Canvey Town Centre Transport Modelling

Final Report (Updated)

December 2010






Document control Sheet

Project title:	Canvey Town Centre Masterplan Transport Modelling
MVA project number:	C39782
Document type:	Final Report
Directory & file name:	Q:\Projects\C39782_CanveyFollowOn\Deliverables\Final_Report\101217_C39782_Final_Report_v2.3.pdf
Document Approval	
Primary author:	Simon Adams
Other authors:	Chris Whitehead, Glen Strongitharm
Reviewers:	Tim Cuthbert, John Emslie

Distribution

Issue	Date	Distribution	Comments
0.2	29/07/2010	MVA	Initial modelling review
1.0	02/08/2010	MVA, BDP, CPBC	Draft version for Client presentation
1.2	27/08/2010	MVA	Final technical review
1.3	03/09/2010	MVA, BDP, CPBC, ECC	Draft Final Report for Client review
2.0	20/10/2010	MVA, BDP, CPBC, ECC	Draft Final Report incorporating all CPBC and most ECC comments
2.1	25/10/2010	MVA, BDP, CPBC, ECC	Final Report incorporating all CPBC and ECC comments
2.2	28/10/2010	MVA, BDP, CPBC, ECC	Correction to page numbering
2.3	17/12/2010	MVA, BDP, CPBC, ECC	Additional information on phasing and scheme costs (pp.37-38)

Report structure

1. Introduction
   - Context
   - Design concept and principles
2. Study Methodology
   - Sequential testing flowchart
   - Base year models
   - Future year models
3. Network analysis – junctions
4. Indicative junction designs
5. Network analysis - links
6. Other transport modes
7. Conclusions

Technical Appendices

1. Base Year Flow Data (Model #1)
2. OD movements
3. Two-way flows (Model #2)
4. Preferred Option assumptions
5. Trip rates and mode shares
6. Trip generation
7. School expansion analysis (summary)
8. Future year model flows (Models #3 to #8)
9. Summary TRANSYT model outputs
10. Final TRANSYT model outputs

Introduction

Canvey Town Centre Masterplan - Preferred Option

The recently produced Canvey Town Centre Masterplan proposed significant changes to the town centre – land uses, quantum of development, and also the transport network.

The transport proposals in the masterplan report were necessarily indicative in nature based on the original scope of work. An additional study was identified to undertake detailed, follow-on testing of the masterplan's proposals. This Report summarises the outputs of this additional transport modelling study that was commissioned by Castle Point Borough Council in early 2010.

This detailed modelling study has a focus on highway changes (particularly changes to the one-way gyratory) but consideration has been given to all modes including walking, cycling, public transport (bus), taxi, and other community transport.

The key questions that this modelling work aimed to answer were :

* do the transport proposals associated with the masterplan's preferred option work successfully?
* what changes are required to the transport network to mitigate any potential impacts of additional development?
* what options/alternatives are there for reducing the impact of transport in the public realm?
* are the final transport proposals feasible / deliverable / viable?

The study has been undertaken at detailed level - impacts have been tested at a localised junction level in order to provide certainty that masterplan development can, in principle, be delivered from a transport perspective. It is important to note that this modelling work is necessarily indicative given the level of uncertainty over precise development land uses, quantums, and spatial layouts. However when a Transport Assessment(s) is submitted in support of a planning application(s) this modelling work will provide a useful starting point for considering development impacts, highway network changes, and any other mitigation.

Furtherwick Park School

Re-development of the existing school site under the BSF scheme could have impacts on the operation of the transport network. These impacts could be sufficiently large in scale to ultimately compromise the masterplan's preferred option when considered in combination. The scope of the modelling work undertaken by MVA has therefore been widened to include the school's development plans.

Additional key questions that will be answered by the modelling study are:

* does the expansion of the school lead to additional impacts that need mitigation?
* can the combination of Masterplan and school expansion be successfully delivered?

Design Concept / Principles

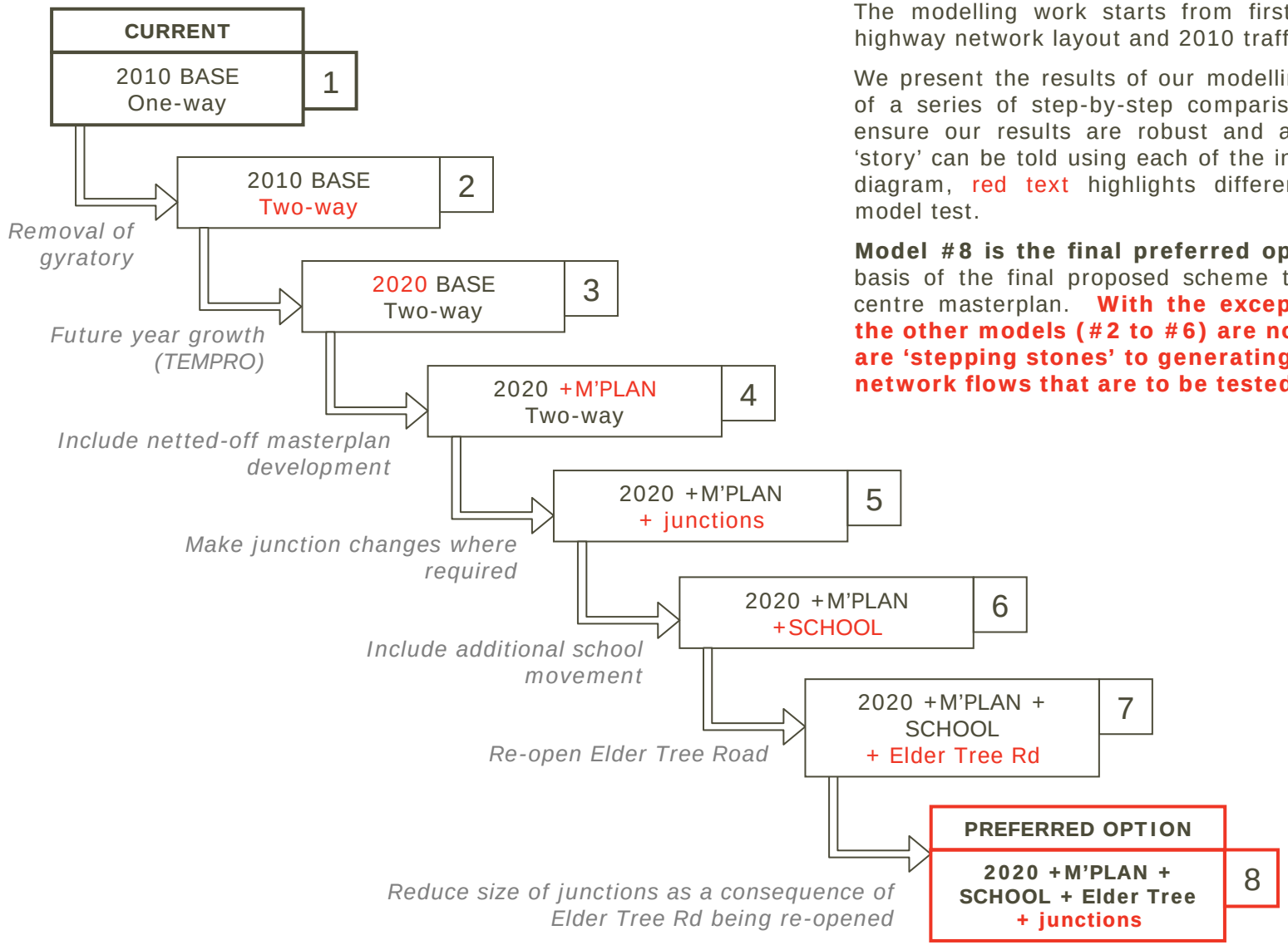
Canvey Town Centre Masterplan – Design Concept

In order to give some general context to this specific transport modelling work, a brief summary of the Canvey Town Centre Masterplan's transport design concept is provided below.

* Removal of one-way gyratory system in its entirety
    * All streets (High Street, Foksville Road, Furtherwick Road) revert to conventional two-way operation
    * All junctions in town centre allow all turning movements
* Re-instatement of the High St link between Knightswick Rd and Elder Tree Rd junctions
* Where required, creation of new junction layouts that are small in scale/size
* Flexibility in operation of the network – allow temporary road closures to accommodate markets, special events etc.
* An aspiration to downgrade the importance of Elder Tree Rd from a through route to a less-trafficked residential street
* Replacement of the existing surface car park with a multi-storey structure accessed from High St
* Improve facilities / conditions for pedestrians and cyclists
* Rationalise bus operations with a focussed bus 'hub' along Furtherwick Road (noting longer-term aspiration for SERT linkage)
* Address the specialist needs of taxis, community transport, disabled road users, etc.
* Implement a substantial improvement in quality of public realm across the whole town centre

Study Methodology

Modelling flowchart – sequential testing



The modelling work starts from first principles (current highway network layout and 2010 traffic flows).

We present the results of our modelling work in the form of a series of step-by-step comparisons. This helps to ensure our results are robust and also so that a clear 'story' can be told using each of the interim steps. In the diagram, red text highlights differences between each model test.

Model #8 is the final preferred option that forms the basis of the final proposed scheme to support the town centre masterplan. **With the exception of Model #7, the other models (#2 to #6) are not final options but are 'stepping stones' to generating the final highway network flows that are to be tested.**

Base year models

Traffic count data
New traffic data was collected in May 2010 as part of this commission. A summary of these flows is included as *Appendix 1*.

Other existing traffic data obtained from Furtherwick Park School Transport Assessment and previous modelling studies used as a cross/sense check. These checks confirmed that the May 2010 data is sensible and reliable.

1 A 'Base Year' Transport model created using the industry-standard TRANSYT modelling software to replicate current day performance of highway network.

Origin-Destination movements
The traffic data collected in May 2010 was only for junction turning movements. A more substantial survey that recorded vehicle origins and destinations would have been preferred but was rejected on cost grounds.

Instead, town centre origin-destination (OD) movement patterns were obtained from a island-wide Paramics microsimulation model previously developed by MVA. The model was used to calculate OD proportions across the town centre highway network (eg Long Rd > High St, Furtherwick Rd > Central Wall Rd). A summary of these OD movements is included as *Appendix 2*.

The current base traffic data (one-way gyratory flows) were then manipulated using the Paramics OD movement proportions to produce highway flows assuming the gyratory was removed and all streets revert to full two-way operation. This ensures the correct balance in flow along High St, Foksville Rd, and Furtherwick Rd based on trips to/from/through the town centre. These 'synthetic' two-way flows are shown graphically in *Appendix 3*.

2 Another TRANSYT model was set up to test base year 2010 network performance with these fundamental highway changes. The key question to be answered was whether conversion from one-way to two-way operation worked satisfactorily using 2010 base flows. If not, masterplan development with its additional demand would be considerably more difficult to successfully deliver.

This model can also be used as a comparison against all the subsequent models (3 to 8) that consider additional development (eg masterplan, school expansion, etc.)

Time Periods
Two time periods have been modelled which represent the times at which the highway network is under the most stress: AM peak period (8-9am); and PM peak period (5-6pm). A Saturday peak has not been modelled as an initial estimation of impact was assessed to be in line with the PM peak period.

Future year models

3

Background growth assumptions

* Assumption made for background growth between 2010 and 2020 – irrespective of any masterplan and/or school development
* Growth factors calculated using standard TEMPRO dataset – 6.6% for both AM peak period and PM peak period
* TRANSYT model created to test 'Base 2020' scenario with no specific additional development BUT WITH two-way network
* There is the possibility that the TEMPRO growth factors include an allowance for specific town centre growth. If this is the case then the 2020 modelled flows may include a small element of double counting which would ensure a reasonable, conservative approach has been taken.

4

Additional masterplan demand

* The mix and quantum of the masterplan's preferred option is known – with existing land uses 'netted off' *(Appendix 4)*
* Trip rates for each land use obtained from standard TRICS national database *(Appendix 5)*
* Total trip generation (person trips and vehicle trips) calculated for entire development for AM and PM *(Appendix 6)*
* No junction changes made – assume a minimum scale/size is achieved at all locations (ie single lane approaches)
* TRANSYT model created to test impact of Masterplan development

5

Junction changes

* Based on the results of scenario 4 above, changes are made to junctions to improve their performance to acceptable levels.
* TRANSYT model created to test impact of required improvements

6

School expansion

* 'First principles' approach taken to impact of school: the number of pupils and teachers; assumed arrival and departure time profiles; and mode shares. Further information is provided in *Appendix 7*.
* TRANSYT model created to test impact of school expansion

7

Elder Tree Road

* Initial tests assumed that Elder Tree Road closed to through traffic – residential access only
* Network flows re-assigned based on this link being re-opened (mostly High St <> Central Wall Rd)
* TRANSYT model created to test impact of re-opening Elder Tree Rd

8

MASTERPLAN PREFERRED OPTION (incl. final junction changes)

* Final model scenario developed to test reduced scale/size of junctions that can be achieved due to Elder Tree Rd reducing pressures on the network in certain locations
* TRANSYT model created with smaller junction layouts

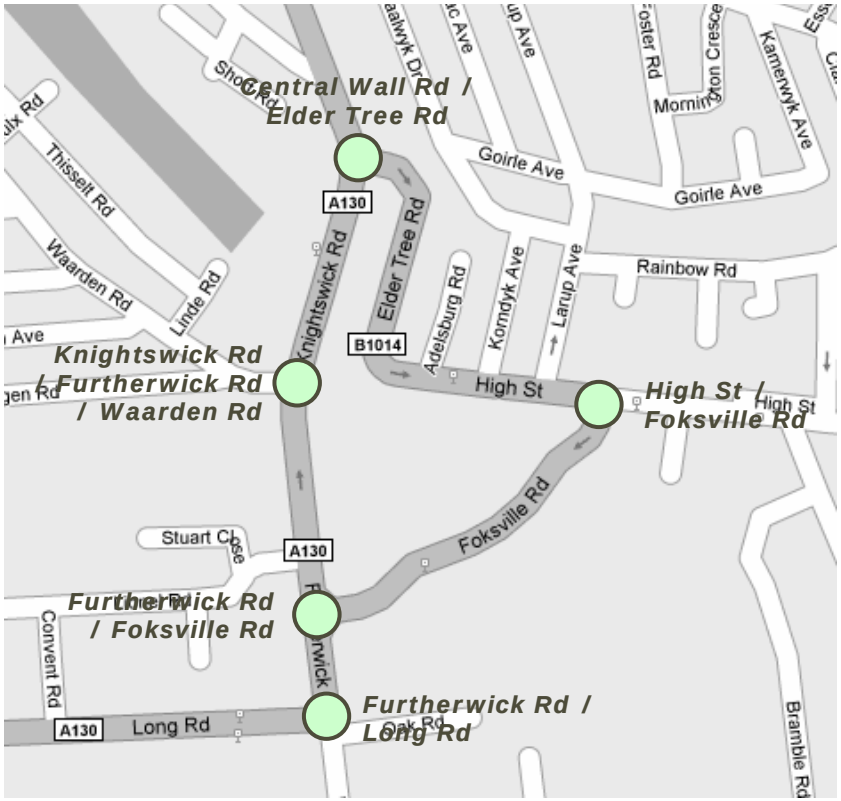
[For reference, assumed link/turn flows and summary model results are provided in *Appendices 8 and 9* respectively.]

Network analysis - junctions

Model #1 (2010 Gyratory) vs. Model #2 (2010 two-way operation)

Summary
Conversion of the gyratory system to conventional two-way operation can be achieved (based on present day flows) using standard junction layouts (ie single lane approaches in all directions with no additional flaring or widening) without causing undue congestion and delays. See **slides 20-23** for more detailed discussion.

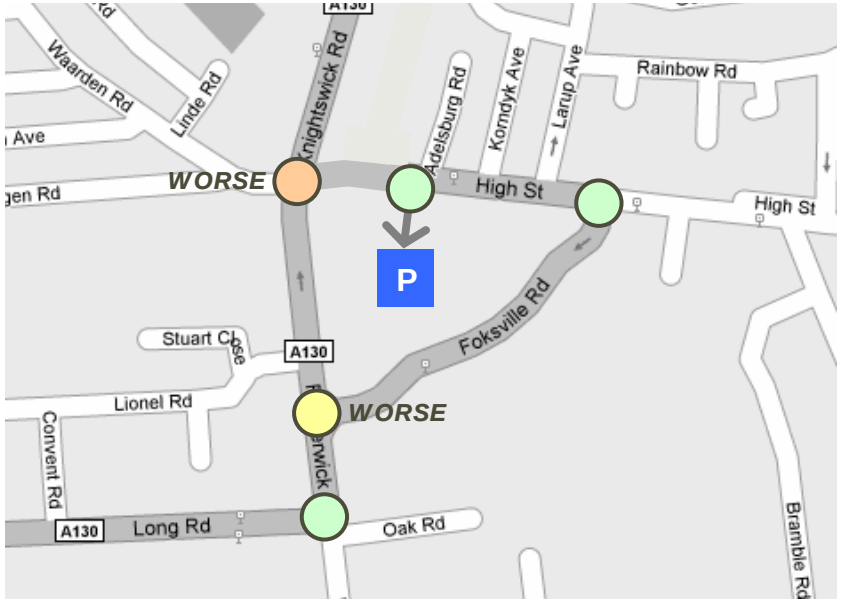
2010 Base Flows with current layout



2010 Base Flows with revised full two-way layout

All junctions have been designed with single lane approaches and no flaring. They can be enlarged if required to accommodate future development flows.

Elder Tree Rd assumed to be closed – flow can be re-introduced along the link to reduce pressure at Knightswick Rd / High St junction.



