

Purbeck Development Testing

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1.0 Introduction

CH2M has been commissioned by Highways England to carry out an assessment of traffic impact arising from proposed development at Purbeck on behalf of Purbeck District Council. CH2M has used the 2017 A35 Paramics Discovery traffic model for the basis of the testing. The A35 Paramics model covers the trunk road network from the Monkey Jump roundabout to the A35/A354 junction at Puddletown, as shown in Figure 1.

Other junctions on the SRN that have the potential to be impacted on by the proposed development in Purbeck District – namely at Bere Regis, Roundhouse and Lake Gates – are assessed in a report produced by Systra on behalf of the District Council.

Figure 1: A35 Paramics Discovery Model Network Coverage



2.0 Purpose

The purpose of the modelling is to:

- Assess the traffic impact on the trunk road network arising from the 'Alternative Option 2ea: maximise housing in north east Purbeck' proposed land allocation/development; and
- Assess the traffic impact on the trunk road network arising from the 'Alternative Option 3fd: maximise housing in south west Purbeck' proposed land allocation/development.

The scenarios tested comprised of the following quanta of development:

- Scenario a = 77 homes;
- Scenario d = 244 homes;
- Scenario e = 0.7ha employment;
- Scenario f = 1.9ha employment.

3.0 Modelled scenarios

The following model scenarios have been assessed:

- 2017 Base;
- 2033 Do-minimum (future year base);
- 2033 Development 2ae;
- 2033 Development 2de; and
- 2033 Development 3fd.

The modelled time periods are:

- AM Weekday Peak Period: 07:00-10:00; and
- PM Weekday Peak Period: 16:00-19:00.

One committed infrastructure change has been added to the future year models. At the Max Gate junction, the right turn movement from the A352 to the A35 northbound has been barred.

The forecast of traffic growth to the 2033 Do-minimum scenario has been prepared based on WebTAG parameters for a low growth scenario. The core forecast based on TEMPRO would have been for growth of 16% between 2017 and 2033. Initial testing with growth of 16% indicated that the network would experience high levels of congestion, in the PM period this caused the network to gridlock on some runs. It was therefore considered that a lower growth forecast should be used in order to obtain sensible results from the model.

A low growth scenario has been prepared based on guidance contained in WebTAG UNIT M4 'Forecasting and Uncertainty'. This forecast gives a growth in traffic of 6% between the 2017 base and the 2033 Do-minimum (future year base) scenario.

Traffic demand associated with the proposed land allocations at Purbeck has been added to the three development models in addition to the 6% background growth.

The trip matrix totals for each of the modelled scenarios are shown in Table 1. The development trips have been added to the model between the A352 (zone 14) and the A35 East (Zone 26).

Table 1: Overall Model Trip Demand

	AM (07:00-10:00)			PM (16:00-19:00)		
	Non-Development Trips	Development Trips	% Increase Due to Development Trips	Non-Development Trips	Development Trips	% Increase Due to Development Trips
2017 Base	20,685	-	-	20,414	-	-
2033 Do-Minimum	21,926	-	-	21,638	-	-
2033 Development 2ae	21,926	410	1.9%	21,638	667	3.1%
2033 Development 2de	21,926	414	1.9%	21,638	655	3.0%
2033 Development 2fd	21,926	325	1.5%	21,638	580	2.7%

4.0 Test results

Journey time data and queue length data has been recorded from the Paramics model.

As the model covers a wide area on the A35 and development trips make up a relatively small proportion of overall demand, data has been recorded for the specific areas of the network affected by development trips.

Modelled journey time data has been collected for two routes:

- A35 from the west of Monkey Jump roundabout to the east of the A35/A354 junction; and
- A352 to the east of the A35/A354 junction.

Journey time data for the AM peak hour is shown in Table 2.

Table 2: AM Peak (08:00-09:00) Journey Time Comparison (Seconds)

Route	2017 Base	2033 Do-Minimum	2033 Development		
			2ae	2de	3fd
A35 Eastbound	708	768	808	819	787
A35 Westbound	718	750	798	821	801
A352 to A35 East	490	673	684	695	683
A35 East to A352	493	508	505	500	505

The data in Table 2 indicates that the addition of development trips will have a relatively minor impact on journey times on the A35 route, with increases of up to 50 seconds eastbound and up to 71 seconds westbound against do-minimum values of around 750 seconds. This is an increase in journey time of up to 9%.

For the 'A352 to A35 East' journey time route, the closure of the right turn movement, from the A352 to the A35 eastbound, for all future year scenarios results in a significant increase in journey time. This occurs as traffic now has a longer route when making this journey. The increase in journey time on the A352 to A35 route with the development in place is less significant, with journey times increasing by around 10 to 22 seconds, depending on scale of development.

Journey time data for the PM peak hour is shown in Table 3.

