

4 Forecasting

The base year models have been developed to assist in forecasting the likely impacts of a number of development proposals in the Newport area and to inform the suitability of the highway strategy for Newport developed during the previous stages of work. The assessments were undertaken for a forecast year 2020.

4.1 Forecasting assumptions

4.1.1 Development growth

The development assumptions were provided by the Isle of Wight Council in May 2010. These include some sites which were completed between 2007 and 2010 and proposed developments until 2020. The development locations include Cowes, East Cowes and Newport.

Table 4.1 shows the housing units completed between 2007 and 2010.

Table 4.1: Completions between 2007 and 2010

	07/08	08/09	09/10	Total
Carisbrooke	25	5	5	35
Rest of Newport	47	140	41	228
Cowes	139	45	37	221
East Cowes	18	84	68	170

Source: Isle of Wight Council

All residential developments have been assumed to have trip generation rates extracted from the TRICS database. The details are appended as **Appendix H** to this document. The trip rates applied to housing are shown in **Table 4.2**. The trip rates for the development sites in Cowes were adjusted to include only trips which travelled to Newport, and were based on the existing distribution of Cowes traffic.

Table 4.2: Trip Rates for Housing Developments

Location	AM in	AM out	PM in	PM out
Newport	0.10	0.40	0.33	0.17
Cowes/ East Cowes	0.00	0.10	0.11	0.00

Source: Based on TRICS database

Tables 4.3 and 4.4 show the development locations, their proposed size and the number of trips generated for developments between 2010 and 2020.

Table 4.3: Development Trips Option 1

Site Name	Number of Housing Units (2010-2020)	Trips			
		AM in	AM out	PM in	PM out
School Ln / Staplers Rd	91	9	37	30	15
Fieldfare Rd	66	7	27	21	11
Medina Ave	18	2	7	6	3
Morey's site	57	6	23	19	9
Nelson Rd	21	2	8	7	3
Prison Estates	300	30	121	98	50
23 Mill Street	13	1	5	4	2
North of Westminster Lane	217	21	87	71	36
Pan	846	84	340	275	140
Partridge Rd	54	5	22	18	9
Worsley Rd	450	45	181	146	75
Various sites within East Cowes	1142	0	118	121	0
Various sites within Cowes	317	0	33	34	0
118-120 Gunville Rd	11	1	4	4	2
Land at Pyle Street & South Street	69	7	28	22	11
32-36 Lugley Street	12	1	5	4	2
15-17 St James Street	50	5	20	16	8
Post offic counters ltd	12	1	5	4	2
Land at 69a-87 Gunville Road	55	5	22	18	9

Table 4.4: Employment Development

Site Name	Development Trip Generation (2010-2020)	Trips			
		AM in	AM out	PM in	PM out
West Medina Mills	AM 101 arrivals + 25 departures; reverse in PM	101	25	25	101

4.1.2 Matrix growth

The completions for Newport and Carisbrooke were added to the base year 2007 matrices. For the forecast developments new zones were created in the SATURN network to add the additional trips. A comparison of the growth based on the development sites versus the growth forecasted in TEMPROv6.1 was undertaken. The Department for Transport maintain the TEMPRO database, which estimates traffic growth rates for each local authority district in the UK. **Table 4.8** shows that the growth in the development matrices is larger compared to the growth forecast with TEMPRO. No adjustments were made to the development matrices.

Table 4.5: TEMRPO Growth Comparison

		2007	2020	
		Base	Development Matrix	TEMPRO
Matrix Total	AM	9552	10944	10527
Growth			1.146	1.102
Matrix Total	PM	10004	11385	11034
Growth			1.138	1.103

4.1.3 Future year highway networks

Two highway scenarios have been modelled, namely:

- Do Minimum: As the 2007 base network, but with a new link between Mill Street and Foxes Road in place.
- Do Something: As the Do Minimum plus the full highway strategy, including the closure or significant constraint of High Street entry to Coppins gyratory, changes to St George's and Medina Way approaches to Coppins gyratory, signalisation of Forest Road / Parkhurst Road junction enabling all movements to take place, changes to layout at Hunny Hill / Hunnycross Way junction, signalisation of River Way roundabouts and signalisation of southbound Medina Way slip road.

Network diagrams corresponding to each of the above scenarios are presented as **Figures 4.1 to 4.2** below

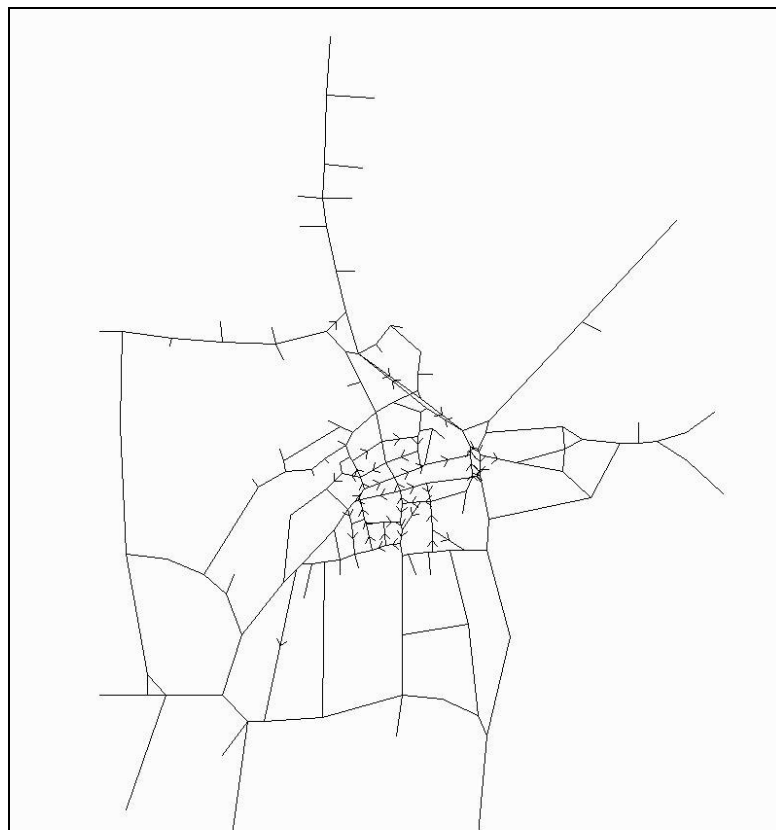


Figure 4.1: Do Minimum highway network



Figure 4.2: Do Something highway network

More detailed junction plans corresponding to the Do Something option, together with the detailed analysis of the operation of this scenario, are presented in **Section 5**.