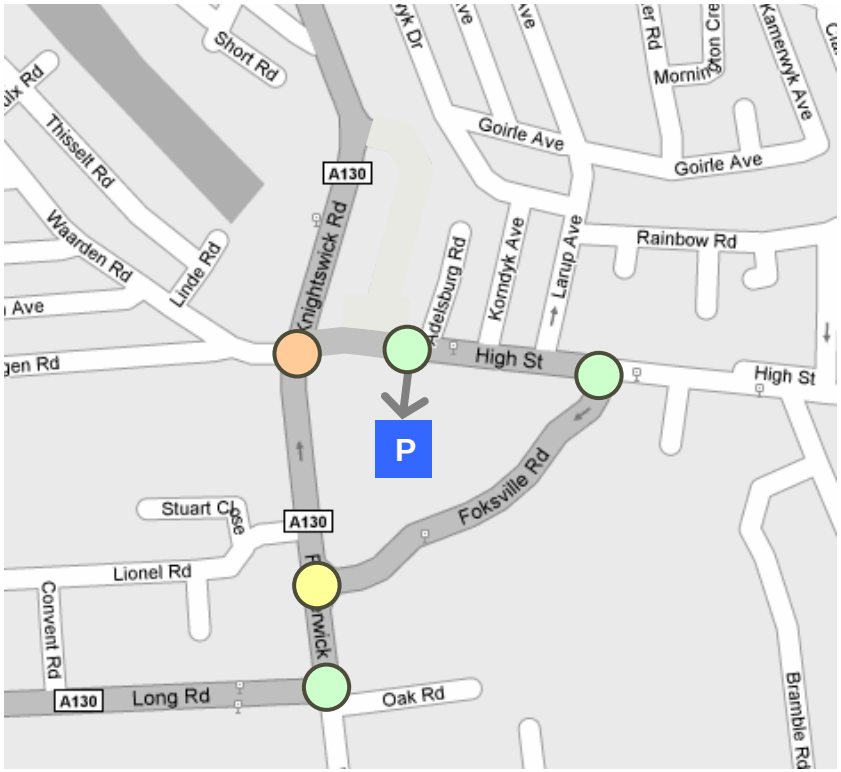
JUNCTION PERFORMANCE

<70% V/C	70-80% V/C	80-90% V/C	90-100% V/C	100-110% V/C	>110% V/C
Satisfactory	Towards capacity	Close to capacity	At capacity	Beyond capacity	Critical

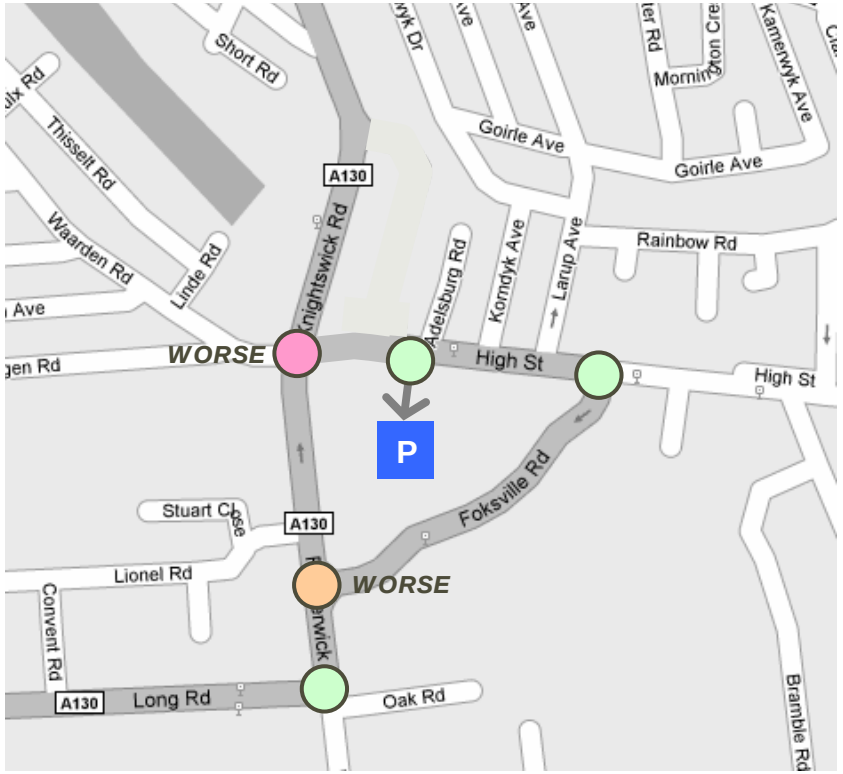
Model #2 (2010 two-way) vs. Model #3 (2020 Future Base)

Summary
Growth in background demand and increased traffic flows leads to additional pressure being placed on the Furtherwick Rd/High St and the Furtherwick Rd / Foksville Rd junctions. Junction performance could be improved if additional lanes and/or flares are constructed (see Model #5).

2010 Base Flows (no development) with single lane approaches



2020 Future Flows (no development) with single lane approaches



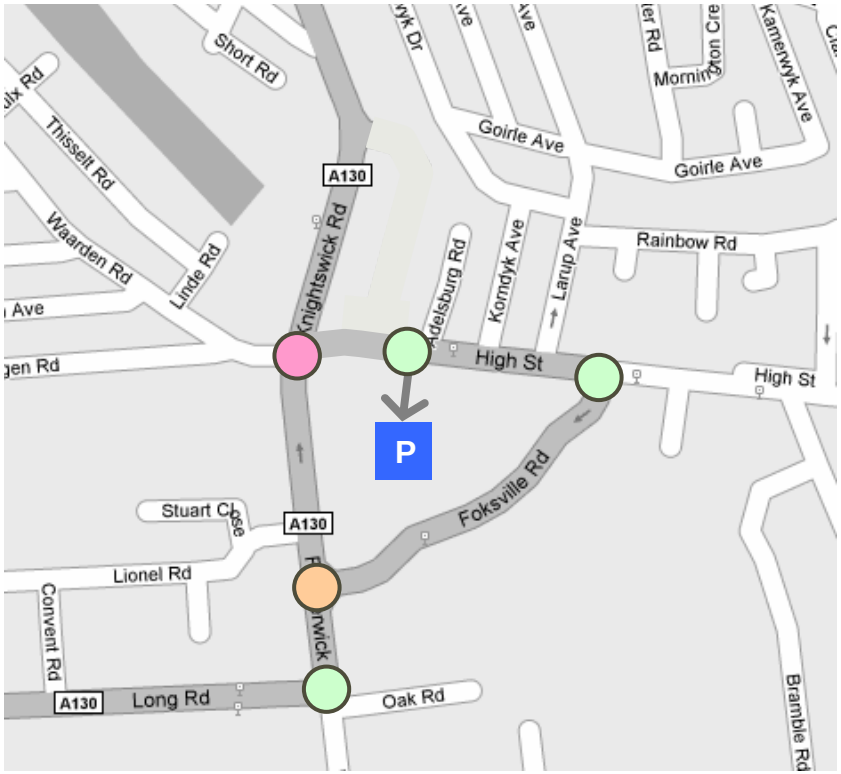
JUNCTION PERFORMANCE

<70% V/C	70-80% V/C	80-90% V/C	90-100% V/C	100-110% V/C	>110% V/C
Satisfactory	Towards capacity	Close to capacity	At capacity	Beyond capacity	Critical

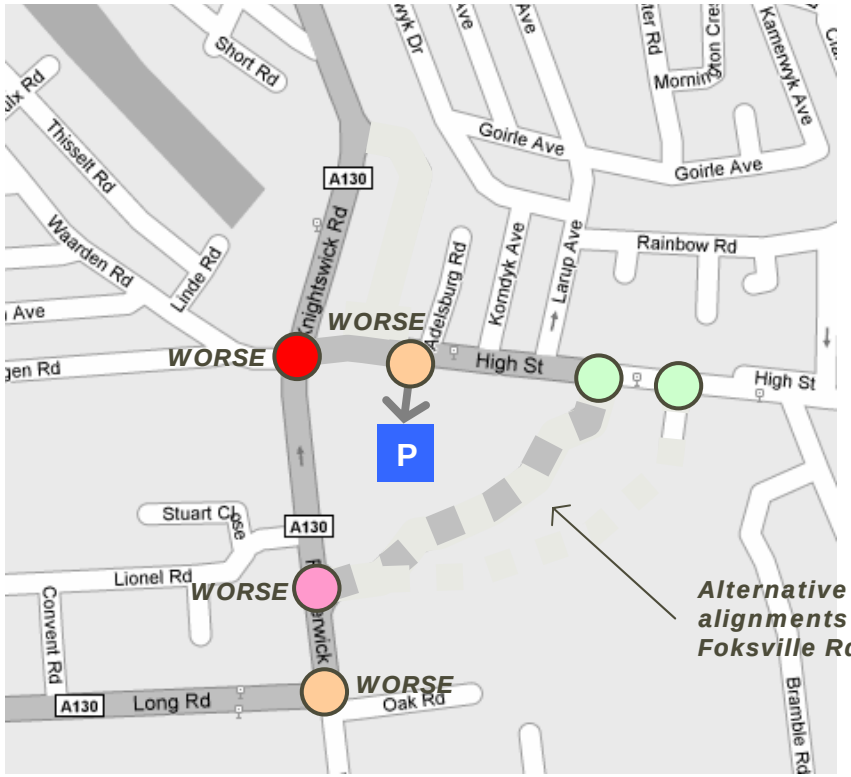
Model #3 (2020 Base) vs. Model #4 (Masterplan development)

Summary
Including traffic generated by the masterplan preferred option leads to the Furtherwick Rd/High St and Furtherwick Rd/Foksville Rd junctions operating at or just beyond capacity. This worsening of junction performance could lead to increased congestion and delay that would generally not be regarded as an acceptable impact for new development.

2020 Future Flows (no development) with single lane approaches



2020 Future Flows (with Masterplan development) with single lane approaches



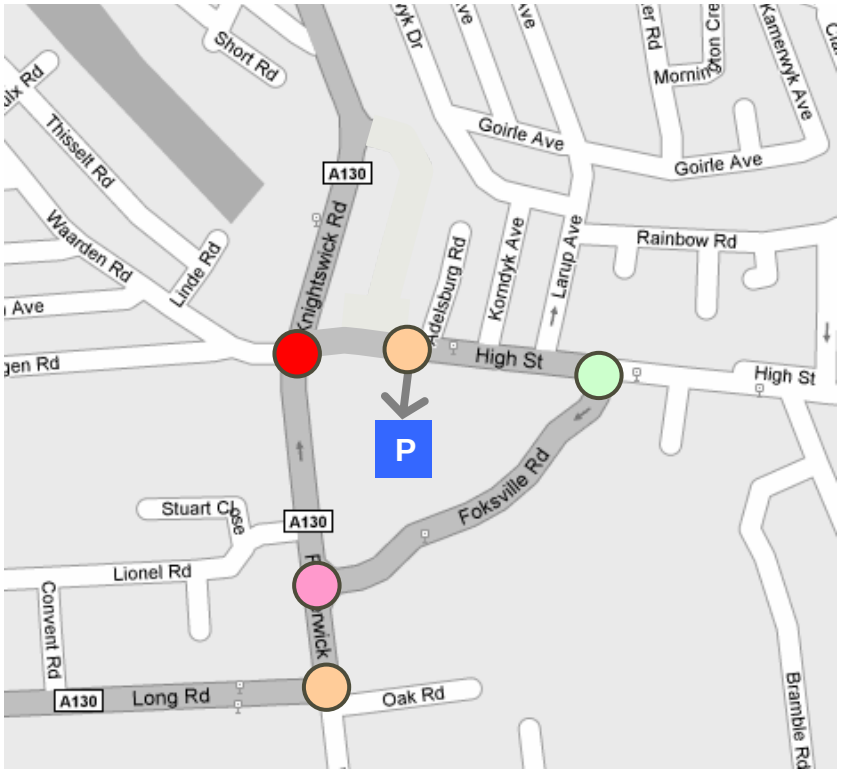
JUNCTION PERFORMANCE

<70% V/C	70-80% V/C	80-90% V/C	90-100% V/C	100-110% V/C	>110% V/C
Satisfactory	Towards capacity	Close to capacity	At capacity	Beyond capacity	Critical

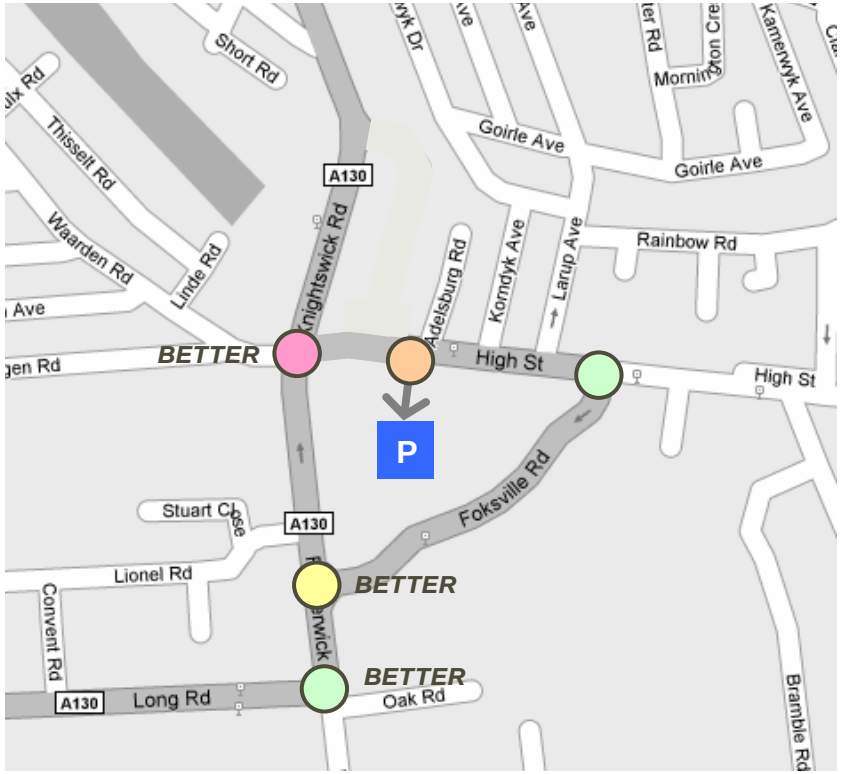
Model #4 (Masterplan) vs. Model #5 (Junction improvements)

Summary
In order to improve junction performance, modest improvements are introduced to Furtherwick Rd/High St, Furtherwick Rd/Foksville Rd, and the High St/Car park access junctions. The effect of revised junction designs is to improve performance at all locations thus enabling the masterplan development to be fully realised without incurring undue delays and congestion.

2020 Future Flows (with Masterplan development) with single lane approaches



2020 Future Flows (with Masterplan development) with junction improvements



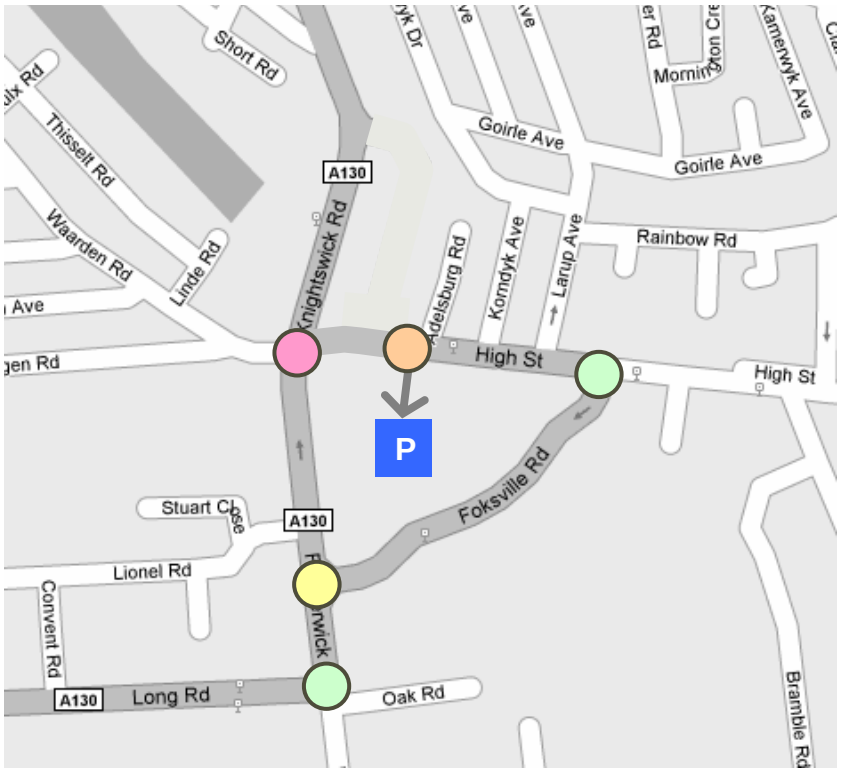
JUNCTION PERFORMANCE

<70% V/C	70-80% V/C	80-90% V/C	90-100% V/C	100-110% V/C	>110% V/C
Satisfactory	Towards capacity	Close to capacity	At capacity	Beyond capacity	Critical

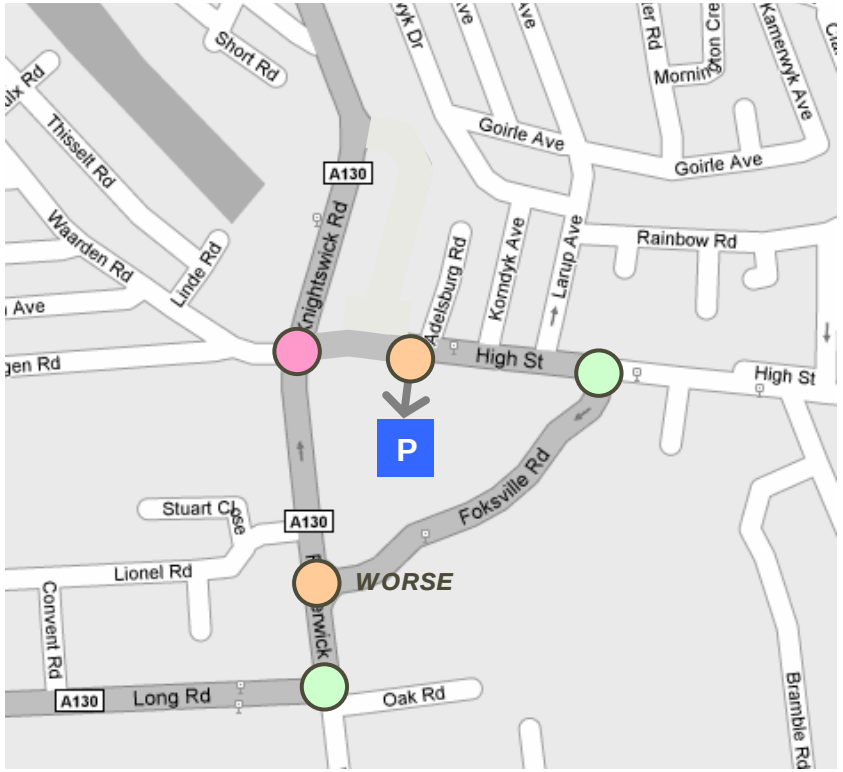
Model #5 (Masterplan only) vs. Model #6 (School expansion)

Summary
With junction improvements included (Model #5), the additional movement associated with the school does not lead to increased junction pressure. This is because relatively few school trips are made in the PM 5-6pm peak period – which is when the junctions are closest to capacity (due to PM retail activity).