Table 3: PM Peak (17:00-18:00) Journey Time Comparison (Seconds)

Route	2017 Base	2033 Do-Minimum	2033 Development		
			2ae	2de	3fd
A35 Eastbound	617	635	649	638	637
A35 Westbound	829	1,163	1,190	1,207	1,179
A352 to A35 East	532	1,119	1,160	1,233	1,143
A35 East to A352	452	451	467	451	462

The pattern of journey time increases in the PM shows a limited change on the longer A35 route. However, there are major increases on the A352 to A35 eastbound route for all future year scenarios. This occurs due to the barring of the right turn and the requirement for traffic to travel westbound on the A35 before doubling back on itself. There is a rolling queue westbound on the A35 as it approaches the A35/A354/B3147 roundabout. This contributes to the increased journey times for traffic making the movement from the A352 to the A35 East.

Queue data for the AM peak hour at the A35/A352 junction is shown in Table 4.

Table 4: AM Peak (08:00-09:00) Queue Length Comparison (no. of Vehicles)

Junction	Approach Arm	2017 Base	2033 Do-Minimum	2033 Development		
				2ae	2de	3fd
A35/A352 Priority Junction	A352	10	5	9	10	7
	A35 South	6	6	5	6	5

The data in Table 4 shows that the model forecasts an increase in maximum queue length of under 5 vehicles between the modelled scenarios on the A352 as it approaches the A35, with the introduction of the development. The closure of the right turn movement, from the A352 to the A35 eastbound, means that the future year models all show lower queuing on this arm than the base model, as traffic is not delayed by right turning movements.

The queue on the A35 right turn ghost island remains relatively stable in terms of maximum length.

Queue data for the PM peak hour at the A35/A352 junction is shown in Table 5.

Table 5: PM Peak (17:00-18:00) Queue Length Comparison (no. of Vehicles)

Junction	Approach Arm	2017 Base	2033 Do-Minimum	2033 Development		
				2ae	2de	3fd
A35/A352 Priority Junction	A352	9	17	46	35	37
	A35 South	7	10	29	14	11

The queue data for the PM period shows greater increases in queuing than the AM with an increase in maximum queue on the A352 side arm of around 30 vehicles (170% increase on the do-minimum), as well as an increase in queuing on the A35 south arm of around 20 vehicles (190% increase on the do-minimum). This reflects blocking back from the A35/A354/B3147 roundabout in the 2033 modelled scenario. With the right turn from the A352 to the A35 being barred in the future year models, traffic now has to head westbound on the A35 in the model. This leads to increase in the westbound queue on the A35 in the 2033 with development scenario. At times, the rolling queue extends back to the A35/A352 junction and impedes traffic from entering and existing the A352.

A full queue comparison is shown in Appendix A for all of the scenarios tested and all junctions within the model.

5.0 Summary

The A35 Paramics Discovery model has been used to test the potential traffic impact of proposed developments at Purbeck for a 2033 future year scenario. The development trips access the network via the A352. This route forms a priority junction with the A35. In all the future year scenarios, the right turn from the A352 to the A35 at the Max's Gate junction is barred.

In the do-something scenarios, development trips lead to an increase in overall demand of around 2 to 3%. This increase in trips has a minor impact on the operation of the A35. Within the PM period, the development trips do however have a noticeable impact on the A352 as it approaches the A35 with queue length increases of up to 30 vehicles (170% increase). For this movement, the impact of the development is small compared to the impact of the planned closure of the right turn movement, from the A352 to the A35 northbound, which will result in a major increase in journey time for traffic from the A352 to the A35 for all future year scenarios, particularly in the PM peak period.

Appendix A

AM Peak:

Junction ID	Approach	Maximum Queue AM (08:00-09:00)															
		Base		Do Nothing (DN)		Dev 2AE		Dev 2AE minus DN		Dev 2DE		Dev 2DE minus DN		Dev 3FD		Dev 3FD minus DN	
		Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max
J1	A35 West	28	21	52	39	63	50	11	11	60	49	8	10	53	42	1	3
J1	A37	20	17	49	36	50	37	2	1	49	39	0	3	49	39	0	2
J1	B3150	5	4	6	5	5	4	-1	0	6	4	0	0	6	5	0	0
J1	A35 East	27	25	47	34	61	46	14	11	59	49	11	14	63	47	15	13
J1	Unnamed Rd	10	8	18	12	18	13	-1	1	15	11	-4	-1	15	11	-3	-1
J2	B3150	3	2	3	2	3	2	0	0	3	2	0	0	3	2	1	0
J2	Peverell Ave W	3	2	3	2	3	3	0	0	3	3	0	0	3	3	0	0
J2	Bridport Rd	1	1	2	1	2	1	0	0	1	1	-1	0	2	1	0	0
J2	Middle Farm Way	2	2	2	2	3	2	0	0	2	2	0	0	2	2	0	0
J3	B3147 Weymouth Rd	4	4	5	4	4	4	-1	0	4	4	0	0	4	4	-1	0
J3	A35 East	8	8	12	10	10	10	-1	0	11	10	-1	0	10	9	-2	-1
J3	A354 Monkton Hil	39	30	59	57	60	59	2	2	61	59	3	2	61	59	2	2
J3	A35 West	11	11	12	11	12	11	0	0	14	12	2	1	13	11	1	0
J7	A35 North	8	7	15	10	12	9	-4	-2	10	8	-5	-2	13	9	-2	-2
J7	Hollow Hil	3	2	3	2	3	2	0	0	3	2	0	0	3	2	0	0
J7	A35 South	11	10	12	10	11	10	-1	0	13	11	1	1	12	11	0	1
J7	B3150 Stinsford Hill	14	11	16	14	15	13	-1	-1	15	14	-1	0	17	15	1	1
J8b	A354 North	2	1	2	2	2	1	0	-1	2	1	0	0	2	1	-1	-1
J8b	B3142	2	1	2	2	2	2	0	0	2	1	0	0	2	1	0	-1
J8b	A354 South	0	0	2	1	0	0	-2	-1	2	2	0	1	2	1	0	0
J8b	A35 EB Slip	3	2	4	3	4	3	0	0	4	3	0	0	4	3	0	0
J8a	A354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
J8a	A35 WB Slip	2	2	2	1	2	1	0	0	2	2	0	0	2	2	0	0
J8a	The Moor	2	1	2	1	2	1	0	0	2	2	0	0	2	1	0	0
J4	A352	10	9	5	5	9	8	3	3	10	8	5	3	7	7	2	2
J4	A35 South	6	5	6	6	5	5	-1	-1	6	5	1	0	5	5	-1	-1