4.2 Forecasting methodology

SATURN assignments have been run for 2020 AM and PM peak for Do Minimum and Do Something. The demand matrices remained the same for the Do Minimum and Do Something scenarios.

In addition to the SATURN model, detailed junction assessments have been carried out for the Do Something scenario using the appropriate junction modelling software for each of the junctions affected by the scheme. The results of these have been fed back into the SATURN models to obtain a more realistic representation of junction operation at the key junctions and their effects on route choice within SATURN. The results of these assessments are discussed in more detail in **Section 5**.

4.3 Forecasting Results

4.3.1 Do Minimum results

Previous work has identified Coppins gyratory, St Mary's roundabout, River Way roundabouts and Hunny Hill / Hunnycross Way junctions as the key locations within Newport where high delays are expected in 2020. The forecast levels of delays from the Do Minimum SATURN model show delays of almost three minutes per pcu for the southbound approach at St Mary's roundabout and over two minutes for the northbound approach to Coppins gyratory for AM peak. In the PM peak the southbound approach to St Mary's roundabout shows four minutes delay and almost five minutes are forecast for Coppins Gyratory.

At Hunny Hill/ Hunnycross Way junction delays are close to two minutes for the southbound and eastbound approaches in the AM peak.

These significant operational problems forecast at the key junctions in Newport in 2020, confirm the conclusions of previous assessments. The following section shows the extent of contribution to these problems by each of the proposed developments.

4.3.2 Development-related effects

Figure 4.3 shows the routes taken by the development traffic in the Do Minimum AM peak in 2020.



Figure 4.3: Development traffic AM routes

This shows that development traffic impacts on all the key junctions in Newport, with over 500 vehicles routeing through St Mary's, just less than 500 vehicles routeing through Coppins gyratory and around 250 vehicles routeing through Hunny Hill / Hunnycross Way junction in the AM peak. The impact of such large additional volumes of traffic on the operation of these junctions is clearly going to have significant implications on the routes taken by other traffic and consequently on the levels of congestion in Newport as a whole.

Table 4.5 shows the impact of each of the proposed developments on the three key areas of Newport, in the Do Minimum and Do Something scenarios for 2020.

Table 4.6: AM 2020 Development Associated Flows (pcus) Through Key Junctions

AM 2020	2020 DM			2020 DS		
	Coppins	St Mary's	Hunnycross Way	Coppins	St Mary's	Hunnycross Way
School Ln / Staplers Rd	24	12	2	25	13	2
Fieldfare Rd	5	2	3	5	3	6
Medina Ave	3	2	0	4	3	0
Morey's site	4	7	1	4	8	7
Nelson Rd	1	2	1	1	3	3
Prison Estates	43	45	49	42	84	7
23 Mill Street	1	1	2	1	2	2
North of Westminster Lane	24	23	36	24	30	55
Pan	180	95	11	191	123	5
Partridge Rd	8	21	1	8	16	2
West Medina Mills	26	72	3	25	69	24
Worsley Rd	63	71	68	62	102	19
Various sites within Cowes	12	22	1	12	18	2
118-120 Gunville Rd	1	1	1	1	1	1
Land at Pyle Street & South Street	22	10	1	13	10	6
32-36 Lugley Street	1	1	1	1	2	2
15-17 St James Street	6	6	4	6	8	8
Post Offic Counters Ltd	1	1	1	1	1	2
Land at 69a-87 Gunville Road	4	2	1	3	2	1
Various sites within East Cowes	113	58	5	116	60	5

Table 4.7: PM 2020 Development Associated Flows (pcus) Through Key Junctions

PM 2020	2020 DM			2020 DS		
	Coppins	St Mary's	Hunnycross Way	Coppins	St Mary's	Hunnycross Way
School Ln / Staplers Rd	37	12	1	36	13	0
Fieldfare Rd	6	5	3	5	1	3
Medina Ave	5	2	0	4	2	0
Morey's site	10	6	2	9	7	2
Nelson Rd	2	2	2	1	2	1
Prison Estates	35	47	45	36	91	14
23 Mill Street	2	1	3	1	2	2
North of Westminster Lane	21	17	49	20	27	24
Pan	297	111	12	179	104	1
Partridge Rd	6	18	4	6	18	4
West Medina Mills	19	92	32	21	78	42
Worsley Rd	50	37	86	53	38	20
Various sites within Cowes	14	24	1	15	26	0
118-120 Gunville Rd	1	1	0	1	1	0
Land at Pyle Street & South Street	31	9	1	31	10	0
32-36 Lugley Street	1	1	1	1	1	0
15-17 St James Street	7	4	8	7	7	2
Post Office Counters Ltd	1	1	1	1	1	1
Land at 69a-87 Gunville Road	5	4	2	3	1	2
Various sites within East Cowes	112	47	15	111	53	0

The tables confirm that forecast development is likely to have a significant effect on key junctions in Newport.

4.3.3 Analysis of traffic using the new link between Mill Street and Foxes Road

As mentioned earlier in this chapter, a scenario has been modelled which has a new link between Mill Street and Foxes Road in place. The following **Figures 4.4 and 4.5** show the distribution of traffic using the new link road for the AM and the PM in 2020. Total 2-way traffic using the new link road is forecast to be 600 vehicles/hour in the PM in 2020.