2020 Future Flows (with Masterplan development) with junction improvements



2020 Future Flows (with Masterplan development and school expansion) with junction improvements



JUNCTION PERFORMANCE

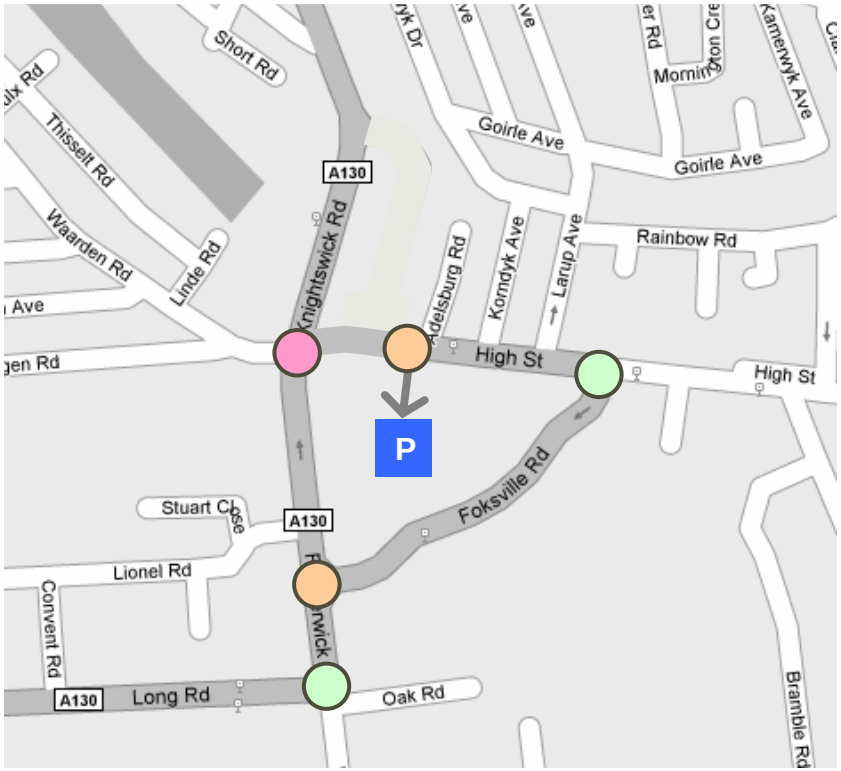
<70% V/C	70-80% V/C	80-90% V/C	90-100% V/C	100-110% V/C	>110% V/C
Satisfactory	Towards capacity	Close to capacity	At capacity	Beyond capacity	Critical

Model #6 (Elder Tree Road closed) vs. Model #7 (Elder Tree Road open)

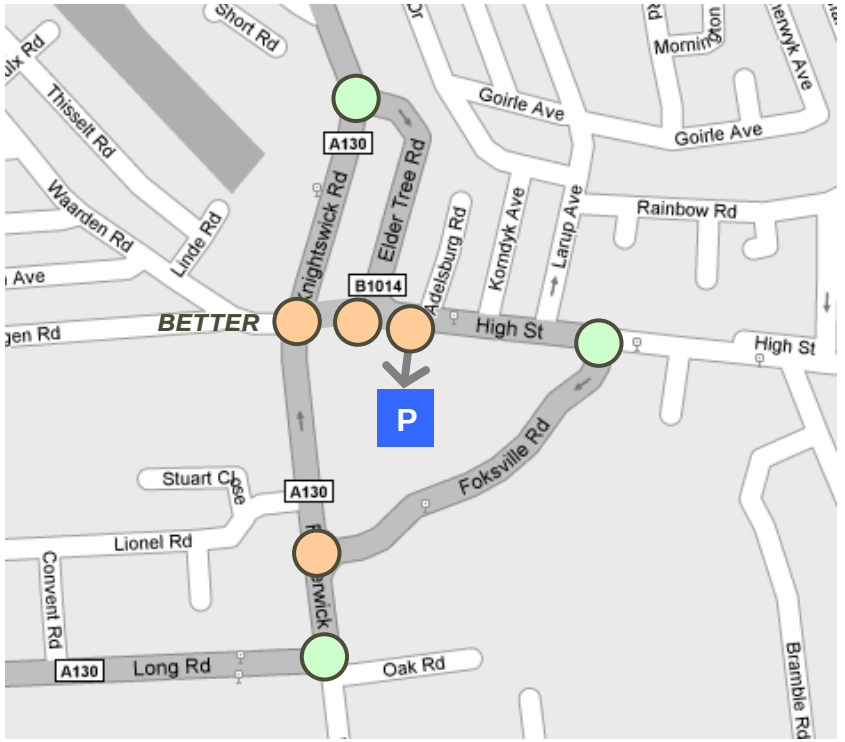
Summary

Re-instatement of Elder Tree Road within the highway network relieves pressure at the Furtherwick Rd/High St junction. See **slide 22** for more discussions on the trade-offs between opening and closing Elder Tree Rd to through traffic.

2020 Future Flows (with Masterplan development and school expansion) with junction improvements



2020 Future Flows (with Masterplan development and school expansion) with junction improvements and Elder Tree Road open



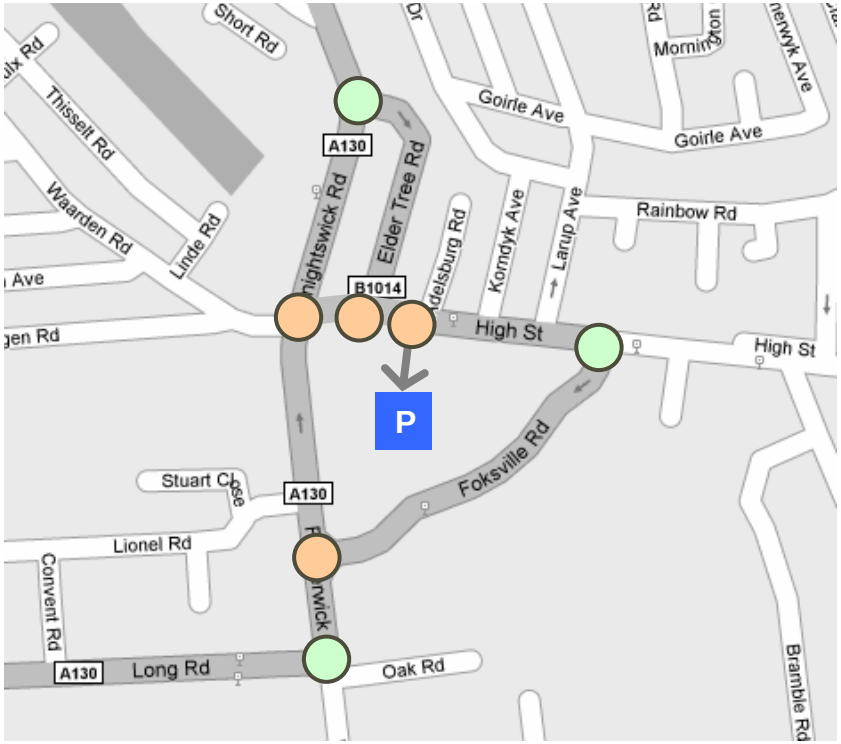
JUNCTION PERFORMANCE

<70% V/C	70-80% V/C	80-90% V/C	90-100% V/C	100-110% V/C	>110% V/C
Satisfactory	Towards capacity	Close to capacity	At capacity	Beyond capacity	Critical

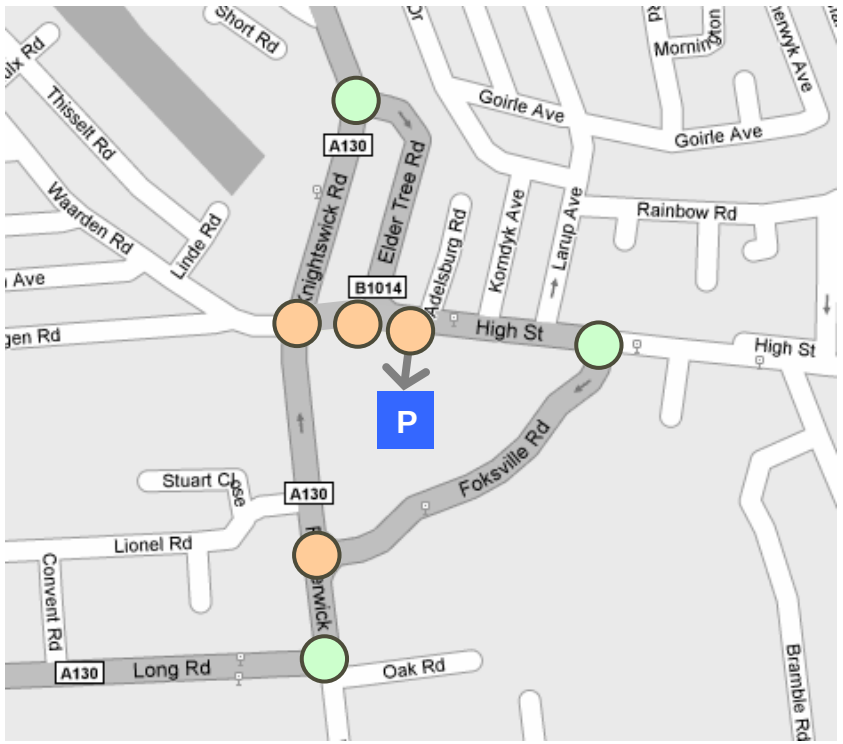
Model #7 (Elder Tree Rd open) vs. Model #8 (with smaller junction layouts) **PREFERED OPTION**

Summary
With reduced pressure due to Elder Tree Road being re-opened, the Furtherwick Rd/High St junction can be reduced in scale/size with no loss in network performance. This forms the **final preferred option** for the highway network – see slide 19 for a summary of what is proposed.

2020 Future Flows (with Masterplan development and school expansion) with junction improvements and Elder Tree Road open



2020 PREFERRED OPTION: Future Flows (with Masterplan development and school expansion) Elder Tree Road open but with reduced junction widening at High St junction



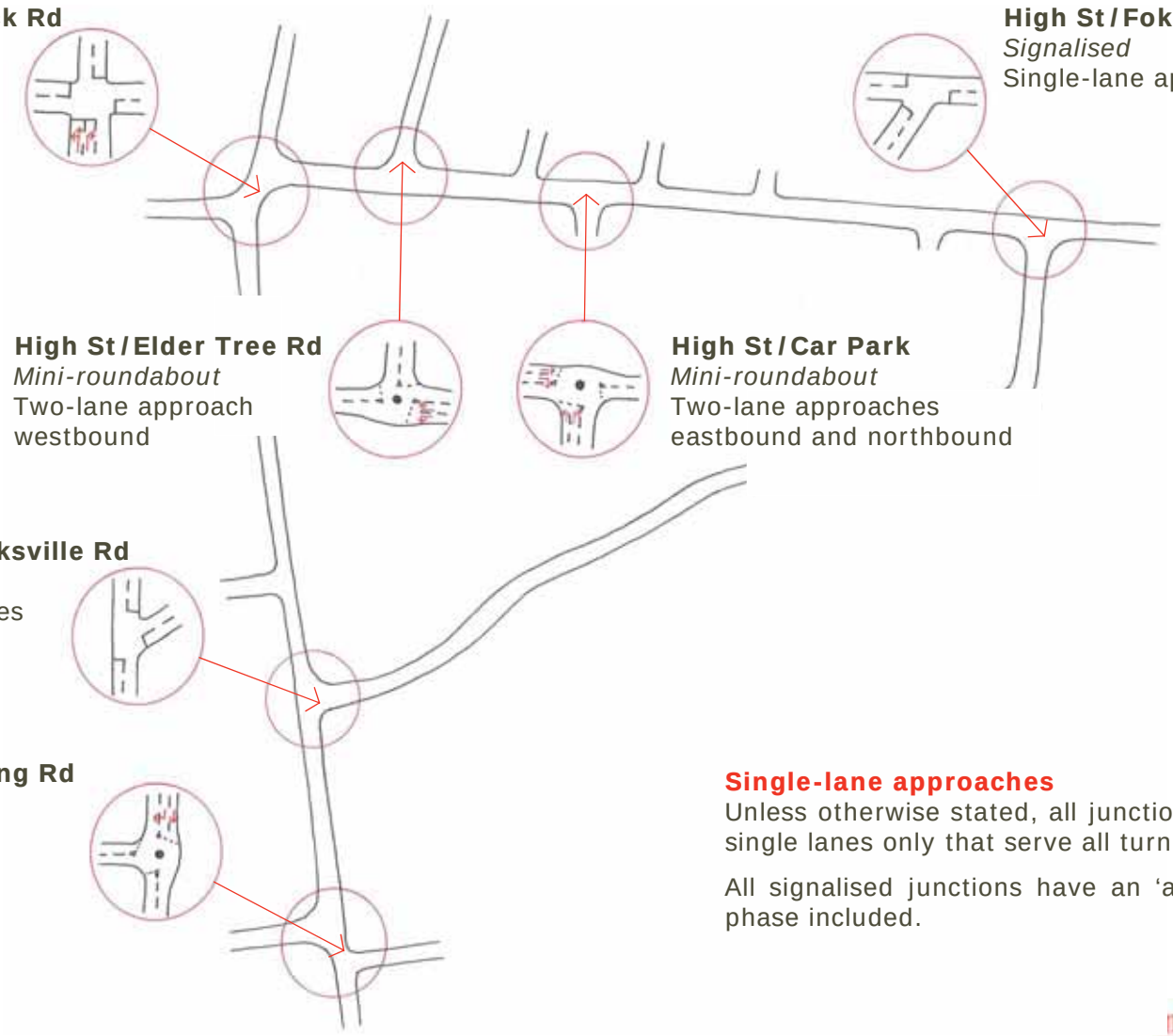
JUNCTION PERFORMANCE

<70% V/C	70-80% V/C	80-90% V/C	90-100% V/C	100-110% V/C	>110% V/C
Satisfactory	Towards capacity	Close to capacity	At capacity	Beyond capacity	Critical

Summary of junction designs as tested in Model #8
PREFERRED OPTION

High St / Furtherwick Rd
Signalised
Two-lane approach
northbound

High St / Foksville Rd
Signalised
Single-lane approaches



High St / Elder Tree Rd
Mini-roundabout
Two-lane approach
westbound

High St / Car Park
Mini-roundabout
Two-lane approaches
eastbound and northbound

Furtherwick Rd / Foksville Rd
Signalised
Single-lane approaches

Furtherwick Rd / Long Rd
Mini-roundabout
Two-lane approach
southbound

Single-lane approaches
Unless otherwise stated, all junction approaches are single lanes only that serve all turning movements.

All signalised junctions have an 'all-red' pedestrian phase included.

nvaconsultancy

Summary of junction performance for each model test

Junction	Type	Model #1 vs. Model #2	Model #2 vs. Model #3	Model #3 vs. Model #4	Model #4 vs. Model #5	Model #5 vs. Model #6	Model #6 vs. Model #7	Model #7 vs. Model #8
	Description	2010: convert to two-way	Growth to 2020	Masterplan development	Junction improvement	School expansion	Elder Tree Rd re-open	Junction resizing
High St / Foksville Rd	Signals	Worse [1]	No change [2]					
Foksville Rd / Furtherwick Rd	Signals	Worse [1]	Worse	Worse	Better	Worse		
Long Rd / Furtherwick Rd	Mini-RBA	Worse [1]		Worse	Better			
Furtherwick Rd / High St	Signals	Worse [1]	Worse	Worse	Better		Better	Better [3]
High St / Elder Tree Rd	Mini-RBA	n/a – Elder Tree Rd closed to through traffic						
High St / Car park access	Mini-RBA	Worse [1]		Worse				

NOTES

1 Worse junction performance (leading to possible increases in delay) should be balanced against the wider benefits that are provided to the town centre by the removal of the one-way system. Journey time savings are also possible due to reduced distance travelled as a result of more direct routes through the town centre using the two-way links.

