and by bicycle between the site and local facilities. The main vehicular access is on Water Lane thus making most journeys to the centre of Angmering quicker and more convenient on foot or by bicycle. The route through the site is limited to pedestrians, cyclists and emergency vehicles. The Details of distances between the site and local facilities are provided above.
- 5.2 The proposed development lies adjacent to a number of bus routes that provide access to surrounding facilities and urban areas.

Travel Plan

- 5.3 A travel plan will accompany the residential element of the development. A Framework Travel Plan has been prepared and discussed with WSCCHA at a meeting on 15th December 2010. WSCCHA confirmed that the Travel Plan prepared for discussion at the meeting was welcomed and was considered of a high quality. A number of suggested amendments have been made to the version that is attached as **Appendix 9**.
- 5.4 The targets of the Travel Plan are:
- **Target 1:** To reduce the number of vehicle trips generated over a 12 hour period (Weekday 7am to 7pm) by the site by a minimum of 10%. This target assumes that the general character of the site location is rural.
 - **Target 2:** To reduce the peak hour trip rate of a development to ensure that there is no material impact on the surrounding network.
- 5.5 The key elements of the Travel Plan comprise the following:
- The development will have a Travel Plan Coordinator who will have

responsibility for delivering and monitoring the Travel Plan.

- Every household will be provided with information on walking and cycling routes, bus services and routes, rail services and opportunities for car sharing.
 - Every household will be provided with a sustainable travel incentive payment that could be used to purchase clothing or equipment to assist with walking and cycling or for public transport use.
 - All households will be provided with high quality cycle parking facilities.
 - Local bus stops will be improved.
 - The development will provide an electric vehicle charging point and the cost of use will be subsidised for residents for an agreed period.
 - The feasibility of a car club or a comparable system whereby residents will be able to conveniently gain access to a vehicle if needed at modest cost will be explored.
 - The Travel Plan Coordinator will explore other ways of achieving reduced car ownership and greater efficiency of vehicle use within the development.
- 5.6 The Travel Plan will be monitored at agreed times using approved survey methods and the results provided to the Highway and Planning Authorities for review.
- 5.7 The applicant will meet the costs incurred to WSCCHA in the course of review activities.
- 5.8 It is expected that the implementation of the Travel Plan will achieve the main target of a 10% reduction in daily vehicle trip generation. The junction operational assessments reported above assume full trip generation rates. The level of impact will be reduced as a result of the implementation of the Travel Plan.
- 5.9 The proposed introduction of a car club or similar system of shared vehicle access and use will achieve significant benefits in terms of reducing car ownership,

reducing parking demand, reducing vehicle trip generation and reducing network km travelled by car. Studies have shown that those who join a car club undertake roughly half the network vehicle km of those who are not members. A single car club car can reduce overall car ownership by at least 14 vehicles. It would be reasonable to assume that the car club or similar arrangement would be available for residents outside of the proposed development within Angmering. The benefits would therefore be multiplied and the achievement of targets would underestimate the overall transport benefit of the measures brought forward as part of the development.

- 5.10 The proposed electric charging point will provide an incentive for those within the development to own and use electric cars and again will facilitate the wider take up of new technology vehicles in line with current guidance and policy.

Junction Improvements

- 5.11 The results of the operational assessments do not suggest that any specific junction improvements are required to accommodate the proposed development other than the proposed new access points on Water Lane and Weavers Hill.
- 5.12 The eastbound A259 arm on the A280/A259 roundabout during the AM peak hour is shown to be operating over capacity in 2021 with committed and proposed development. The proposed development adds one additional vehicle movement every 15 minutes to this arm of the junction during the AM peak hour. This level of impact is negligible and does not, in itself justify any junction improvements. The committed development at West Durrington generates twice the vehicle movements as the proposed development on this arm of the junction during the AM peak hour. It is understood that no improvements at this junction have been offered as part of the West Durrington proposals. It should be noted that vehicles from the proposed development also have an alternative route through this junction avoiding the congested arm by using the A280 east of the site.

SECTION 6: CONCLUSION

- 6.1 This Transport Assessment considers the impact of the proposed development of up to 190 dwellings and 2,300sqm gross floor area of B1 office development on land south of Water Lane, Angmering.
- 6.2 It is proposed to provide a main vehicular access to the development on Water Lane. A second vehicular access serving around 40 dwellings is proposed on Weavers Hill. No vehicular link will be provided between the two access points.
- 6.3 The site layout will maximise opportunities for pedestrian and cycle movements between the site and the surrounding facilities. Angmering provides a range of local facilities including shops, pubs, a garden centre, schools, medical facilities, other services and employment.
- 6.4 Bus stops are located on Water Lane a little more than 100m from the edge of the site and less than 400m from the centre of the site and on Weavers Hill immediately adjacent to the site and within 300m from the centre of the site. Bus frequencies are around one per hour. Bus routes connect to surrounding urban areas (including Littlehampton and Worthing).
- 6.5 Angmering train station lies approximately 2km from the site. The station provides around 4 services per hour in each direction (Littlehampton-Worthing-Shoreham-Brighton-London). The main bus service provides access to the train station.
- 6.6 The impact of the proposed development has been assessed for the years 2013 (earliest site occupation) and 2021 (ten years after planning application registration) at a number of junctions on the local highway network. Operational assessments indicate that the proposed development can be accommodated on the surrounding highway network without causing unacceptable queues or delays. These operational assessments are based on trip generation rates predicted in the absence of the proposed Travel Plan for the site.
- 6.7 The proposed development will have a negligible impact on the centre of

Angmering.

- 6.8 A Framework Travel Plan has been prepared for the development. This identifies a number of measures to encourage sustainable travel. The Travel Plan has been discussed with the Highway Authority who are pleased with its detail, content and scope. The Travel Plan is expected to reduce the impact of the proposed development and to offer benefits to the wider community in Angmering.
- 6.9 It is concluded that there are no highways or transport reasons for objecting to the proposed development.

FIGURES

APPENDICES

APPENDIX 1: Scoping Discussions

APPENDIX 2: Bus Routes

APPENDIX 3: Details of Personal Injury Road Traffic Accidents

APPENDIX 4: Details of Traffic Surveys

APPENDIX 5: Indicative Site Plan

APPENDIX 6: EA Comments on Proposed Vehicular Access

APPENDIX 7: TRICS Data

APPENDIX 8: Details of Junction Operational Assessments

APPENDIX 9: Framework Travel Plan