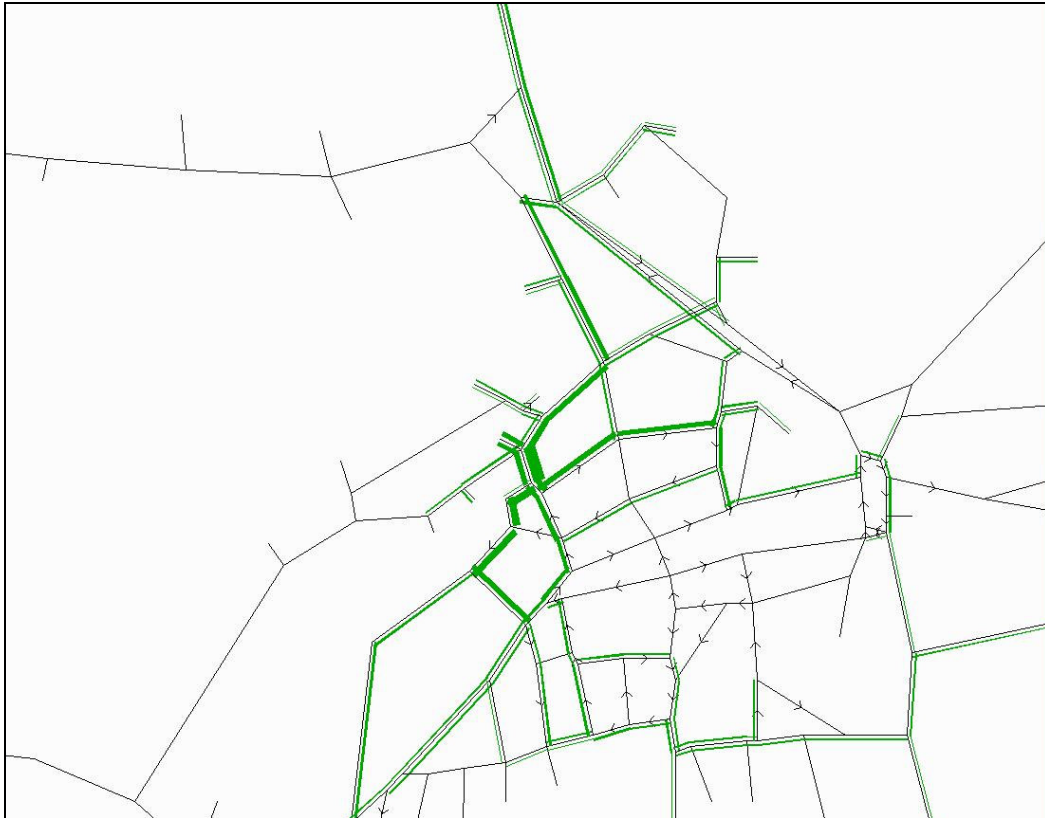


Figure 4.4: Routing of Link Road Traffic in AM 2020

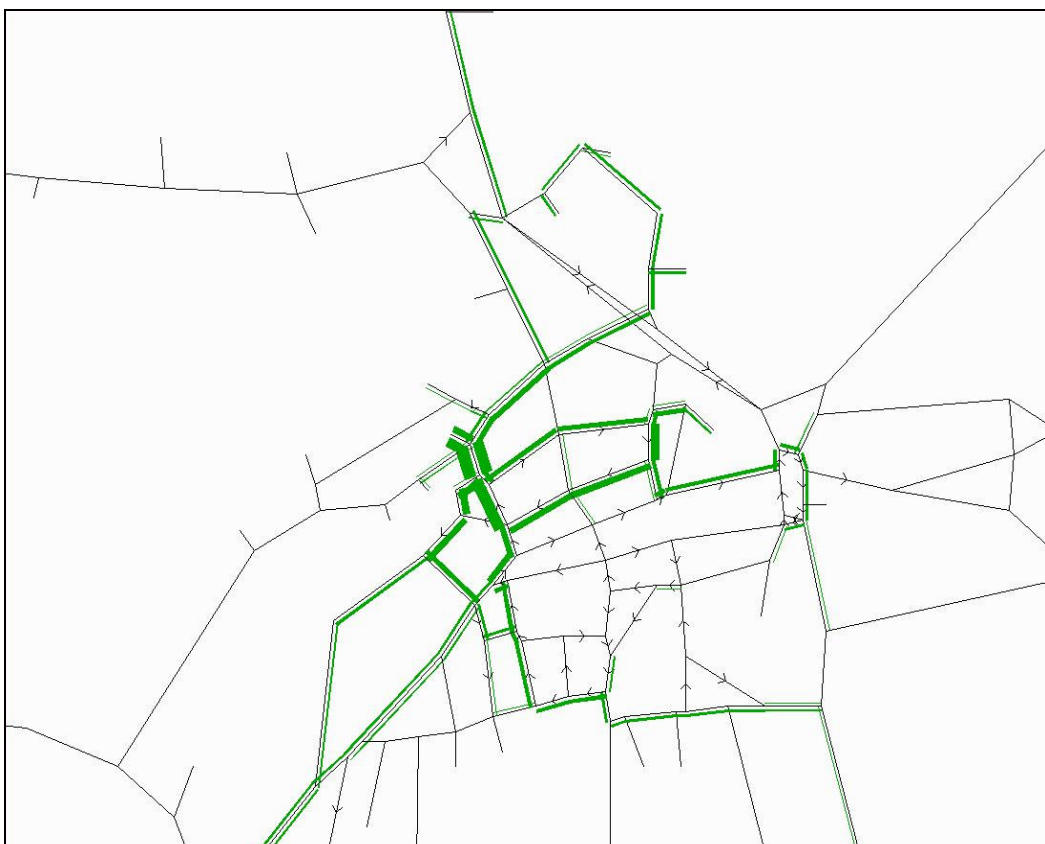


Figure 4.5: Routing of Link Road Traffic in PM 2020

5 Option Testing

5.1 Background

Previous work carried out for the Isle of Wight Council identified the following junctions as likely to be experiencing operational problems in 2020:

- Coppins Bridge gyratory;
- St Mary's roundabout;
- Hunnycross Way/Hunny Hill signals;
- St George's roundabout; and
- River Way/Hunnycross roundabouts.

A number of options were considered at each of these locations, with a view to identifying a scheme which would provide adequate capacity at these junctions in 2020. Because of the close proximity of many of these junctions and the likelihood of traffic reassigning as a result of any potential junction improvements, the scheme identification process was done iteratively, taking into account any changes on traffic flows caused by improvements elsewhere on the network. The problems at St George's roundabout were revealed as being caused by blocking back from Coppins gyratory and it was found that addressing the problems at Coppins gyratory would be sufficient to reduce the delays and improve the operation of St George's roundabout. The scheme that was proposed comprised the following measures:

- Coppins Bridge gyratory: closure or significant constraint of the High Street approach, widening of the approach from St George's Way and widening of the Medina Way approach. **Figure 5.1** shows the proposed layout at Coppins gyratory.
- St Mary's roundabout: realignment and widening of Parkhurs Road (W) approach and signalisation of the Forest Road junction, enabling all movements at this junction. **Figure 5.2** shows the proposed layout at this location.
- Hunnycross Way/Hunny Hill signals: provision of right turn flares at all arms of this junction. **Figure 5.3** shows the proposed layout of this junction.
- River Way/Hunnycross roundabouts: signalising both junctions, as well as the Medina Way southbound slip road, and lane gain along Medina Way southbound. **Figure 5.4** shows the proposed layout at this location.