2 All other blank cells are also 'No Change'

3 Whilst overall junction performance is unchanged, it is achieved using reduced number of lanes and flares leading a smaller junction 'footprint' and reduced visual impact.

mvaconsultancy

Discussion of model results (1)

We present the results of our modelling work in the form of a series of step-by-step comparisons. Model #8 is the final preferred option that forms the basis of the final proposed scheme to support the town centre masterplan. With the exception of Model #7, all the other models (#2 to #6) are not final options but are 'stepping stones' to generating the final flows that are to be tested.

Conversion from one-way to two-way (Model #1 vs. Model #2)
Conversion of the gyratory system to conventional two-way operation is assumed to be achieved using standard junction layouts – ie single lane approaches in all directions with no additional flaring or widening. This major change to the town centre highway network is achieved without incurring unacceptable levels of congestion and delay at any of the junctions. All of the junctions operate within typically acceptable levels of performance (see Appendix 9 for more details).

It should be noted that two junctions (Furtherwick Rd/High St and Furtherwick Rd/Foksville Rd) show a modest reduction in performance when converted from one-way to two-way operation. This is because all junctions now permit all turning movements rather than the current simplified arrangements which are made possible because of one-way operation.

This disbenefit of reduced performance (increased junction congestion and delay) in these two locations must be balanced against the wider benefits that are provided to the town centre by the removal of the one-way system. Benefits include more direct journeys through the town centre leading to reductions in vehicle distance travelled and potential time savings as a result.

Increase in background traffic flows to 2020 levels (Model #2 vs. Model #3)
Growth in background demand and increased traffic flows leads to additional pressure being placed on the High St / Knightswick Rd and the Furtherwick Rd / Foksville Rd junctions. This is equivalent to an additional average delay of 8 seconds per vehicle at the Furtherwick Rd/High St junction and an additional average delay of 3 seconds per vehicle at the Furtherwick Rd/Foksville Rd junction. Both of these junctions continue to operate within standard acceptable operational limits despite this increased growth. All other junctions operate satisfactorily as in 2010. It should be noted that both Models #2 and #3 assumed all junctions were constructed with single lane approaches in order to minimise their 'footprint'. Junction performance could be improved if additional lanes and/or flares are constructed (see Model #5).

Addition of masterplan preferred option (Model #3 vs. Model #4)
Including traffic generated by the masterplan preferred option leads to a number of junctions in the town centre performing worse. The Furtherwick Rd/High St and the Furtherwick Rd/Foksville Rd junctions are predicted to operate at or just beyond capacity. This would lead to additional congestion and delay that would generally not be regarded as an acceptable impact for new development. This comparison between models #3 and #4 shows that, without additional intervention, the masterplan's preferred option development could not be delivered. Assuming only single-lane approaches at all junctions, the two-way highway network is overloaded. Subsequent tests consider what interventions are required in order to create a network that operates satisfactorily.

Discussion of model results (2)

Modest junction improvements to support masterplan development (Model #4 vs. Model #5)
In order to improve junction performance to acceptable levels, changes were made to the Furtherwick Rd/High St, Furtherwick Rd/Foksville Rd, and the High St/Car park access junctions.

The effect of revised junction designs (additional lanes and/or flares and/or revised cycle times) is to improve junction performance at all locations. These improvements enable the masterplan development to be fully realised with no section of the network operating beyond its available capacity. This does not mean that there will not be delays at the junctions, but that any delays experienced are an acceptable compromise with the wider benefits that a two-way highway network brings. The maximum queue length predicted in the AM and PM peak periods is 12 vehicles at the Furtherwick Rd/High St junction (westbound approach). Maximum queue lengths at all other locations are smaller.

Expansion of Furtherwick Park School (Model #5 vs. Model #6)
With junction improvements included from Model #5, the additional movement associated with the school does not lead to a substantial worsening in junction performance. There is a small amount of additional delay experienced at the Furtherwick Rd/High St junction. This is estimated to be an additional average delay of 3 seconds per vehicle.

The reason why the school expansion does not lead to substantial additional pressure on the highway network is because relatively few school trips are made in the PM 5-6pm peak period. This is when the junctions are closest to capacity (due to PM retail activity). Many more school trips are made in the AM 8-9am peak period but comparatively few retail trips are made at this time leading to less junction pressure.

Re-opening of Elder Tree Road (Model #6 vs. Model #7)
See next slide for more discussion on the trade-offs between opening and closing Elder Tree Rd to through traffic.

The re-instatement of Elder Tree Road within the highway network relieves pressure at the Furtherwick Rd/High St junction as traffic to/from High St has an alternative route. This reduction in pressure at the Furtherwick Rd/High St junction is reflected by a **reduction** in queuing and delay of up to a maximum of 11 seconds per vehicle on average. No other junctions are affected by this localised change. In order to maximise network performance the Elder Tree Rd/High St junction should ideally be a mini-roundabout if space permits rather than signalised.

Reduction in scale/size of junctions (Model #7 vs. Model #8 PREFERRED OPTION)
With reduced pressure due to Elder Tree Road being re-opened, the Furtherwick Rd/High St junction can be reduced in scale/size with no change in network performance. All junctions are predicted to be operating at acceptable levels – with a balance being struck between keeping junction 'footprints' as small as possible and limiting congestion and delays.

Appendix 10 contains full model results for the final preferred option for the highway network.

Discussion of model results (3)

Elder Tree Road
Two models runs considered the impact of having Elder Tree Road open to through traffic (#7) and closed to through traffic (#6).

The main conclusion drawn from comparing these two runs is that there is a direct trade-off between how much traffic uses Elder Tree Road and how large the High Street / Furtherwick Road junction would need to be:

* no through traffic along Elder Tree Road = larger scale junction at High Street / Furtherwick Road; or
* through traffic along Elder Tree Road = smaller scale junction at High Street / Furtherwick Road.

Because the High Street / Furtherwick Road junction is a key gateway into the town centre it would be preferable if the scale and size of the junction could be limited. This would lead to improved, easier pedestrian movement, enhanced visual amenity and would require less private land to be used to accommodate the revised junction 'footprint'.

If however the closure of Elder Tree Road to through traffic is of greater concern than an alternative junction layout could be specified for High Street / Furtherwick Road that operates satisfactorily. It would however not offer some of the benefits as described immediately above.

Also, if changes are to be made to Elder Tree Rd consideration needs to be given to its current strategic highway network status. The design of Elder Tree Rd would most likely be amended in order to reflect its changed role as a part of the town centre network rather than the key feeder of traffic from the north.

Summary modelling conclusions

Removal of gyratory (Models #2 and #3)
The conversion of the one-way gyratory to full two-way operation can be achieved in both current and future years without unacceptable levels of congestion and delay being incurred.

This is not to say that there will be delays experienced at junctions in the town centre but these delays should be balanced against the wider aspirations and benefits of the masterplan and the loss of the current one-way gyratory system. Furthermore, because traffic is taking more direct routes through the town centre there are journey time savings possible due to reduce vehicle kilometres travelled.

Masterplan development (Model #5)
The Masterplan preferred option can be delivered in transport terms using a two-way town centre highway network, modest junction improvements at a limited number of locations, and a multi-storey car park accessed from the High St. There is not a substantial increase in network delay compared to a future year scenario with no masterplan development (Model #3).

School development (Model #6)
Expansion of Furtherwick Park School can be accommodated within the revised highway network. There could be additional delay experienced at the Foksville Rd/Furtherwick Rd junction due to pick-up/drop-off trips but this increase in delay is not expected to be a substantial increase. It would be possible to design a larger scale junction to minimise additional delays but the trade-off is a larger junction footprint that is inappropriate for the town centre location.

It should be noted that careful management of drop-off / pick-up arrangements on Foksville Rd will be required – this is discussed further in later slides.

Elder Tree Rd and scale/size of Furtherwick Rd/High St junction (Models #7 and #8)
There is a trade-off between how much traffic uses Elder Tree Road and how large the Furtherwick Rd/High St junction would need to be. The preferred option would be for Elder Tree Rd to be open to through traffic (in addition to Knightswick Rd) in order for the Furtherwick Rd/High St junction to be kept as small as possible to be in keeping with its gateway location.

Masterplan Preferred Option (Model #8)
The Masterplan preferred option can be delivered in transport terms using a two-way town centre highway network, modest junction improvements at a limited number of locations, and a multi-storey car park accessed from the High St. There is only a modest increase in junction delays due to the additional masterplan development compared to a non-development scenario.

Appendix 10 contains full model results for the final preferred option for the highway network.


Indicative junction designs

Summary of designs

Indicative designs have been prepared to illustrate how the various junctions could be re-designed to accommodate the proposed town centre redevelopment and school expansion. It is important to note that these designs are only indicative and might be expected to change when final development land uses, quantums, and locations are known. All the designs shown operate satisfactorily and would not be expected to create unacceptable congestion and delays on the network. *Appendix 10* provides detailed TRANSYT model outputs for the preferred option using these indicative junction designs.

Knightswick Rd / High St
Assuming Elder Tree Rd is open to through traffic, the scale/size of this junction is modest and is therefore in line with wider aspirations for a high-quality gateway into the town centre. With the exception of Furtherwick Rd northbound, all four approaches to the junction are single lane. However, if Elder Tree Rd is modified to prevent through traffic then the scale of this junction increases. An all-red pedestrian phase has been assumed that allows pedestrians to cross the junction in one easy movement.

High St / Elder Tree Rd
This junction (assuming Elder Tree Rd is open to through traffic) would be best laid out as a mini-roundabout. A short flare on the High St westbound approach would be required otherwise single lane approaches would be sufficient.

High St / Car Park access
This junction would be best laid out as a mini-roundabout although an alternatives is to have simple priority control. The priority control option only just operates within acceptable limits however. Both options would benefit from separate, dedicated pedestrian crossings being provided at nearby locations to improve pedestrian movement along/across the High St.

High St / Foksville Rd
This junction will require signalisation but will only need single lane approaches in all directions. The precise location of the junction (ie whether it follows the existing or the proposed revised alignment of Foksville Rd) does not impact on its design. An all-red pedestrian phase has been assumed that allows pedestrians to cross the junction in one easy movement.

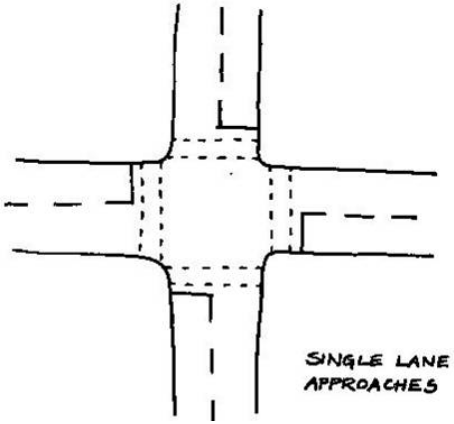
Furtherwick Rd / Foksville Rd
This junction will require signalisation but will only need single lane approaches in all directions. However it would be desirable, although not strictly necessary, for a right turn flare to be provided for the Furtherwick Road northbound approach. Again an all-red pedestrian phase has been assumed that allows pedestrians to cross the junction in one easy movement.

Furtherwick Rd / Long Rd
Only a small change is required to this existing junction – the addition of a short right turn flare for the Furtherwick Rd southbound approach.

Indicative junction designs (Furtherwick Rd/High St)

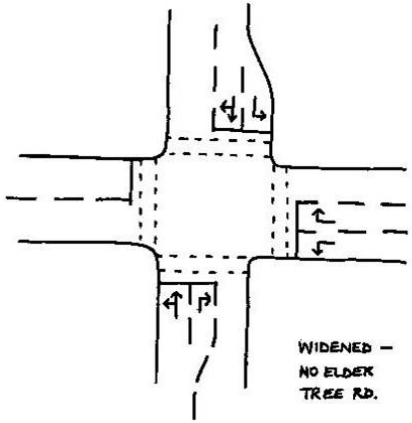
Single lane approaches

Beyond capacity



Widened – Elder Tree Rd closed

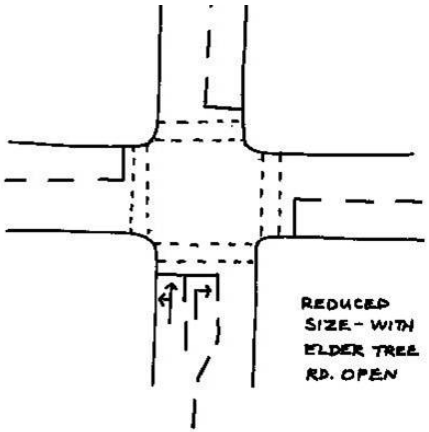
At capacity



Flared entry on N and S arms
Full two lane approach on E arm

PREFERRED OPTION
Elder Tree Rd open <u>and</u> reduced junction size

Close to capacity



Flared entry on S arm only

There is a trade-off to e made here between scale/size of junction at Knightswick Rd / High St and the volume of flow along Elder Tree Rd.

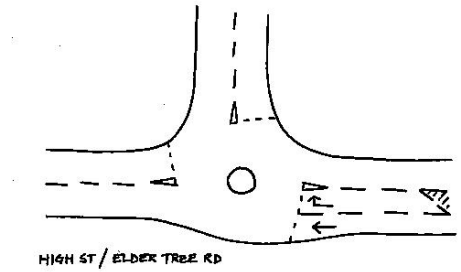
If Elder Tree Road is closed to through traffic a larger junction design is required at Knightswick Rd / High St which is only just operating within acceptable limits.

If Elder Tree Road continues to carry through movement the scale of the Knightswick Rd / High St junction can be reduced substantially whilst also improving in overall performance.

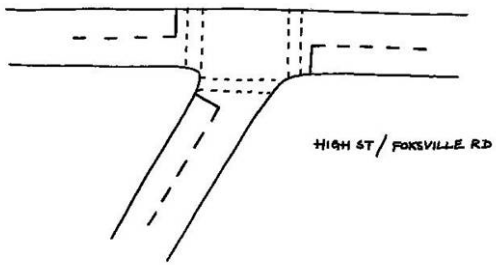
See slide 22 for more discussion on this.

mvaconsultancy

Indicative junction designs (High St)



Car Park access



Close to capacity

High St / Elder Tree Road
(mini-roundabout)
Single lane approaches for all directions except High St westbound which has short flare

Satisfactory

High St / Foksville Rd
Single lane approaches for all directions

Pedestrian provision
Foksville Rd junction - 'All-red phase' to enable pedestrians to cross in one movement
Elder Tree Rd junction - pedestrian crossing possible using mid-carriageway refuges – although no formal priority over vehicles

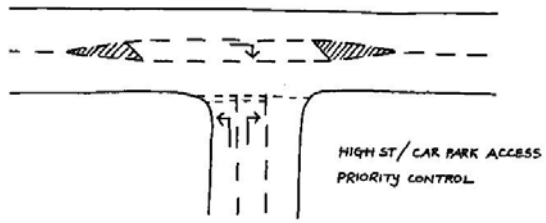
Heavy Goods Vehicles (HGVs)
It is noted that there is an existing problem with HGVs at the Elder Tree Rd/High St junction. Detailed junction designs have not been produced for this study but it would be expected that the presence of the mini-roundabout would help to slow vehicle speeds which, with a sufficiently generous turning radii, would help to prevent instances of HGVs over-running the corner at this location.

Similar principles should also be applied at other locations. Reduced vehicle speeds at the approaches to junctions (compared to the present day where speeds are relatively unconstrained) should be combined with sufficient carriageway space for the safe turning of large vehicles. The presence of dedicated pedestrian crossings will also help in reducing conflict between HGVs and pedestrians.

Indicative junction designs (Car park access)

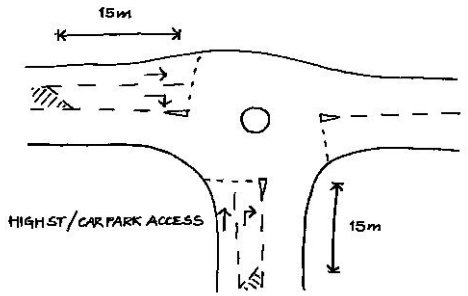
Car Park access - Option A
(priority)
Right turn 'pocket' from High St W
Two lane exit from car park

At capacity



Car Park access - Option B
(mini-roundabout)
Flared entry from High St W
Flared entry from car park

Close to capacity

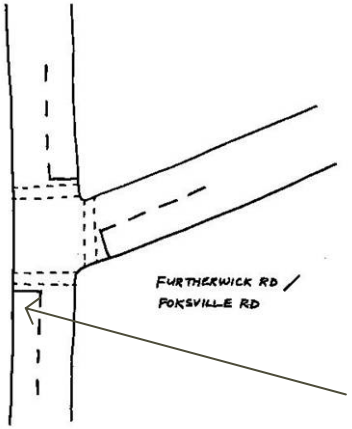


There is a trade-off to be made between junction types – priority control would have a smaller footprint (potentially important along High St) whilst a mini-roundabout may take up marginally more space but could operate more efficiently.