PM Peak:

Junction ID	Approach	Maximum Queue PM (17:00-18:00)															
		Base		Do Nothing (DN)		Dev 2AE		Dev 2AE minus DN		Dev 2DE		Dev 2DE minus DN		Dev 3FD		Dev 3FD minus DN	
		Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max	Maximum	Average Max
J1	A35 West	5	4	6	4	6	4	0	0	6	5	0	1	5	4	-1	0
J1	A37	10	7	12	9	15	9	3	1	12	9	1	0	14	5	3	-4
J1	B3150	14	13	15	14	15	14	0	0	15	14	0	0	15	73	0	59
J1	A35 East	59	46	71	47	67	43	-4	-4	76	50	5	3	69	2	-3	-45
J1	Unnamed Rd	2	2	2	2	2	2	0	0	2	2	0	0	2	1	0	-2
J2	B3150	2	1	1	1	2	1	0	0	2	1	1	0	2	1	1	0
J2	Peverell Ave W	3	2	3	2	3	2	0	0	3	2	0	0	3	0	0	-2
J2	Bridport Rd	2	1	2	1	2	1	0	0	2	2	0	0	2	6	0	4
J2	Middle Farm Way	52	39	54	52	55	54	1	1	54	53	0	0	55	5	1	-48
J3	B3147 Weymouth Rd	13	8	28	19	27	19	-1	0	37	23	9	5	31	46	4	28
J3	A35 East	40	32	57	55	58	56	1	1	57	56	1	1	56	6	-1	-49
J3	A354 Monkton Hil	8	7	8	7	7	7	-1	0	9	7	1	0	9	7	2	0
J3	A35 West	12	10	12	11	13	11	0	0	12	11	0	0	14	4	2	-7
J7	A35 North	4	4	4	4	4	4	0	0	4	4	0	0	4	2	0	-2
J7	Hollow Hil	7	4	8	4	7	3	-2	0	10	4	2	1	8	7	0	3
J7	A35 South	9	8	12	9	10	9	-2	-1	12	10	0	1	10	59	-2	50
J7	B3150 Stinsford Hill	42	32	65	55	70	63	4	8	69	62	4	7	71	1	6	-54
J8b	A354 North	2	1	1	1	2	1	0	0	2	1	1	0	2	2	1	1
J8b	B3142	2	2	2	1	1	1	-1	0	1	1	-1	0	2	2	0	1
J8b	A354 South	2	1	1	0	1	0	0	0	0	0	-1	0	2	3	1	3
J8b	A35 EB Slip	4	3	4	4	4	4	0	0	4	3	0	0	4	0	0	-4
J8a	A354	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
J8a	A35 WB Slip	2	1	1	1	2	1	1	0	2	1	1	1	2	2	1	1
J8a	The Moor	2	1	1	1	2	1	0	0	2	1	1	0	1	29	0	28
J4	A352	9	7	17	12	46	27	29	16	35	22	18	10	37	6	20	-6
J4	A35 South	7	6	10	8	29	18	19	10	14	10	4	2	11	0	1	-8



Site ID	Site Description	Easting	Northing
J1	A35/A37 Roundabout Junction	366706	090361
J2	B3150/Bridport Road Junction	366842	090391
J3	A35/B3147 Roundabout Castle Park	368518	089031
J4	A352 Roundabout Junction	370732	089626
J5	A35/ B3144 Max Gate Junction	370464	089795
J6	B3144/Buckingham Way Roundabout Junction	370230	089952
J7	Stinsford Roundabout	370869	091227
J8a	A35/A354 Northbrook Puddletown South	375947	094940
J8b	A35/A354 Northbrook Puddletown North	375991	095077