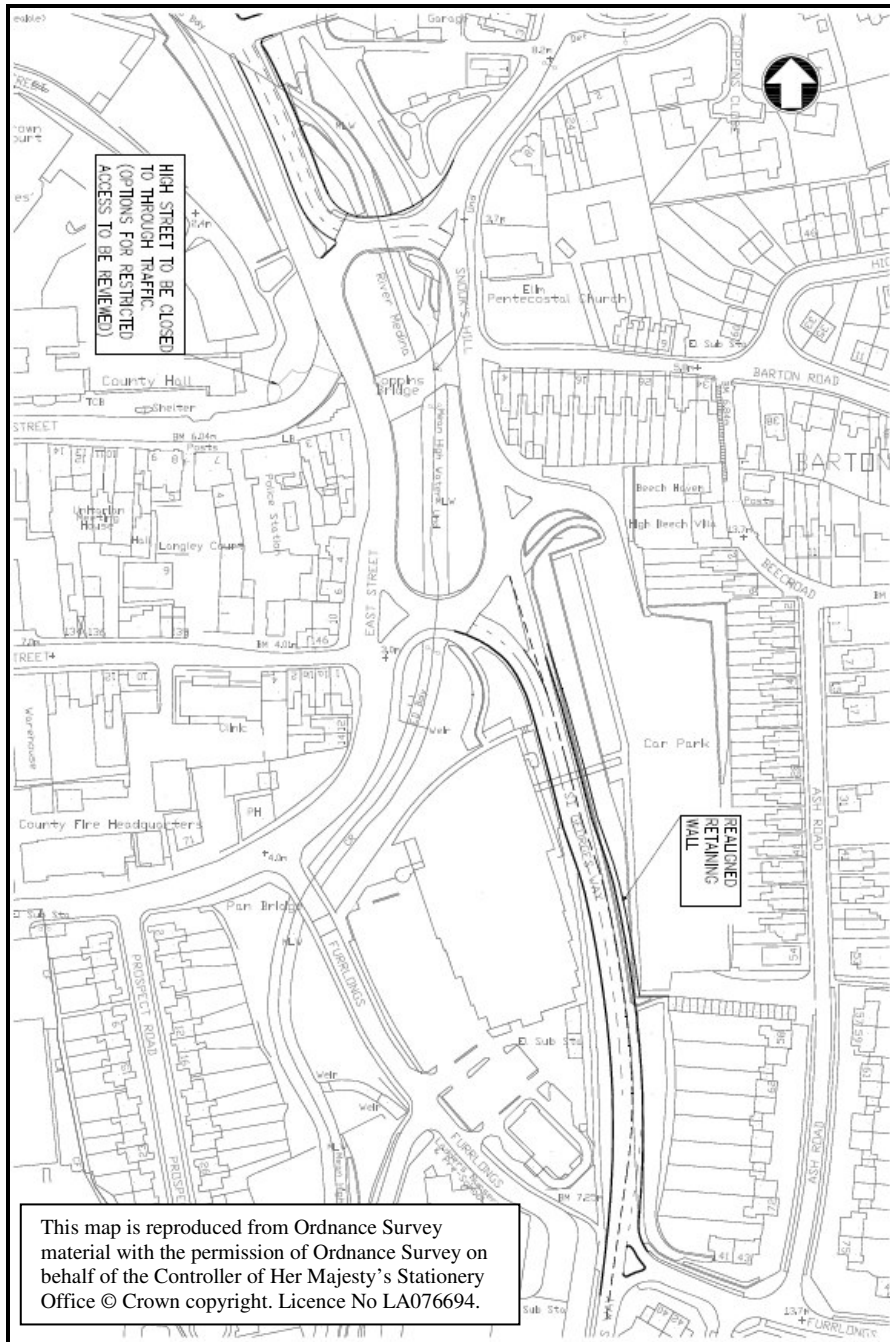


Figure 5.1: Coppins gyratory proposed layout

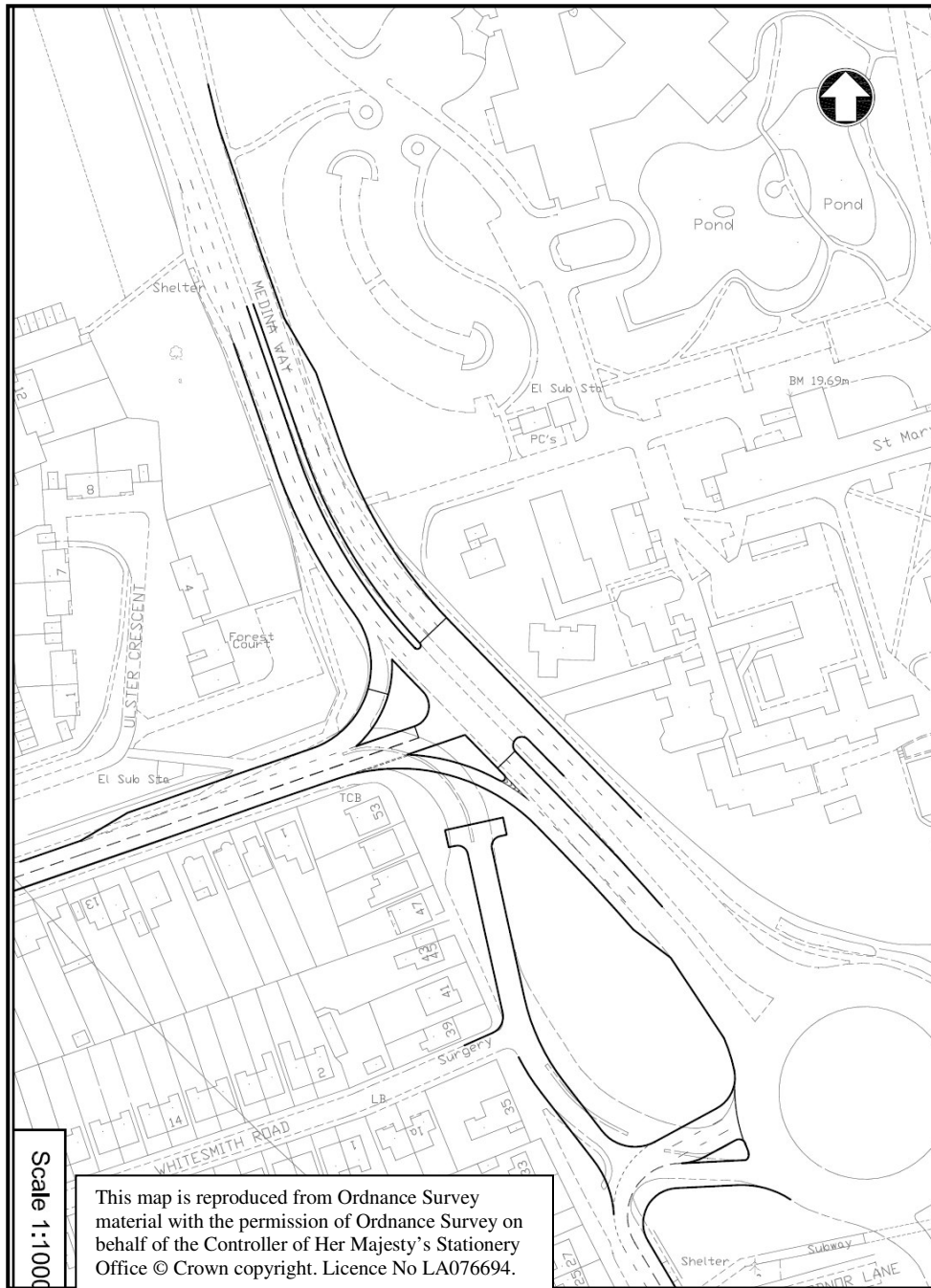


Figure 5.2: St Mary's roundabout proposed layout

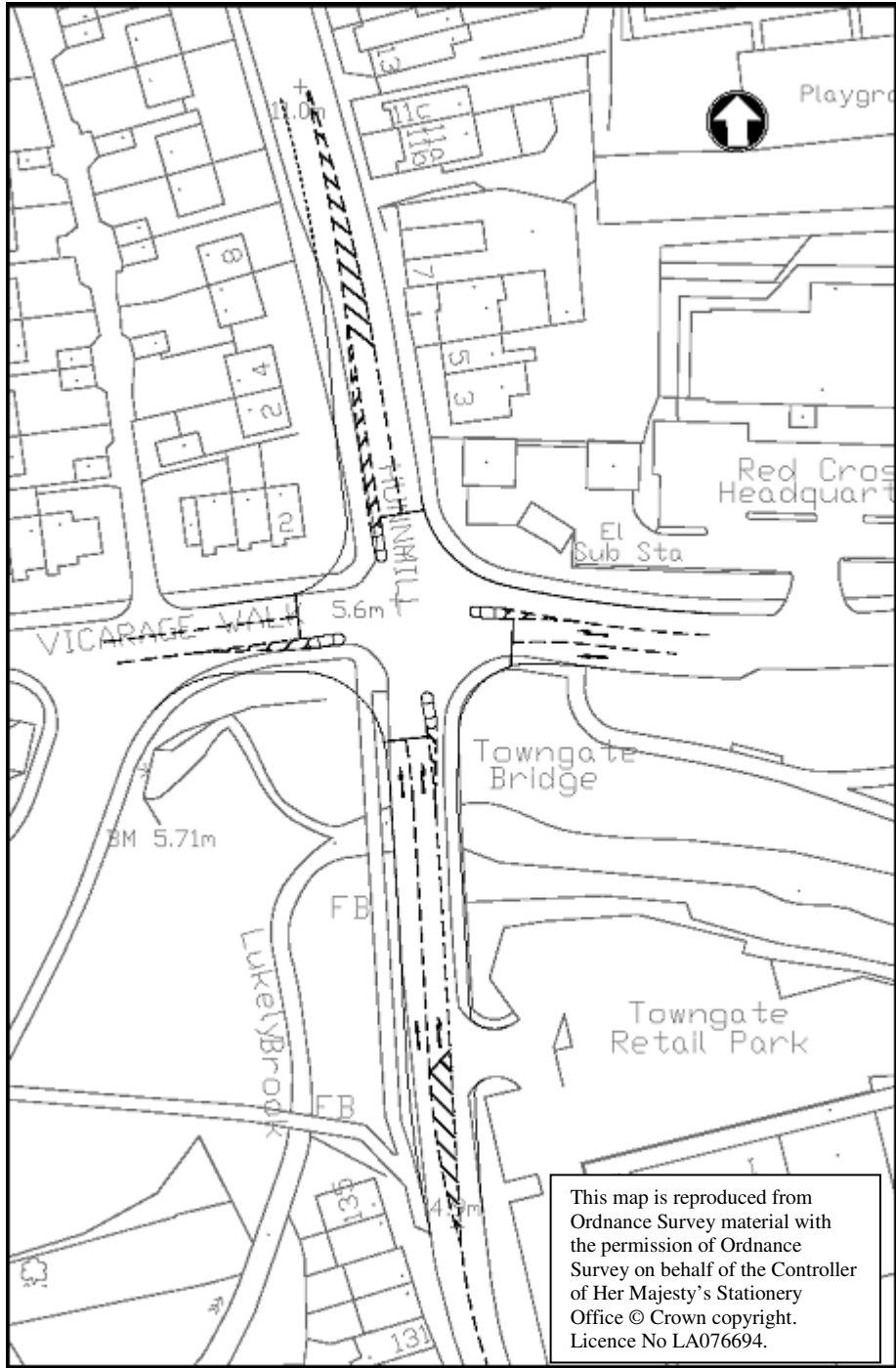


Figure 5.3: Hunnycross Way / Hunny Hill junction proposed layout

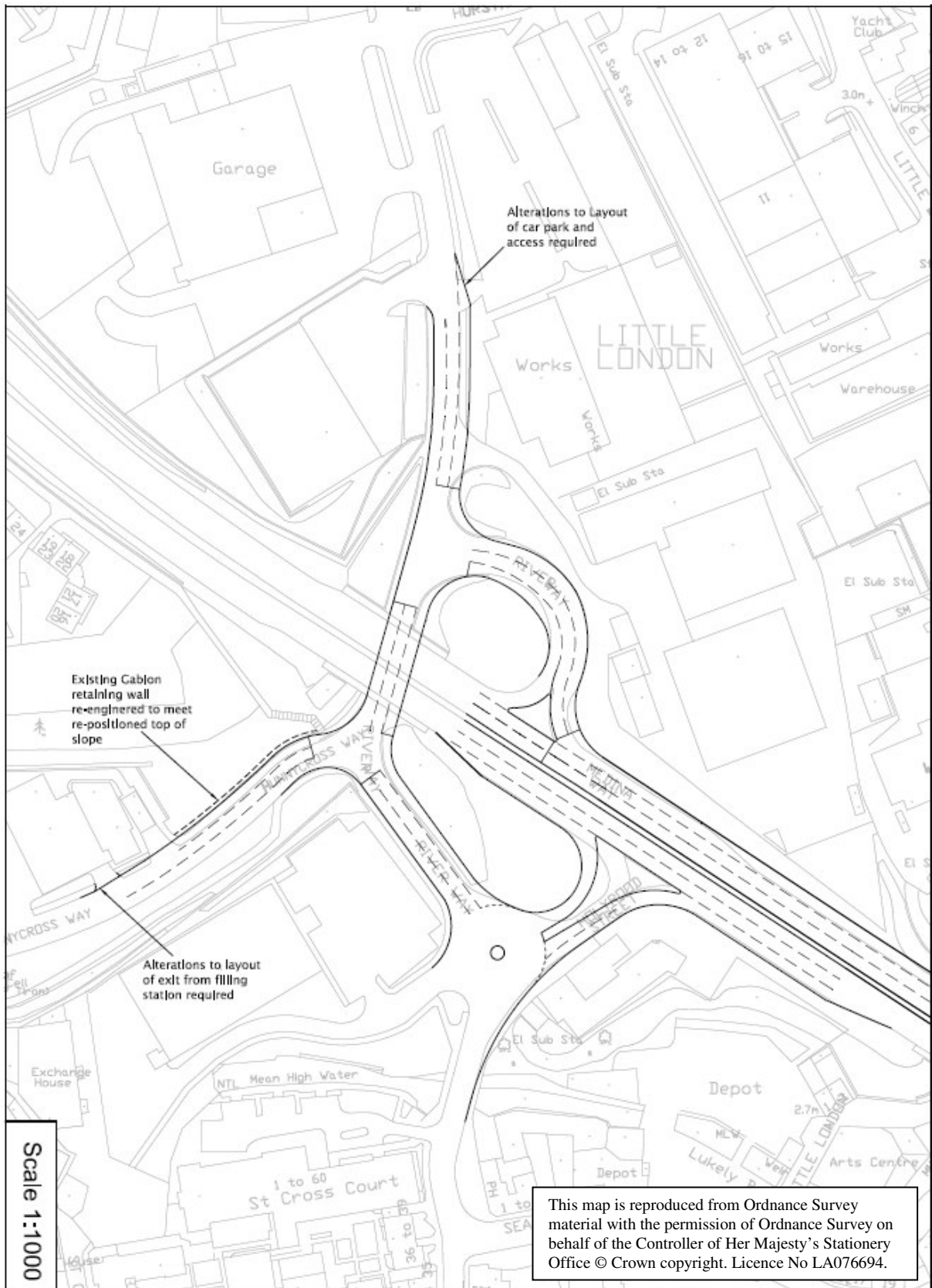


Figure 5.4: River Way junctions proposed junction layout

Each of these is now dealt with in turn, presenting the operational results for the junction with and without the scheme in place.

5.2 Coppins Gyratory

SATURN models indicate significant operational problems at this gyratory in the Do Minimum scenarios in 2020. The greatest problems in the AM peak are expected at the entries to the gyratory from the High Street and Staplers Road, and in the PM peak hour, capacity problems exist also on the approach from Fairlee Road as well as at the entries from the High Street and Staplers Road. Delays between one and two minutes/vehicle are forecasted at these locations.