Indicative junction designs (Furtherwick Rd)

Close to capacity

Furtherwick Rd / Foksville Rd
Single lane approaches for all directions

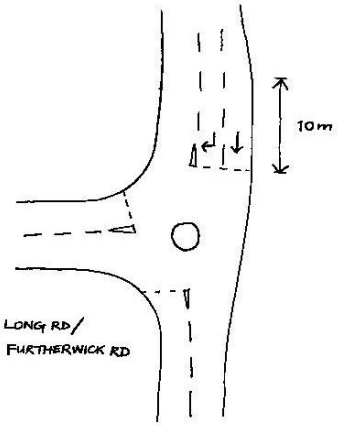


***NB** a right turn filter would be desirable (but not strictly necessary) for the right turn from Furtherwick Road into Foksville Road*

Lionel Rd / Furtherwick Rd
Propose to retain existing priority-control junction with Lionel Rd. The use of Lionel Rd as a potential rat-run between Furtherwick Rd and Long Rd should be discouraged. This could be achieved by making changes to this junction and along Lionel Rd that Significantly reduce the attractiveness of through-movement compared to using Furtherwick Rd / Long Rd.

Satisfactory

Long Rd / Furtherwick Rd
Short two-lane flared entry from Furtherwick Rd N



Pedestrian provision
Foksville Rd junction - 'All-red phase' to enable pedestrians to cross in one movement
Long Rd junction - pedestrian crossing possible using mid-carriageway refuges – although no formal priority over vehicles

mvaconsultancy

Qualitative network analysis

Qualitative link analysis

Link performance

Junctions are typically the main constraint on network performance – links in this context are generally of lesser concern.

Whilst the detailed transport modelling work has identified satisfactory junction and layout designs, localised operational implications that are specific to Canvey Town Centre do need addressing:

* additional crossing facilities at non-junction locations (see image to the bottom-right);
* school operations, particularly drop-off and pick-up arrangements for parents in cars and school buses; and
* the need to balance competing needs of 'link' and 'place' functions on town centre streets (in particular Furtherwick Rd.

These considerations are dealt with in more detail in subsequent slides using a qualitative approach.

An indicative quantitative assessment of network performance has been undertaken using the TRANSYT model #8 (future year 2020 flows including masterplan and school expansion; with junction improvements). Assumed link speeds were reduced in the model to reflect more activity on the streets in the town centre as a result of two-way operation, on-street parking, bus operations and more pedestrian/cyclist priority.

Link speed changes were tested both at a global level (entire network) and also only for Furtherwick Road. In all instances the reduction in assumed link speeds in the town centre did not lead to a worsening in link and/or junction performance. In most locations, no change in performance was predicted. In those locations were there was a change in performance it was marginal; across the network there was a mix of responses - both negative (worse performance) and positive (better performance).

‘Place’ function of streets

Links and places

A good way of understanding how streets work is to consider their link and place functions:

* a *link* is defined as ‘a movement conduit’ where its function is to ‘enable users to pass through the street as quickly and conveniently as possible’. The current highway network in Canvey town centre is dominated by this link function; and
* a *place* is defined as ‘a destination in its own right’ and furthermore, ‘seeks to encourage users to stay as long as desirable on a street and enjoy the streets surroundings’. It is a key aim of the masterplan is to encourage the town centre streets to take on a much stronger place function.

In the case of Canvey town centre the proposed approach in the masterplan was to redress the balance between link and place function of High St, Foksville Rd, Furtherwick Rd (and others) through reversion to full two-way operation, removal of unnecessary street furniture ‘clutter’, improvement in the quality of the public realm, and a strengthening of the economic vitality and retail offer leading to increased activity (particularly on foot).

The following activities all need to take place within the town centre, both in order for it to function and also to create a better environment and ‘sense of place’:

* loading/servicing activity – particularly for stores that are serviced directly from Furtherwick Rd;
* temporary short-stay parking to encourage ad-hoc shopping for disposable goods;
* retail and other commercial activity – stores spilling out onto the street, street stalls, and also markets;
* streets as public spaces – for meeting friends, eating/drinking venues, other leisure opportunities; and
* temporary special events.

All of the themes listed above are essential components in developing a highway network that successfully delivers both link and place functions. There is a ‘virtuous circle’ whereby increased town centre activity leads to an improved balance between vehicles and pedestrians/cyclists and vice versa.

Venables Close

One location of concern is Venables Close. The proposed re-alignment of Foksville Road changes Venables Close from being a cul-de-sac into a component part of the town centre network. The western side of the close will be subject to comprehensive redevelopment; on the eastern side existing residential properties may potentially suffer from increased traffic and noise. However the nature and character of this section of highway can be re-designed in order to minimise any such impacts through measures such as generous frontage-to-frontage widths, tree planting, and a low vehicle design speed.

Closure of Furtherwick Road

Closure of Furtherwick Road (temporary and permanent)

An important consideration is the management of the town centre highway network during temporary events that involve road closures. This, and the possibility of a more fundamental change to the network involving permanent closure(s), has been investigated.

The proposed revised two-way network that has been tested has been designed to operate with all turning movements permitted at all junctions. This means that if a particular street (eg Furtherwick Road) is closed for regular and/or special events, maintenance, etc. then vehicles can take alternative routes through the town centre. There may be additional congestion and delay however due to increased traffic flows along alternative routes. For relatively infrequent closures, localised congestion and delays may be acceptable as a compromise.

However we believe that the permanent closure of any of the key streets in the town centre (eg Furtherwick Road, Foksville Road, High St) is neither practicable nor desirable. The following considerations are particularly important:

* **vehicle movements** - vehicles that use Furtherwick Rd would be diverted onto other routes. The consequent increase in diverted flow on Foksville Road / High St may lead to increased delays, congestion, and worsened journey times. Localised rat-running may also occur – particularly to/from Waarden Road;
* **strategic network** – Furtherwick Road (A130) is part of the strategic road network and downgrading its status (ie completely removing it might be significantly difficult. It should be noted that the full implications for a permanent closure of the road have not been investigated further with the highway authority;
* **local access** - Furtherwick Road would still need selective access for goods vehicles servicing businesses, disabled users, emergency access, taxis(?) and would require enforcement to ensure it does not become a *de-facto* through route for all vehicles. Restricting access to particular times of the day is an option but this too requires enforcement;
* **buses** - bus operations would also be impacted by the loss of Furtherwick Road as a through route. Services could use alternative routes although journey times could be increased and bus stops located away from the heart of the town centre; and
* **retail activity** - retail properties along Furtherwick Road may also be affected as passing-by traffic would be removed. The detailed public realm proposals that are being drawn up could include short-stay parking provision that could encourage increased 'passer-by' trade.

The masterplan's aspirations for Furtherwick Road include a number of pedestrian priority measures that help to redress the current imbalance between fast-moving vehicles and pedestrians. Careful management of Furtherwick Road as a through-route would enable this imbalance to be corrected whilst still maintaining direct access into the town centre along this key corridor.

Pedestrian crossings

Pedestrian crossing provision

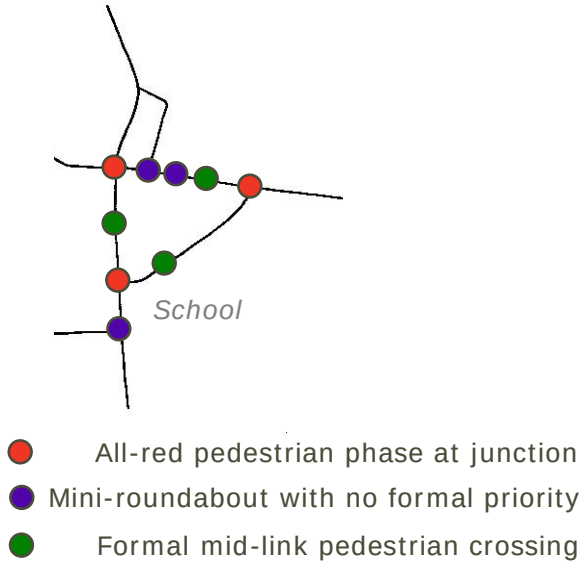
Ensuring there is sufficient, safe pedestrian crossing provision in the town centre is critical to the success of the re-designed transport network. The figure to the right illustrates potential locations for a range of different crossing types.

It should be noted that the design of High St, Foksville Rd, and Furtherwick Rd would be done in such a way to significantly reduce vehicle speeds. This would enable easier and safer crossing of these streets at other locations, not just the formal crossing points.

The formal crossing on Foksville Rd should ideally be a signalised crossing. This is so that the high pedestrian crossing flows to/from the expanded school are controlled in order to provide a balance between pedestrian and vehicle flows at peak times. An alternative would be to use a 'lollipop lady' at a zebra crossing.

The other formal mid-link pedestrian crossings (High St and Furtherwick Rd) could take on several forms (either unsignalised or signalised). This, plus the specific locations of the crossings, will be considered further as the detailed streetplan is developed in partnership with BDP.

Indicative pedestrian crossing locations



School operations

School operations

How school traffic is managed will have a significant bearing on how well the town centre's highway network operates.

The new school will be accessed primarily from Foksville Rd – both on foot, by cycle, and by car. With in excess of 1,200 pupils and staff there will clearly be a considerable amount of activity in this area which, if unmanaged, could lead to significant problems developing:

* the volume of cars picking-up / dropping-off children in the vicinity of the school leading to congestion and delays, potentially leading to blocking back of queues to other junctions;

* buses / coaches that are picking-up children in the afternoon require a certain amount of layover that also may lead to congestion and delays, particularly if buses stop on the main carriageway rather than in off-highway bays;

* the number of children attempting to cross Foksville Rd at a formal pedestrian crossing is likely to be substantial (several hundred in the AM peak period). It is thought that unless this crossing is managed there is a clear risk of vehicles being delayed at a zebra crossing due to an almost constant flow of pedestrians. In this instance, management could involve either signalisation or human control ('lollipop person').

Continued close working between the design teams for the school and the masterplan is encouraged in order to resolve any conflicts that may arise between the two parallel schemes being developed.

Phased gyratory conversion

Phased approached to gyratory conversion

The modelling work undertaken has tested a final, completed transport network where the gyratory system has been converted fully to two-way operation.

Initial consideration has also been given to phasing changes to the gyratory over time in an incremental approach. This may enable construction to be started more quickly than waiting for the entire conversion scheme to be financially viable. Conversely there may be a fundamental issue about how attractive this approach would be if there is no financial commitment to complete it in the medium/long-term.

Converting the gyratory to full two-way operation in one phase (including sub-Phases) would be highly desirable for a number reasons including:

* most importantly, minimising delays to road users during construction due to necessary re-routing;
* reducing the time that contractors are on-site which should lead to reduced scheme complexity and cost; and
* enabling new junction layouts to be used immediately rather than having to use more complex, flexible arrangements in order to cope with transitional arrangements due to construction.

Adopting a phased approach where some sections of the town centre network remain one-way in the medium to long-term whilst other sections are converted to two-way operation is possible but could lead to problems including:

* existing junctions are not designed for all turning movements (eg High St/Foksville Rd) and may need substantial modification to enable localised re-routing of traffic in the town centre during construction works;
* furthermore, the new junctions that are being built would need to be designed for use in the final, fully two-way scheme but may also require modification in the short to medium term in order to cope with one-way/two-way operational conflicts;
* potential delays and congestion due to transitionary junction arrangements that persist until full two-way operation is achieved – potentially taking a number of years; and
* potential conflict between different modes that, whilst acceptable during a short-term construction phase, may not be acceptable for longer periods of time.

This is not to say a phased approach to gyratory conversion could not be made to work – merely that the consequent, significant trade-offs in terms of network performance (congestion, delays, queues), safety implications, and cost (more complex planning, designs, construction) all have to be considered.

The next slide considers an indicative phased solution for converting the gyratory to two-way operation.

Phased construction

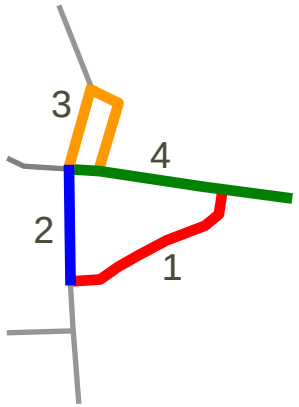
Phased Construction
Assuming that a phased approach to converting the gyratory is taken, we have considered a potential sequence for the necessary work. It should be noted that this phasing plan is **highly indicative** and is dependent on a number of key issues being resolved (see p.45 for 'Key Delivery Risks') and in what sequence development land can be made available. Pages 32 and 33 of the 'Canvey Town Centre Masterplan' considered scheme phasing and the approach suggested below is based on this. It should also be noted that additional modelling may be required to fully understand the implications of partial two-way operation of the town centre highway network.

Phase 1 – Foksville Rd (between Furtherwick Rd and High St)
Foksville Rd is an important link in the town centre – particularly due to the expansion of the school. Realigning Foksville Rd so that it connects to Venables Close is an essential part of delivering the key retail elements of the masterplan scheme. Therefore it must therefore be completed in advance of most other changes to the town centre network. Comprehensive junction re-modelling will be required to the junctions at each end (Furtherwick Rd and High St) to enable immediate full two-way operation. Access to/from the existing surface car park should be retained until the newly-located multi-storey car park (MSCP) is completed.

Phase 2 – Furtherwick Rd (between Foksville Rd and High St junctions)
This is the most important link in the town centre and so should be prioritised for change. It could also act as a high-quality example of how the fully regenerated town centre will look and feel. Comprehensive junction re-modelling will be required to the junctions at each end (Foksville Rd and High St) to enable full two-way operation *although one-way working should be retained as an interim step*.

Phase 3 – Knightswick Rd and Elder Tree Rd
Conversion of Knightswick Rd (between Central Wall Rd and High St junctions) enables Furtherwick Rd (Phase 2) to be fully converted to full two-way operation. Comprehensive junction re-modelling will be required to the junction of Furtherwick Rd, High St, Waarden Rd and Knightswick Rd. Once Phase 3 is completed, both Furtherwick Rd and Foksville Rd are now operating two-way.

Phase 4 – High St (between Furtherwick Rd and Venables Close)
The final section of the highway network to be converted is the High St (between Furtherwick Rd and Venables Close). However this phase depends on when construction of the MSCP is completed. The new MSCP access junction will need to constructed, the Elder Tree Rd junction remodelled as a mini-roundabout and the link to Furtherwick Rd reintroduced to all vehicles. Once Phase 4 is completed, all roads in the two centre are now operating two-way.



mvaconsultancy

Indicative construction costs

Indicative Costs

The 'Canvey Island Town Centre Study' (Mouchel, 2008) presented a range of options for town centre highway changes and their associated construction cost. Revised, **highly indicative** cost estimates have been prepared for the masterplan using this previous work as a base. Because the masterplan is proposing more fundamental change to the town centre, in particular the highway network, construction costs are substantially higher than for Mouchel's more modest changes.

Utilities

It is understood that the location of utilities in the town centre is not ideal and could lead to complex and expensive re-routing being required to accommodate planned highway and footway changes. The potential cost of diverting utilities may make the case for a phased approach to construction more appealing. The indicative cost estimates provided below **do not include** specific costs relating to diverting or protecting statutory undertakers' plant.

Description	Indicative Minimum estimate	Indicative Maximum estimate
New junction - High St / Venables Close (signalised)	£90,000	£140,000
New junction - High St / Multi-storey car park (mini-roundabout)	£80,000	£100,000
Junction remodelling - High St / Elder Tree Rd (mini-roundabout)	£70,000	£110,000
Junction remodelling - Furtherwick Rd / High St (signalised)	£100,000	£150,000
Junction remodelling - Furtherwick Rd / Foksville Rd (signalised)	£100,000	£150,000
Junction remodelling - Furtherwick Rd / Long Rd (mini-roundabout)	£20,000	£40,000
Junction remodelling - Furtherwick Rd / Lionel Rd (priority)	£10,000	£20,000
Major carriageway realignment - Foksville Rd and Venables Close	£250,000	£400,000
Carriageway remodelling – Furtherwick Rd, Foksville Rd, High St	£90,000	£150,000
Carriageway remodelling – Knightswick Rd, Elder Tree Rd (ie N of High St)	£30,000	£50,000
Bus stop relocation, new shelters, step free access, real-time information	£80,000	£150,000
Cycle parking, cycle lanes, cycle route creation, signage	£40,000	£80,000
Pedestrian route creation, signage, other small-scale public realm improvements	£10,000	£30,000
Sub-total	**£0.97mi**	**£1.57mi**
Multi-storey car park – new structure for c. 450 spaces	£4.00mi	£6.75mi
Sub-total	**£4.97mi**	**£8.32mi**
Contingency @ 20%	£0.99mi	£1.66mi
TOTAL	**£5.96mi**	**£9.98mi**


Other transport modes

Bus operations

Town centre bus 'hub'

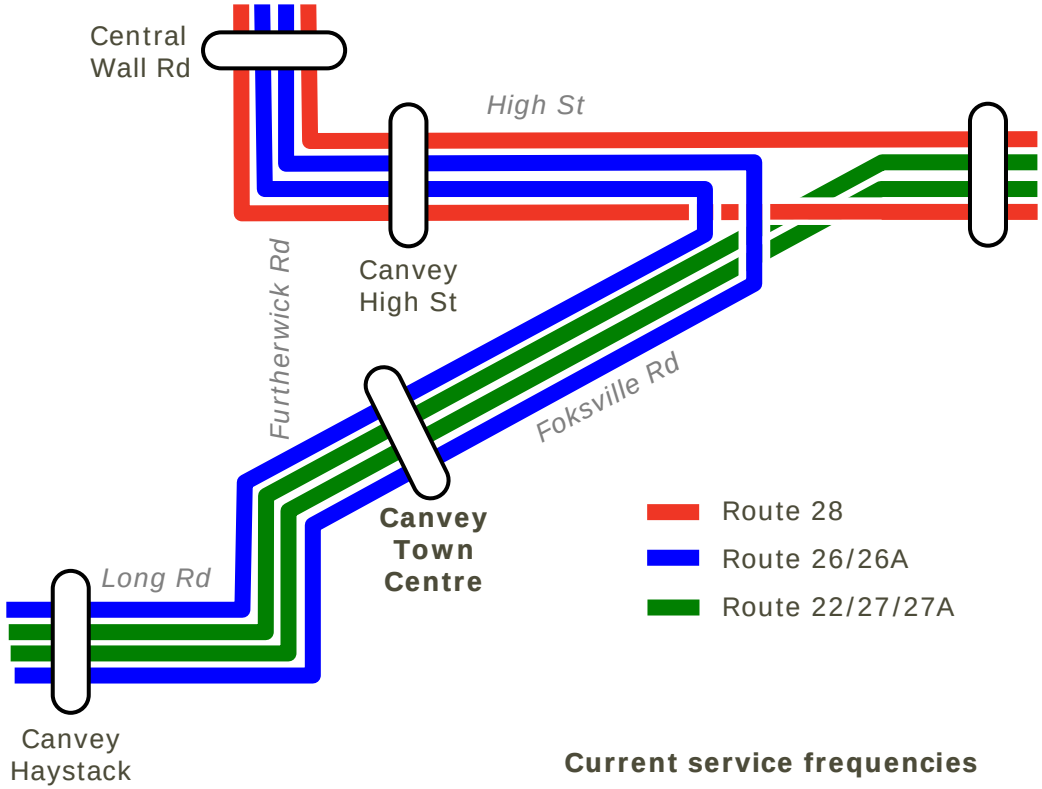
A key transport principle in the masterplan was the creation of a central bus 'hub' in the town centre. This hub would be the focus of public transport provision and be located in a prominent location. It should aim to compress the current widely-spread distribution of stops into a more rationalised solution.

The image to the right shows a potential solution where the hub is located on Foksville Rd (entitled 'Canvey Town Centre'). All routes that operate in this part of the island would stop at the hub in both the inbound and outbound directions.

In order to have all services stopping at the hub, the route each service takes may not be the shortest path. However, because the gyratory system has been removed, the distance each service takes through the town should not be much different.

No stops are proposed on Furtherwick Rd. This is for two reasons: the closure of Furtherwick Rd on event days would render any stops unusable; and the addition of bus operations along Furtherwick Rd could add unacceptable levels of congestion and delay to other vehicles that could jeopardise the success of the proposed public realm improvements.

All town centre junctions will need to be carefully designed in order to allow easy movement of buses. This is however a pre-requisite in any case given the requirement for emergency vehicle access and goods vehicle servicing. Precise locations for each of the bus stops need to be considered further during the town centre streetplan design process.



Current service frequencies

Service	Weekday frequency	Saturday frequency
22	20 mins	20 mins
26/26a	30 mins	30 mins
27/27a	20 mins	20 mins
28	'Frequent intervals'	No service

Taxis, community transport, walking, cycling

Taxis

Taxis play an important role in Canvey and the specific needs of taxi users and drivers should be accommodated within any proposals for changes to the town centre highway network. This includes provision of sufficient pick-up, drop-off and waiting spaces within the town centre at locations that match local demand requirements. The number and location of taxi spaces will be considered further as the detailed streetplan is developed in partnership with BDP.

Community Transport and disabled users

Similarly, the role of community transport needs to be accommodated within the final streetplan. The emerging streetplan includes an element of on-street parking provision which can be used to include specific provision for blue-badge holders and other flexible spaces which could be used by community transport vehicles and operators.

Walking and cycling

The current environment in the town centre is not particularly appealing to pedestrians or cyclists. Those who do cycle often use footways, particularly to avoid longer than necessary journeys due to the one-way gyratory. Parking facilities available to cyclists are limited to a small number of stands provided in a handful of locations.

There is however a significant population within walking and particularly cycling distance of the town centre. Given the flat topography and pleasant climate of the island this could be capitalised upon in order to increase walk and cycle rates and reduce short distance car journeys.

The removal of the one-way system in principle allows cyclists to follow much more direct highway routes. Combined with an improved town centre environment that reduces the dominance of the moving car and balances the needs of all road users, there are solid foundations for improving walking and cycling in the area.

Specific measures that could be included within a final solution for the town centre include:

* formally signed on-street and off-street (where appropriate) walk/cycle routes that link the town centre to residential areas;
* provision of Advanced Stop Lines (ASLs) at signalised junctions to provide improved cyclist priority, visibility and awareness;
* significant increase in dedicated cycle parking (ideally covered) that is located at a range of key destinations in the town; and
* range of promotion and publicity events linked to improving the image of walking and cycling and encouraging more trips to be made.


Conclusions

Conclusions (1)

Removal of gyratory and replacement with two-way operation
The conversion of the one-way gyratory to full two-way operation can be achieved in both current and future years with junctions operating within acceptable operational parameters.

At present, vehicles move through the gyratory system relatively smoothly due to very few conflicting movements. With the changes to the network to accommodate full two-way operation delays will be experienced at several locations. This is due to the addition of signalised control at a number of junction in order to manage conflicting flows. These junction delays can be balanced against reductions in journey times due to more direct routes being taken through the town centre.

Masterplan development
The Masterplan preferred option can be delivered in transport terms using a two-way town centre highway network, modest junction improvements at a limited number of locations, and a multi-storey car park accessed from the High St. There is only a modest increase in junction delays due to the additional masterplan development compared to a non-development scenario.

Elder Tree Rd and scale/size of Furtherwick Rd/High St junction
There is a trade-off between how much traffic uses Elder Tree Road and how large the Furtherwick Rd/High St junction would need to be. The preferred option would be for Elder Tree Rd to be open to through traffic (in addition to Knightswick Rd) in order for the Furtherwick Rd/High St junction to be kept as small as possible to be in keeping with its gateway location.

Furtherwick Rd
The highway network has been designed to accommodate a temporary closure of **one** of the town centre streets. It is however impractical and undesirable that a permanent closure is effected due to a wide range of resultant disbenefits.

Junction scale/size
The scale/size of all the redesigned junctions is modest and appropriate for the town centre location, particularly in light of the wider improvements being made to the public realm.

The use of mini-roundabouts at several locations along High St maximises highway performance but with some loss in pedestrian crossing provision. Providing additional formal pedestrian crossings at other locations on High St will help in providing an environment which still offers an improvement over present conditions.

Conclusions (2)

School development

The expansion of Furtherwick Park School can be accommodated within the revised highway network. There may be additional delay experienced at the Foksville Rd/Furtherwick Rd junction but this increase is not expected to be substantial. It would be possible to design a junction layout that minimises additional delays but the trade-off is a larger 'footprint'. This may require additional land take and may be inappropriate in size for this sensitive town centre location.

Careful management of drop-off / pick-up arrangements on Foksville Rd will be required to ensure that this link in the town centre network does not become heavily congested at the start and end of the school day. There is little information available about how the school will manage parents picking-up/dropping-off their children at the school. We would continue to encourage all parties to come to a joint agreement on how to manage this issue.

Construction phasing

Consideration has been given to phasing changes to the gyratory over time in an incremental approach. Converting the gyratory to full two-way operation in one phase (including sub-Phases) is highly desirable in order to reduce complexity, cost, and inconvenience to town centre users.

Adopting a phased approach where some sections of the town centre network remain one-way in the medium to long-term whilst other sections are converted to two-way operation is a possibility. Such a decision would require a thorough investigation of the consequent trade-offs including network performance (congestion, delays, queues), safety implications, cost (more complex planning, designs, construction), and the risk of completing all phases of the conversion.

Public transport operations

Existing bus routes have been revised to ensure all inbound and outbound services stop at a central 'hub' located in Foksville Rd. This removes the need to use different stops for different services as is currently the case and maintains the ability to close Furtherwick Rd on a temporary basis for events, markets, etc.

Walking and cycling

The removal of the one-way system in principle allows cyclists to follow much more direct highway routes. Combined with an improved town centre environment that reduces the dominance of the moving car and balances the needs of all road users, there are solid foundations for improving walking and cycling in the area. Several example measures have been identified that could be included within a final solution for the town centre.

Key delivery risks

Foksville Rd realignment

In order to accommodate the masterplan's proposed quantum and spatial disposition of development it is necessary to re-align Foksville Rd. This re-alignment would see Foksville Rd be extended to the east so that it connects directly with Venables Close. Such a route alignment currently passes across private (school) that is not in public ownership.

If it is not possible to utilise school land for a re-aligned Foksville Rd then a thorough, critical review of the town centre masterplan's preferred option (and the related transport changes) would be required.

Furtherwick Park School expansion

As discussed in the conclusions section, careful management of drop-off / pick-up arrangements on Foksville Rd will be required to ensure that Foksville Rd does not become heavily congested at the start and end of the school day.

There is little information available about how the school will manage parents picking-up/dropping-off their children at the school. We would continue to encourage all parties to come to a joint agreement on how to manage this issue so that the masterplan and school development plans do not conflict.

Construction phasing

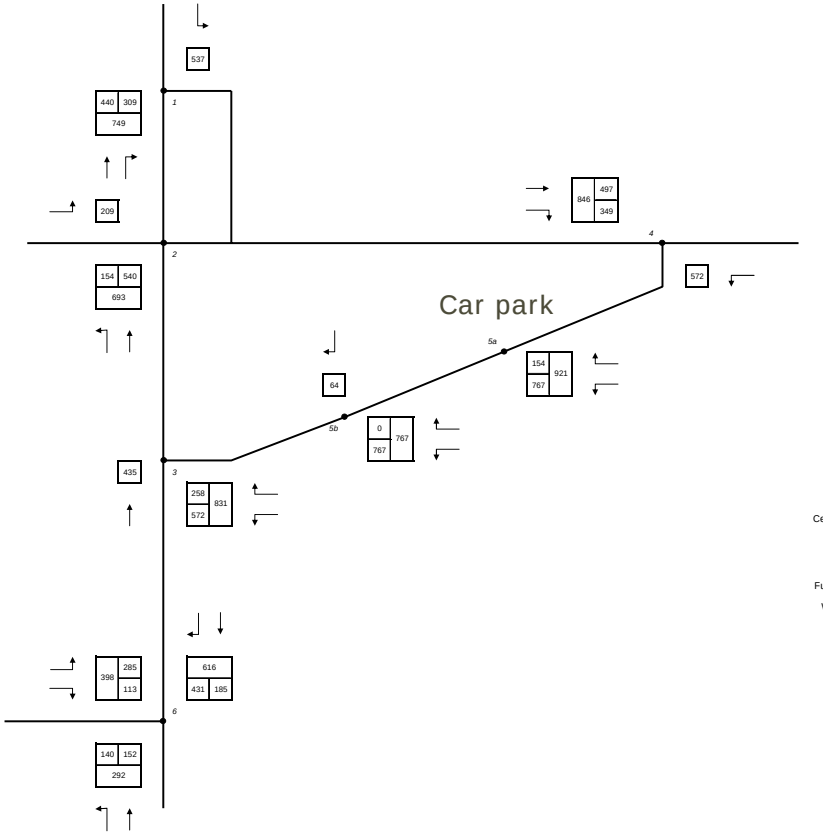
Converting the gyratory to full two-way operation in one phase (including sub-Phases) is highly desirable in order to reduce complexity, cost, and inconvenience to town centre users. This approach does however require committed funding to be in place for the full scheme.

In order to make best use of available funds when they are available, adopting a phased approach where some sections of the town centre network remain one-way whilst other sections are converted to two-way operation is a possibility. This approach has a number of disbenefits (network performance, safety implications, cost). The major risk is clearly not fully completing all phases of the conversion and having a 'transitional' town centre network in the long term that is sub-optimal.

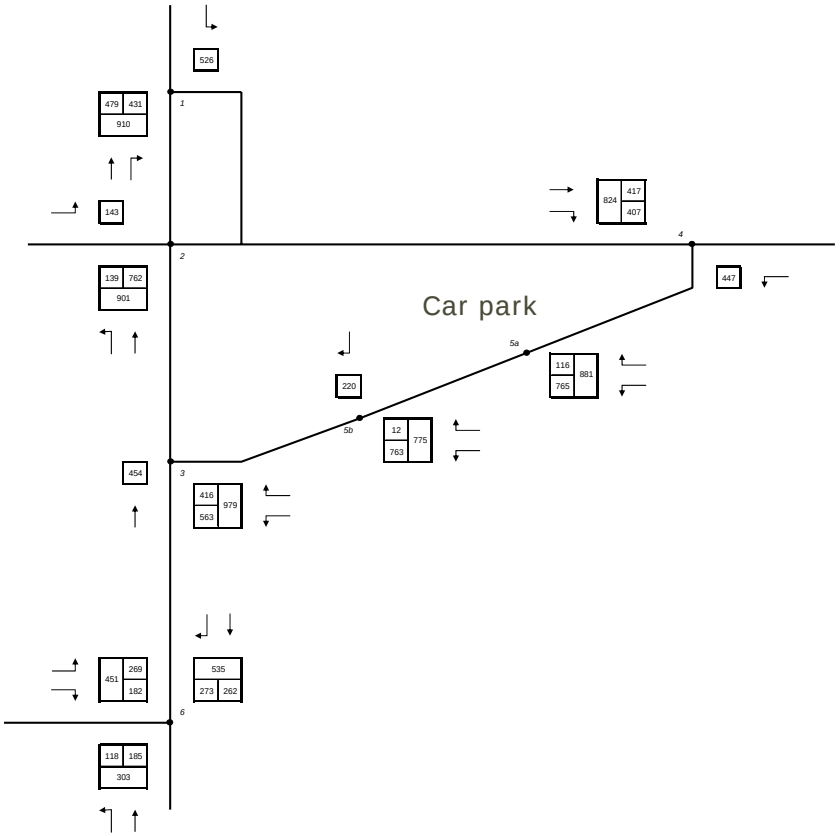
Technical Appendices

Appendix 1 – Base year flow data (Model #1)

AM peak period (8-9am)



PM peak period (5-6pm)



Appendix 2 – OD movements from Paramics

AM Matrix	Central Wall Rd	High St	Car Park	Furtherwick Rd	Waarden Rd	Total
Central Wall Rd	0	227	57	46	21	351
High St	92	0	14	225	33	364
Car Park	67	50	0	163	26	306
Furtherwick Rd	104	64	17	0	32	217
Waarden Rd	34	5	5	53	0	97
Total	297	346	93	487	112	1335

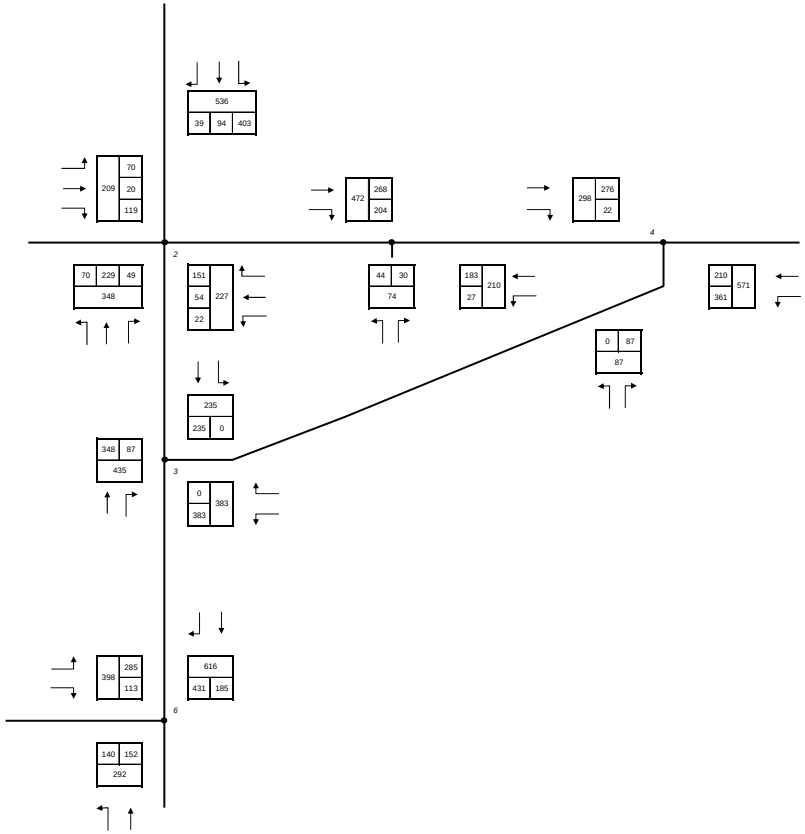
AM Matrix %	Central Wall Rd	High St	Car Park	Furtherwick Rd	Waarden Rd	Total
Central Wall Rd	0%	65%	16%	13%	6%	100%
High St	25%	0%	4%	62%	9%	100%
Car Park	22%	16%	0%	53%	8%	100%
Furtherwick Rd	48%	29%	8%	0%	15%	100%
Waarden Rd	35%	5%	5%	55%	0%	100%

PM Matrix	Central Wall Rd	High St	Car Park	Furtherwick Rd	Waarden Rd	Total
Central Wall Rd	0	165	76	148	19	408
High St	135	0	105	237	37	514
Car Park	57	28	0	79	5	169
Furtherwick Rd	136	70	134	0	31	371
Waarden Rd	53	29	7	29	0	118
Total	381	292	322	493	92	1580