With the scheme in place, these delays are significantly reduced. The Transyt assessments for AM and PM peak 2020 show that the gyratory operates well with the forecasted flow volumes. Only during the AM peak the traffic volumes from Fairlee Road and St Georges Street to Medina Road are close to capacity. Flows during the PM peak are forecasted within practical capacity. **Appendix I** contains the full results of these assessments and the link diagrams relating to the Do Something scenario.

Closure or significant constraint of the High Street entry forces the traffic to redistribute to alternative routes, as shown for the AM peak on **Figure 5.5** below. Routes chosen by traffic in the PM peak are broadly similar to those chosen in the AM peak. Some traffic could relocate to New Street and Chapel Street. To mitigate this, a new link through the Morey's site is included in the strategy.

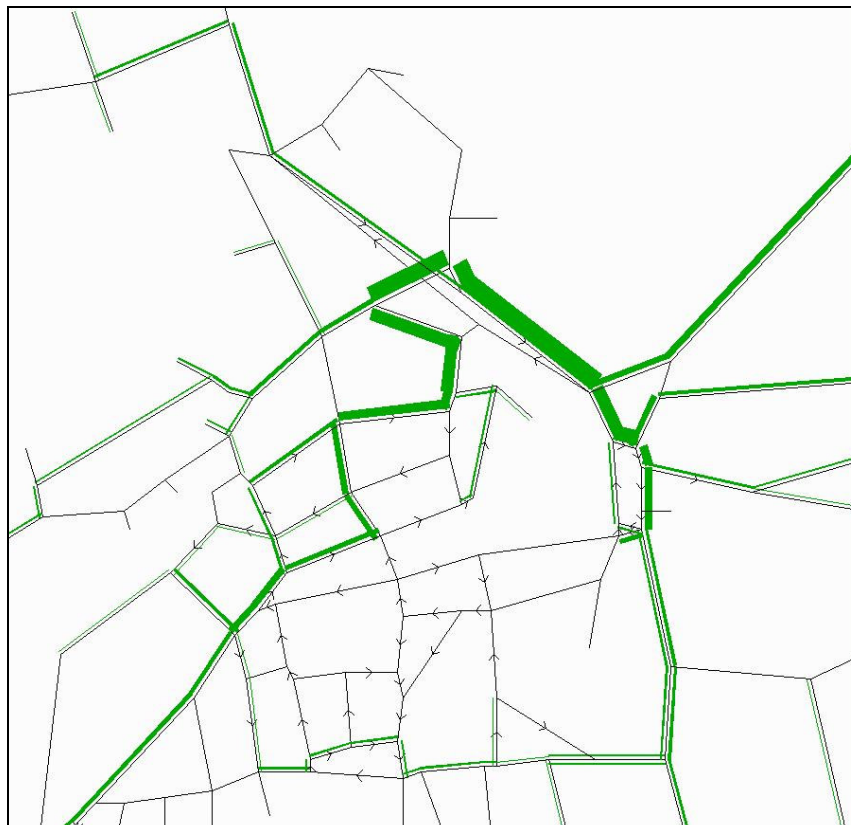


Figure 5.5: Routes chosen by traffic relocated away from High Street

From the figure above it can be seen that the junctions most likely to be affected by the proposed closure of the High Street entry are the River Way roundabouts underneath Medina Way and the Medina Way Approach to Coppins gyratory. As a complementary measure to this option, an improvement to the River Way roundabouts would be required, as discussed above in Section 5.1.

A further impact shown on the figure above is the increase in traffic flow through the Hunny Hill / Hunnycross Way signalised junction. This is in the region of around 100pcus going eastbound from Vicarage Walk in the AM peak hour. Crocker Street and Holyrood Street are also likely to experience large increases in traffic flow, around 300pcus on Holyrood Street in the AM peak hour and around 500pcu in the PM peak hour, impacting the River Way roundabouts, as described above.