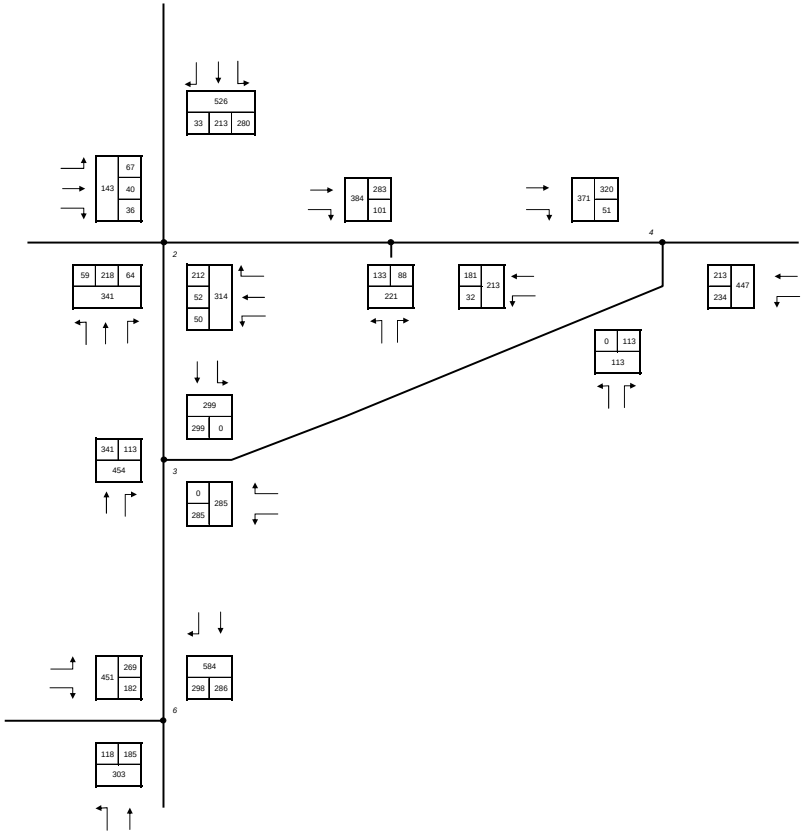
PM Matrix %	Central Wall Rd	High St	Car Park	Furtherwick Rd	Waarden Rd	Total
Central Wall Rd	0%	40%	19%	36%	5%	100%
High St	26%	0%	20%	46%	7%	100%
Car Park	34%	17%	0%	47%	3%	100%
Furtherwick Rd	37%	19%	36%	0%	8%	100%
Waarden Rd	45%	25%	6%	25%	0%	100%

Appendix 3 – Two-way flows (Model #2)

AM peak period (8-9am)



PM peak period (5-6pm)



NB Elder Tree Road assumed to be closed to through traffic – residential access only

Appendix 4 – Preferred Option assumptions

Preferred Option development quantums

Land Use	Classification	Existing quantum	Masterplan quantum	Netted quantum
Retail (non-food)	A1-A3	5,204m^2	12,455m^2	7,251m^2
Retail (food)	A1	3,600m^2	6,500m^2	2,900m^2
Employment	B1	0m^2	900m^2	900m^2
Other uses	Sui Generis	*uncertainty regarding actual use and netted quantums – assumed to be broadly neutral overall (particularly during peak periods)*		
Residential	C3	0 dwellings	240 dwellings	240 dwellings

Netting Off

The quantum, by land use, of existing development has been subtracted from the proposed masterplan quantums in order to provide 'net' development quantums and to avoid double counting.

However, we have not attempted to apply any other factors to account for changes to trip making patterns, in particular retail (food and non-food) trips. There is an existing trend for many retail trips to be made off island; however by increasing floorspace in the town centre it could be expected that an increased proportion of these trips could be kept on-island. As such, there may be fewer trips within and to/from the island than predicted using the unadjusted development quantums above.

Appendix 5 – Trip rates and mode shares

PERSON trip rates for AM and PM peak periods

Land Use	Netted quantum	AM Inbound	AM Outbound	PM Inbound	PM Outbound
Retail (non-food)	7,025m^2	2.83	2.00	5.17	4.67
Retail (food)	2,900m^2	5.23	3.22	10.92	11.10
Employment	900m^2	4.01	0.33	0.44	3.28
Residential	240 dwellings	0.65	1.05	0.68	0.44

Assumed trip mode shares

Land Use	Car Mode Share
Retail (non-food)	60%
Retail (food)	75%
Employment	65%
Residential	65%

[Mode share assumptions informed by Census Journey to Work dataset – where the headline car mode share for intra-island trips is 58% and off-island trips is 64%.]

Appendix 6 – Trip generation

PERSON trips for AM and PM peak periods

Land Use	Netted quantum	AM Inbound	AM Outbound	PM Inbound	PM Outbound
Retail (non-food)	7,025m^2	199	141	363	328
Retail (food)	2,900m^2	152	93	317	322
Employment	900m^2	36	3	4	29
Residential	240 dwellings	156	253	163	106
TOTAL		**543**	**489**	**847**	**785**

VEHICLE trips for AM and PM peak periods

Land Use	Netted quantum	AM Inbound	AM Outbound	PM Inbound	PM Outbound
Retail (non-food)	7,025m^2	119	84	218	197
Retail (food)	2,900m^2	114	70	237	242
Employment	900m^2	23	2	3	19
Residential	240 dwellings	101	164	106	69
TOTAL		**358**	**320**	**564**	**526**

Appendix 7 – School expansion analysis

Pupils

VARIABLE	VALUE	SOURCE
CURRENT PUPILS	370	Ofsted report
PLANNED PUPILS	1200	BSF TA
NET INCREASE	830	
% NET INCREASE	224%	

11-16 CAR MODE %	6%	NTS (<1 mile)
11-16 CAR MODE %	21%	NTS (1-2 mile)
SCHOOL TP CAR MODE %	23%	BSF TA
CAR MODE %	23%	^ (Robust)
PUPILS TRAVELLING BY CAR	191	

DROP-OFF % (8-9AM)	90%	Robust (BSF TA = 75%)
PICK-UP % (5-6PM)	25%	(BSF TA = 75% 3PM-5PM)
AM PEAK PUPILS	172	
PM PEAK PUPILS	48	

AM OCCUPANCY	1.5	Standard value
PM OCCUPANCY	1.2	Amended standard value
AM PEAK VEHICLES	115	
PM PEAK VEHICLES	40	

ASSIGNMENT % to/from Central Wall Rd	35%	Census pop'n by OA
ASSIGNMENT % to/from High St	30%	Census pop'n by OA
ASSIGNMENT % Furtherwick Rd (S)	10%	Census pop'n by OA
ASSIGNMENT % to/from Long Rd	20%	Census pop'n by OA
ASSIGNMENT % to/from Waarden Road	5%	Census pop'n by OA

Teachers

VARIABLE	VALUE	SOURCE
CURRENT STAFF	26	Based on 370*(79/1124)
PLANNED STAFF	84	Based on 1200*(79/1124)
NET INCREASE	58	
% NET INCREASE	224%	

STAFF CAR MODE %	90%	Robust
STAFF BY CAR	53	

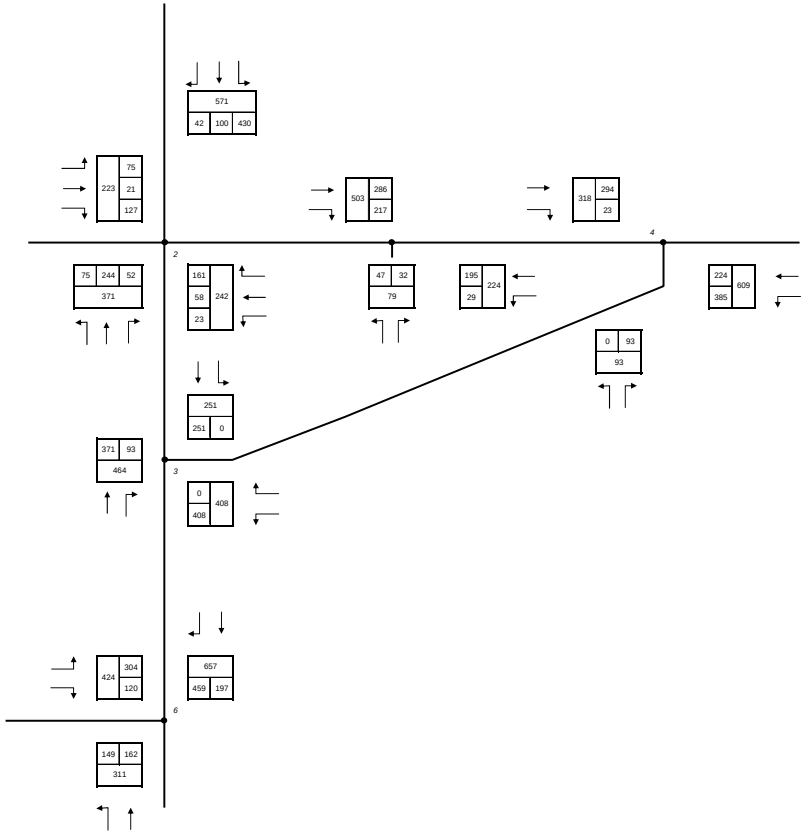
ARRIVAL % (8-9AM)	90%	Robust (BSF TA = 75%)
DEPARTURE % (5-6PM)	75%	(BSF TA = 75% 3PM-5PM)
AM PEAK STAFF	47	
PM PEAK STAFF	39	

AM OCCUPANCY	1.0	Standard value
PM OCCUPANCY	1.0	Amended standard value
AM PEAK VEHICLES	47	
PM PEAK VEHICLES	39	

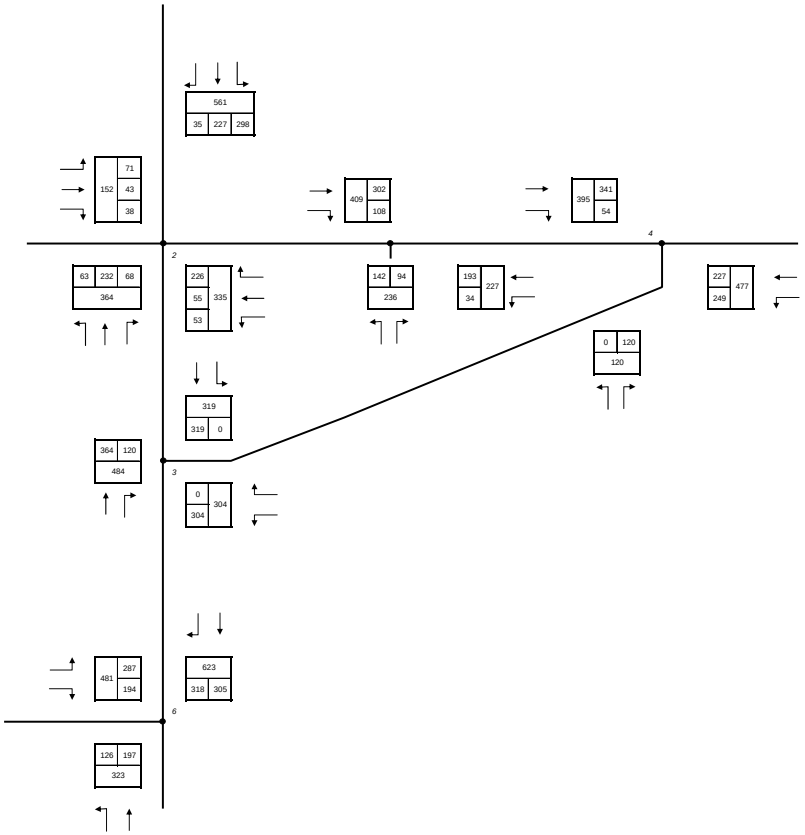
ASSIGNMENT % to/from Central Wall Rd	50%	Census pop'n by OA
ASSIGNMENT % to/from High St	15%	Census pop'n by OA
ASSIGNMENT % Furtherwick Rd (S)	10%	Census pop'n by OA
ASSIGNMENT % to/from Long Rd	20%	Census pop'n by OA
ASSIGNMENT % to/from Waarden Road	5%	Census pop'n by OA

Appendix 8a – Flows for Model #3 (2020 Future Base)

AM peak period (8-9am)



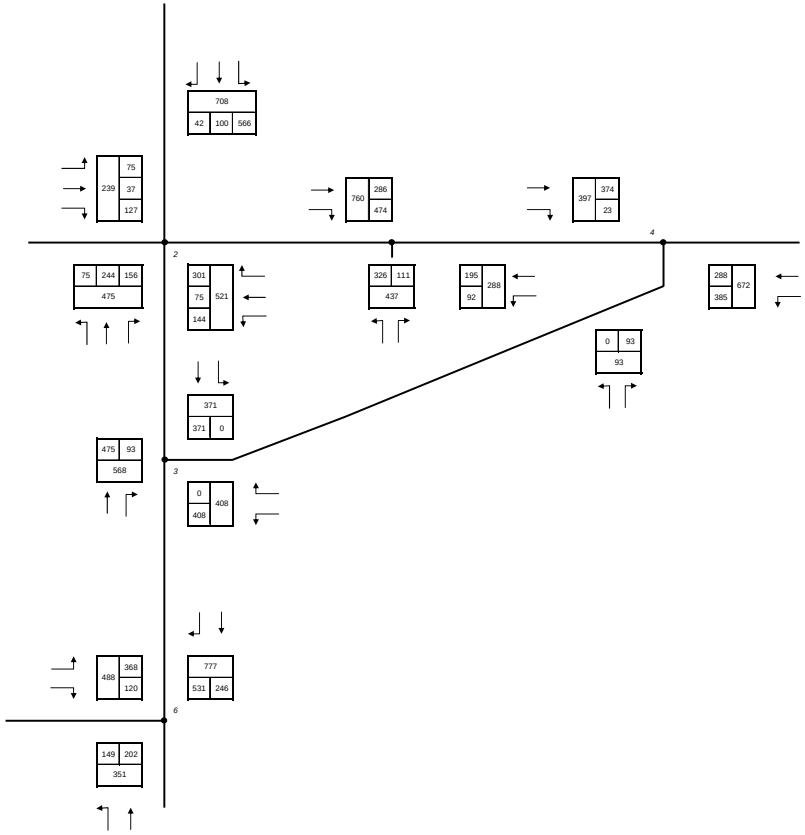
PM peak period (5-6pm)



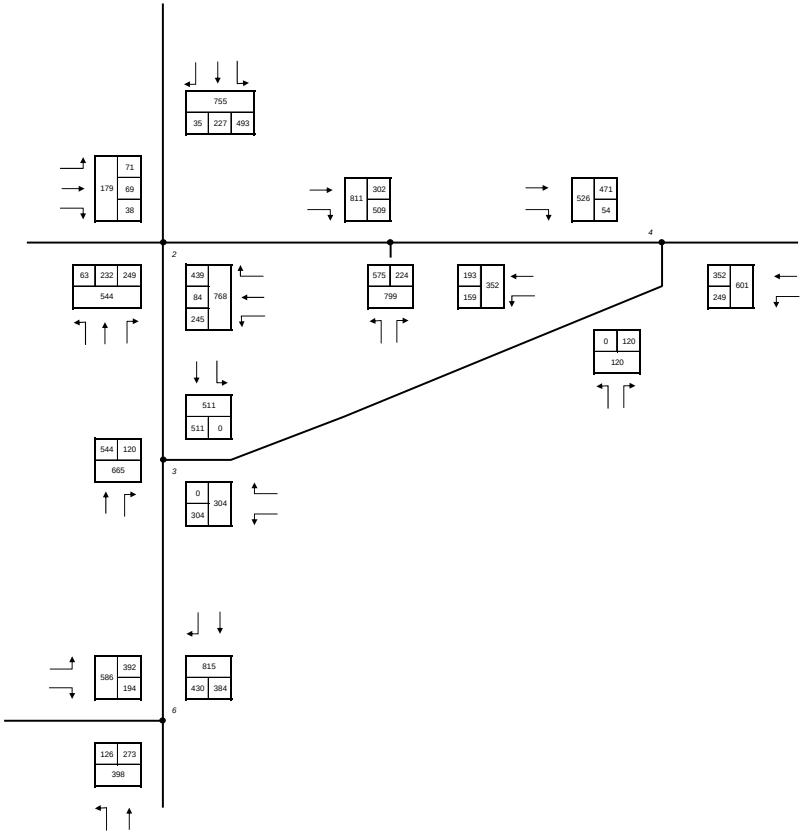
NB Elder Tree Road assumed to be closed to through traffic – residential access only

Appendix 8b – Flows for Models #4 + #5 (Masterplan)

AM peak period (8-9am)