5.3 St Mary's Roundabout

As part of the Do Something scheme described in the previous chapter, this option would retain the current layout of St Mary's roundabout with the western approach widened by an additional lane, close the Forest Road link to through traffic and signalise a new Forest Road / Parkhurst Road junction. Although initial impacts have been assessed using SATURN, SATURN is not best suited to modelling roundabouts and consequently this junction has been assessed in greater detail using ARCADY. The results for the Do Something options are presented in **Table 5.1** below.

Table 5.1: Arcady Results for St Mary's roundabout

Approach	2020 Do Something			
	AM Peak Hour		PM Peak Hour	
	RFC	Max Queue	RFC	Max Queue
N: Medina Way	0.98	14	1.02	40
E: Dodnor Lane	0.23	0	0.56	1
S: Medina Way	0.82	4	0.82	4
W: Forest Road	0.99	12	0.66	2

Although with the scheme, the Northern approach to the roundabout is close to or exceeds 100% saturation in AM and PM peak, respectively, this only occurs in the peak half hour of the peak period. The queues quickly dissipate to around 5 vehicles. There is only sufficient stacking space for around 80 vehicles between the roundabout and the signalised junction with Forest Road, hence even these are relatively high queues in the PM peak would not affect the operation of the upstream junction. Without the scheme, North and South approaches would be over capacity, with significantly higher queues when compared to the Do Something option.

The signalised junction with Forest Road has been assessed using Linsig. The results of this analysis are presented in **Table 5.2**. As this junction is signalised as part of the Do Something scheme, results are presented only for the Do Something option.

Table 5.2: Linsig Results for Forest Road junction

Approach	Turn	AM Peak Hour: ct=90s			PM Peak Hour: ct=87s		
		Av RFC (%)	MMQueue (vehs)	Delay s/pcu	RFC (%)	MMQueue (pcus)	Average Delay / vehicle (s)
N: Parkhurst Road	Ahead	50	17	16	67	26	14
	Right	82	6	88	88	11	68
S: Medina Way	Ahead	92	37	41	89	31	38
	Left	29	3	4	53	8	9
W: Forest Road	Right	91	18	54	87	13	56
	Left	33	5	15	15	2	11

The above results have been achieved with a 90s cycle time in the AM and 87s cycle time in the PM and the table shows that junction operates satisfactorily, with mean maximum queues within the available stacking space at the junction. The staging for this junction for the AM and PM peak periods is as shown on **Figures 5.6 and 5.7** respectively.

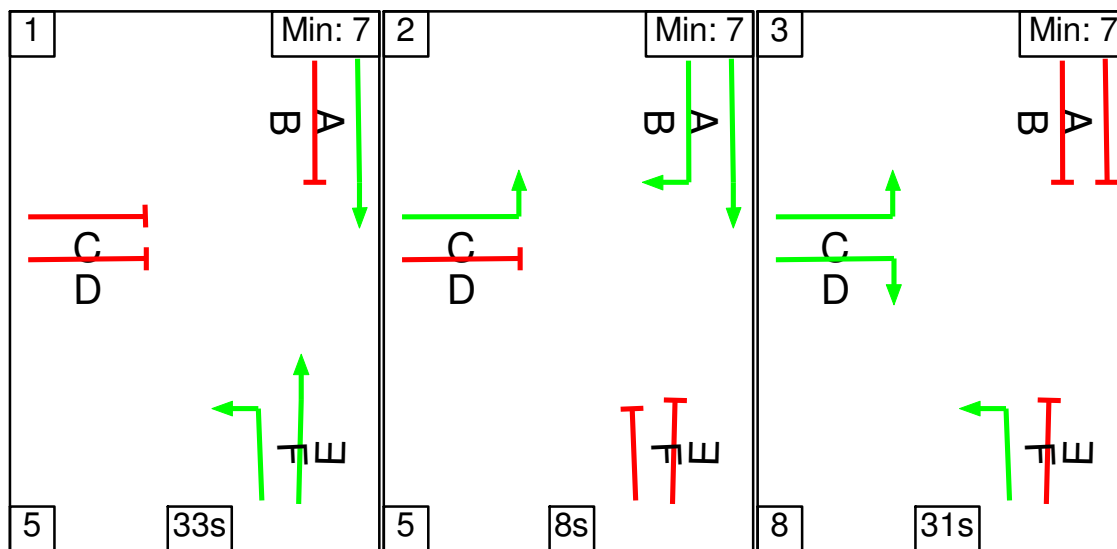


Figure 5.6: AM Stage sequence and duration

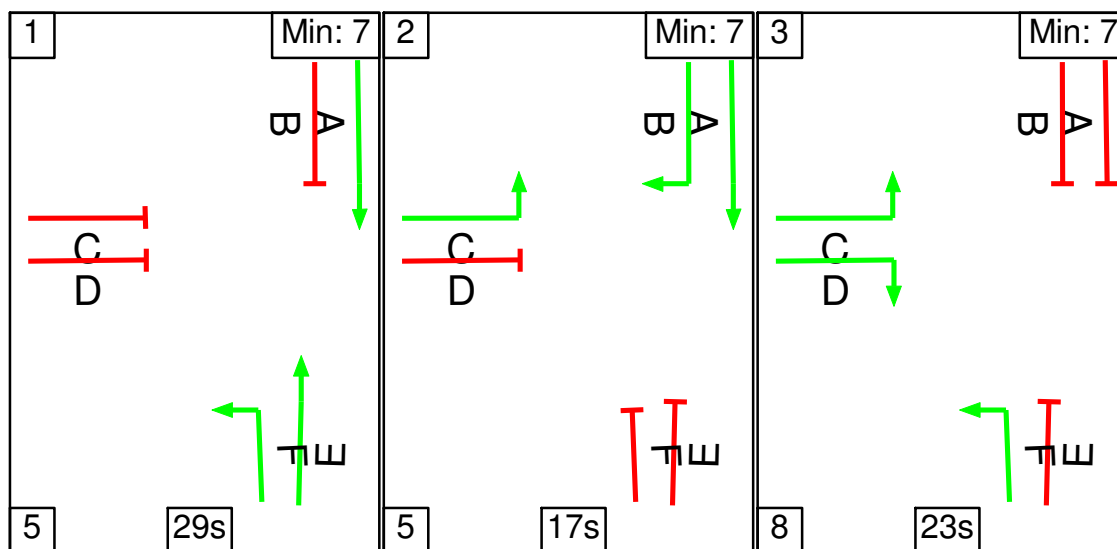


Figure 5.7: PM Stage sequence and duration

It should be noted that the reporting of queue lengths in **Tables 5.1** and **5.2** is not strictly comparable, with ARCADY reporting an average queue in a peak 15-minute period within the peak hour, whilst LINSIG gives the length, in pcus, of the mean maximum queue which often includes an element of queue build up whilst the front of the queue dissipates during the green time.

As shown in Table 5.1, queuing traffic would extend through the Forest Road junction from St Mary’s roundabout during the PM peak period and this means that the theoretical capacity at Forest Road predicted by LINSIG could not be achieved.

5.4 Hunnycross Way / Hunny Hill signals

The 2020 SATURN models show significant volumes of additional traffic causing delays at this junction in 2020 without improvement. This was primarily caused by diverting traffic as a consequence of closing the High Street entry to Coppins gyratory, which would need to pass through this junction as discussed in **Section 5.2**. The solution which had been developed includes the provision of specific right-turn lanes at all approaches to this junction, but without significant junction widening and undertaking major bridge reconstruction, the current bridge structure restricts the lane widths to a maximum 3.0m.

This junction has been optimised with LINSIG, for the Do Something AM and PM peak hours in 2020. The worst case scenario with the High Street entry to Coppins Bridge closed has been modelled. A pedestrian phase has been retained in all assessments. The resulting junction operation, in terms of RFC and mean maximum queues is presented in **Table 5.3** below.

Table 5.3: Linsig results for Hunnycross Way / Hunny Hill junction

Approach	Turn	2020 Do Something			
		AM Peak Hour		PM Peak Hour	
		RFC	MMQueue	RFC	MMQueue
Hunny Hill	Left, Ahead	12	1	21	3
	Right	67	5	84	9
Hunnycross Way	Left, Ahead	21	3	40	5
	Right	29	1	37	1
St James’s Street	Left, Ahead	78	8	79	10
	Right	1	0	3	0
Vicarage Walk	Left, Ahead	81	14	81	12
	Right	21	2	7	0

The above results were achieved with a 90s cycle time in the AM and PM.

Table 5.3 clearly indicates that benefits are achieved through the provision of the additional right turn lanes at this junction.

5.5 Hunnycross Way / River Way Roundabouts

As discussed in **Section 5.2**, closure of the High Street approach to Coppins gyratory causes traffic to re-route through these roundabouts, requiring a larger capacity increase than could be provided retaining the junctions as roundabouts. Signalising both junctions, as well as the southbound on-slip onto Medina Way, and widening some of the approaches, gives sufficient capacity to accommodate the additional High Street traffic.

The results show that the signalised junctions operate well in 2020. In the AM peak flows are well within capacity, while during the PM peak forecasts show that the increased flows are approaching a practical capacity limit with volumes over capacity of up to 88%. The capacity assessment for this option has been carried out in TRANSYT and the full TRANSYT results and TRANSYT link diagrams are appended as **Appendix J**.

5.6 Costing

A preliminary cost estimate was prepared previously in January 2007 for each of the outline junction improvements using work item rates that had been estimated through a comparison of rates submitted for improvement schemes under the Highway Agency's Framework Agreement for Area 3 (Hampshire, Surrey & West Sussex) and were reviewed against rates using 'SPONS' pricing data and adjusted as considered necessary.

To ensure these costs reflect current market conditions, they have been uplifted to Q1/2010 prices using a compound construction inflation rate of +16.2% as advised by the DfT, which closely aligns with cost indices adopted by MM construction cost specialists.

The updated cost estimate is presented in **Table 5.4** below.

Table 5.4: Option Costs (£) – Q1/2010 prices

NEWPORT, IOW : JUNCTION IMPROVEMENTS

Item	St Mary	Riverway	Riverway to Coppins	Coppins	St Georges Way	Hunny Cross Way	TOTAL
Site Clearance	3,000	0	2,000	0	3,000	0	8,000
Demolition	0	241,000	233,000	117,000	7,000	0	598,000
Earthworks	5,000	41,000	0	0	2,000	0	48,000
Pavements	240,000	251,000	71,000	104,000	142,000	98,000	906,000
Drainage	20,000	10,000	10,000	10,000	10,000	5,000	65,000
Signing inc lighting	9,000	35,000	0	12,000	3,000	6,000	65,000
Signals	70,000	70,000	24,000	9,000	0	62,000	235,000
Structures	0	457,000	930,000	880,000	218,000	0	2,485,000
Safety Fencing	0	14,000	14,000	12,000	0	0	40,000
Out of Hours	61,000	237,000	283,000	250,000	76,000	34,000	941,000
Subtotal	408,000	1,356,000	1,567,000	1,394,000	461,000	205,000	5,391,000
Preliminaries @ 30%	122,400	406,800	470,100	418,200	138,300	61,500	1,617,300
Traffic Management @ 10%	40,800	135,600	156,700	139,400	46,100	20,500	539,100
Construction Costs	571,200	1,898,400	2,193,800	1,951,600	645,400	287,000	7,547,400

As earlier indicated, owing to the shortage of existing ground and topographic information, together with details of existing structures it is considered unrealistic to comment on construction costs in some areas without further investigations and therefore a number of the estimates remain incomplete in some areas and may also make assumptions in others.

In summary, these exclusions are:

1. General
 - i. Costs for diverting Statutory Undertakers plant
 - ii. Impacts of proposals on existing buildings, structures and embankments/cuttings and their ability to accommodate the proposals.
 - iii. Landscaping
 - iv. Land costs where works are proposed outside the existing highway boundary and the purchase of land is necessary.
 - v. Part 1 compensation claims

Exclusions/assumptions, specific to each junction, but not necessarily exhaustive, include:

2. Riverway Junction
 - i. Existing underbridge to be widened to accommodate third lane assumes simple construction and piled foundations.
3. Riverway to Coppins
 - i. Existing structure over Medina River is suitable to widening
4. Coppins
 - i. The estimates assume that a retaining wall enabling widening of the southbound carriageway at the high level is possible.
 - ii. Structure over Medina River forming north section of gyratory is suitable to widening.
5. St Georges Way
 - i. The estimate assumes that alterations and realignment of the existing retaining wall to the car park will not affect the existing footbridge crossing between the car park and cinema complex.
6. Hunny Cross Junction
 - i. The estimate assumes that, the widening of St James Street to provide a 2-lane approach to the junction can be accommodated within the parapets of the existing bridge.

In addition to the construction costs there are other costs relating to preparation and supervision of the scheme(s), optimism bias and inflation.

Guidance contained in the HA Design Manual for Road and Bridges are for allowances of 12% and 5% of construction, land and property costs to be allowed at preliminary stage for preparation and supervision respectively. Equally, current guidance is for a further 45-65% to be added as Optimism Bias (65% for a complicated scheme) at this stage where no detailed risk assessment has been undertaken.

Future inflation should be added to give an overall Scheme Cost and is subject to the design and implementation programme for the scheme.