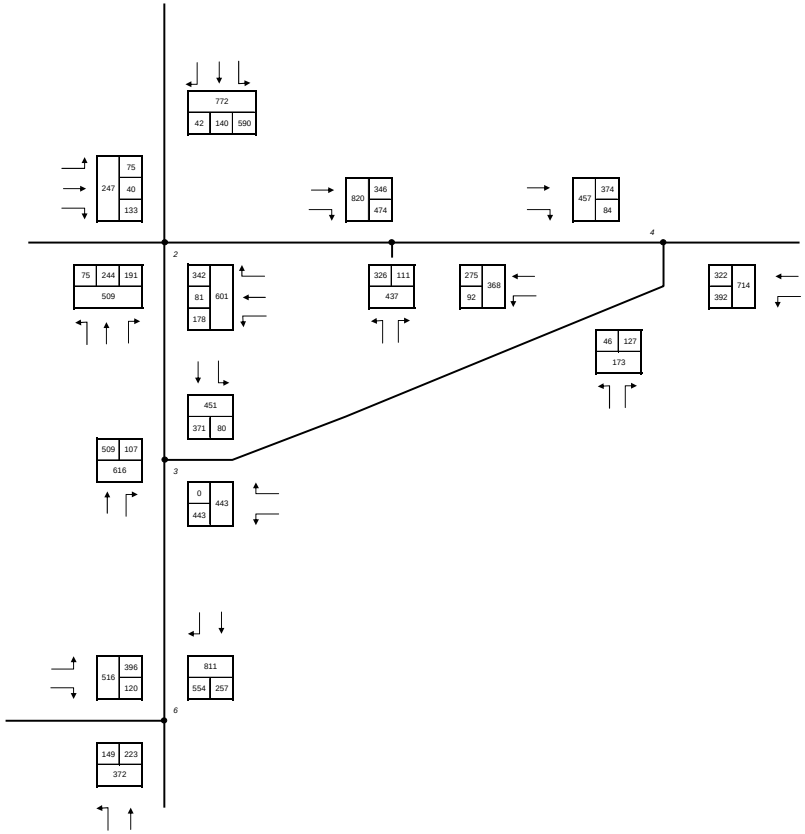
PM peak period (5-6pm)



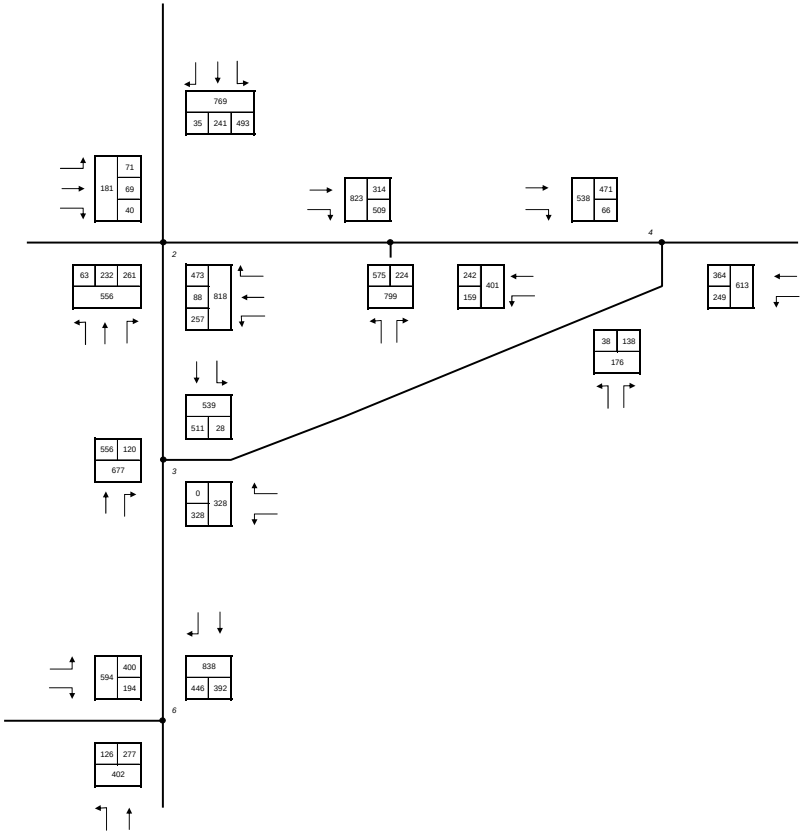
NB Elder Tree Road assumed to be closed to through traffic – residential access only

Appendix 8c – Flows for Model #6 (School)

AM peak period (8-9am)



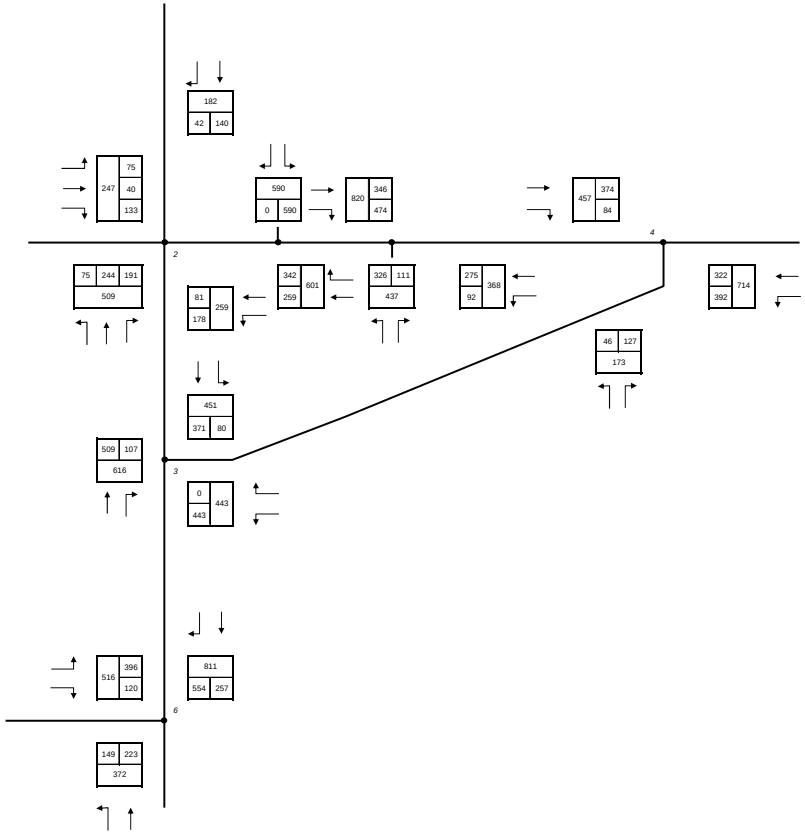
PM peak period (5-6pm)



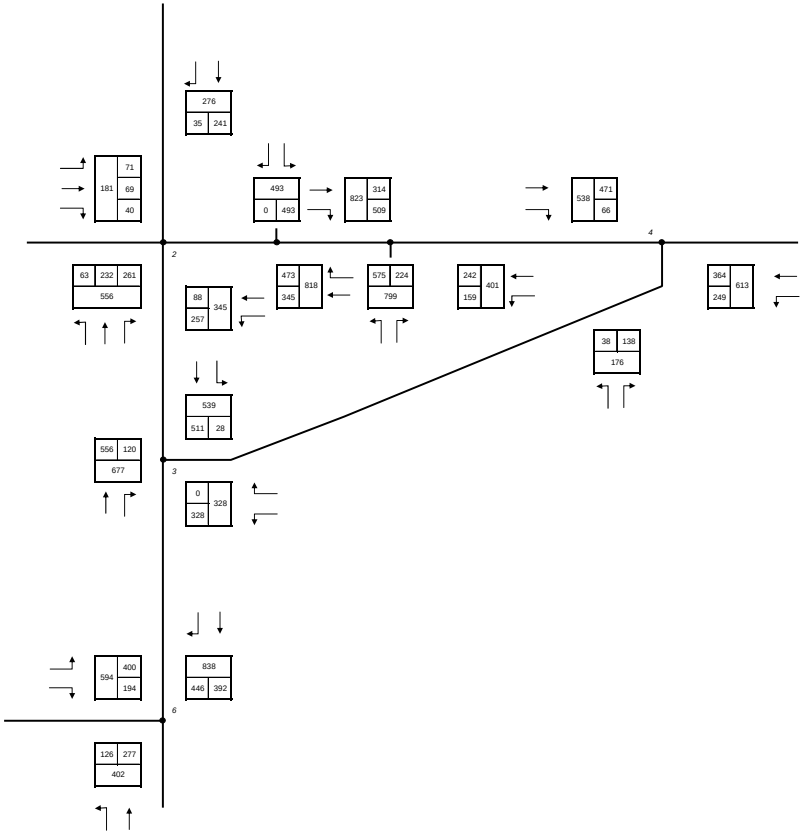
NB Elder Tree Road assumed to be closed to through traffic – residential access only

Appendix 8d – Flows for Models #7 + #8 (Elder Tree)

AM peak period (8-9am)



PM peak period (5-6pm)



NB Elder Tree Road assumed to be re-opened to through traffic

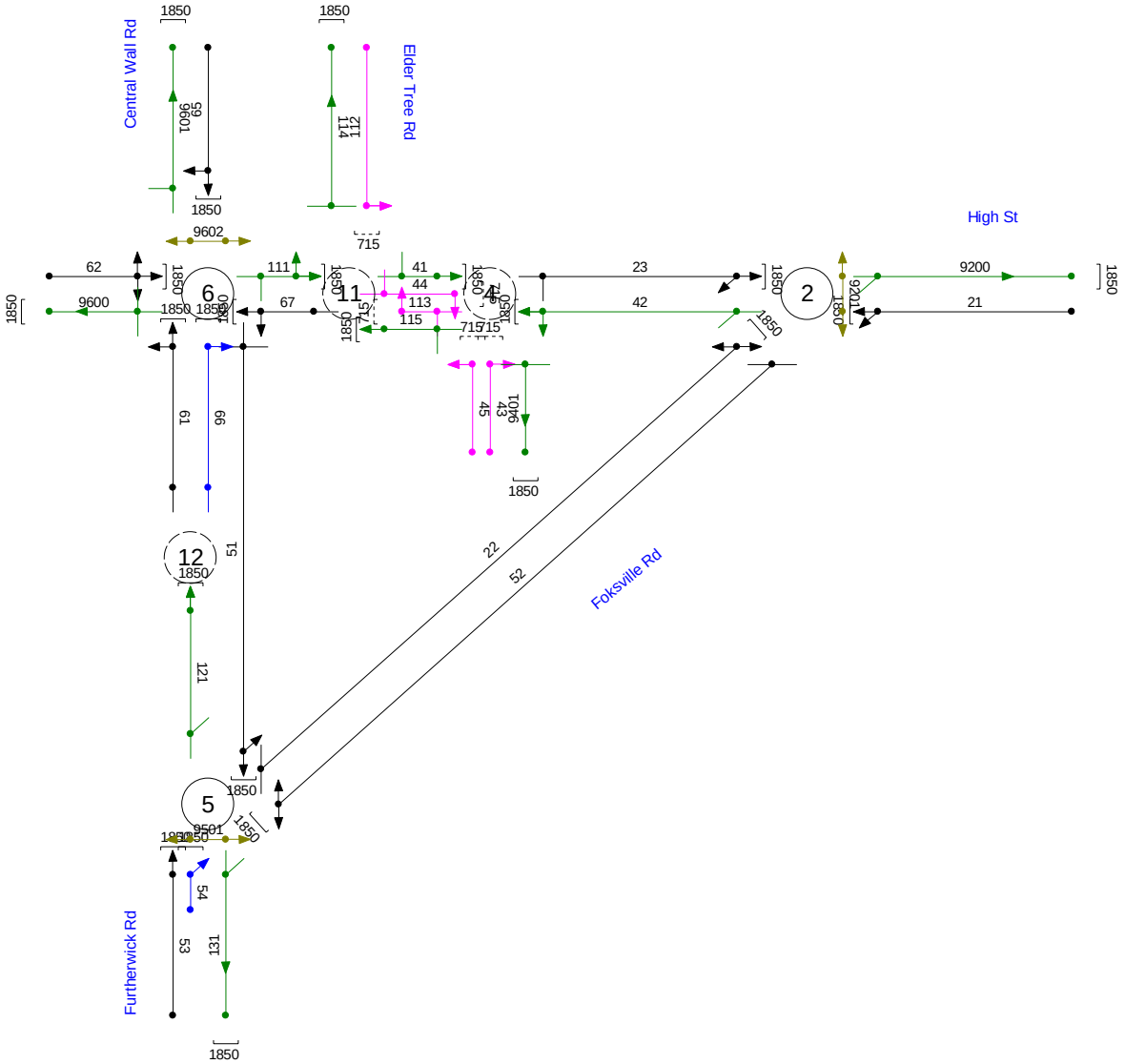
Appendix 9 – Summary TRANSYT model outputs

Junction	Type	Time	Model #3 2020 Base	Model #5 Masterplan + junction changes	Model #6 School expansion	Model #7 Elder Tree Rd re-opened	Model #8 Junction changes (reduction)
Junction improvements?			No	Yes	Yes	Yes	Yes [1]
High St / Foksville Rd	Signals	AM	56%	62%	71%	71%	70%
		PM	46%	61%	64%	64%	69%
Foksville Rd / Furtherwick Rd	Signals	AM	86%	75%	82%	82%	78%
		PM	81%	77%	79%	75%	71%
Long Rd / Furtherwick Rd	Mini-RBA	AM	64%	64%	79%	83%	83%
		PM	71%	71%	92% [2]	93% [2]	93% [2]
High St / Knightswick Rd / Furtherwick Rd	Signals	AM	89%	81%	84%	81%	81%
		PM	90%	89%	89%	83%	88%
High St / Elder Tree Rd	Mini-RBA	AM	Elder Tree Road closed			89%	89%
		PM				81%	81%
High St / Car park access	Mini-RBA	AM	48%	77%	83%	83%	83%
		PM	40%	88%	90%	90%	90%

1 Junctions reduced in scale/size to improve public realm whilst still maintaining operational performance

2 Minor junction changes proposed – junction performance can be further improved with additional improvements to reduce V/C to less than generally accepted 90% threshold

Appendix 10a – Final TRANSYT model outputs for Masterplan Preferred Option (Model #8) - Network



Appendix 10b – Final TRANSYT model outputs for Masterplan Preferred Option (Model #8) - AM Peak Period

TRANSYT Link Results Summary																		
AM																		
Link	Node	Actual Flow (PCU/H)	Sat. Flow (PCU/H)	Degree Of Saturation (%)	Mean Cruise Time Per PCU (sec)	Mean Delay Time Per PCU (sec)	Uniform Delay (PCU-H/H)	Rand + OverSat Delay (PCU-H/H)	Cost Of Delay (£/H)	Mean Stops Per PCU (%)	Cost Of Stops (£/H)	Mean Max Queue (PCU)	Average Excess Queue (PCU)	P.I. (£/H)	Green1 Start	Green1 End	Green2 Start	Green2 End
21	2	714	1850	69	16	18	2.3	1.1	48.9	72	16.5	12	0.0	65.4	5	46		
22	2	173	1850	70	23	42	0.9	1.1	28.3	124	6.9	5	0.0	35.2	51	60		
23	2	457	1850	44	10	13	1.2	0.4	23.3	55	8.1	6	0.0	31.4	5	46		
41	4	346	1850	19	5	2	0.0	0.1	1.6	2	0.2	0	0.0	1.8				
42	4	367	1850	20	10	2	0.0	0.1	1.8	2	0.2	0	0.0	1.9				
43	4	111	715	20	16	4	0.0	0.1	1.7	0	0.0	0	0.0	1.7				
44	4	475	715	75	5	13	0.2	1.5	23.1	42	6.3	6	0.0	29.5				
45	4	326	715	51	16	6	0.0	0.5	7.5	0	0.0	1	0.0	7.5				
51	5	451	1850	63	15	16	1.1	0.8	27.4	53	7.7	6	0.0	35.0	0	28		
52	5	443	1850	78	23	29	1.7	1.7	49.4	88	12.6	10	0.0	62.0	33	55		
53	5	509	1850	71	7	29	2.8	1.2	56.4	90	14.7	10	0.0	71.1	0	28		
54	5	107	1850	51	2	41	0.7	0.5	16.9	103	3.5	2	0.0	20.4	0	30		
61	6	319	1850	59	3	21	1.1	0.7	26.0	38	3.8	3	0.0	29.9	10	31		
62	6	247	1850	77	16	54	2.0	1.6	51.6	119	9.5	6	0.0	61.1	51	63		
65	6	182	1850	34	4	26	1.1	0.3	18.5	80	4.7	3	0.0	23.2	10	31		
66	6	191	1850	76	3	40	0.6	1.5	30.0	78	4.8	4	0.0	34.8	10	33		
67	6	258	1850	81	5	57	2.1	2.0	57.5	126	10.5	7	0.0	67.9	68	5		

Appendix 10c – Final TRANSYT model outputs for Masterplan Preferred Option (Model #8) - AM Peak Period

TRANSYT Link Results Summary																		
AM																		
Link	Node	Actual Flow (PCU/H)	Sat. Flow (PCU/H)	Degree Of Saturation (%)	Mean Cruise Time Per PCU (sec)	Mean Delay Time Per PCU (sec)	Uniform Delay (PCU-H/H)	Rand + OverSat Delay (PCU-H/H)	Cost Of Delay (£/H)	Mean Stops Per PCU (%)	Cost Of Stops (£/H)	Mean Max Queue (PCU)	Average Excess Queue (PCU)	P.I. (£/H)	Green1 Start	Green1 End	Green2 Start	Green2 End
111	11	231	1850	12	5	2	0.0	0.1	1.0	1	0.1	0	0.0	1.1				
112	11	590	715	89	16	23	0.0	3.6	52.0	36	6.8	7	0.0	58.8				
113	11	342	715	51	5	6	0.0	0.5	7.5	0	0.0	1	0.0	7.5				
114	11	10	1850	1	16	2	0.0	0.0	0.0	1	0.0	0	0.0	0.0				
115	11	258	1850	14	5	2	0.0	0.1	1.2	1	0.1	0	0.0	1.3				
121	12	519	1850	28	13	2	0.0	0.2	2.8	2	0.3	0	0.0	3.1				
131	5	813	1850	44	7	2	0.0	0.4	5.6	2	0.6	0	0.0	6.2				
9200	2	501	1850	27	16	2	0.0	0.2	2.6	2	0.3	0	0.0	2.9				
9201	2	10	9999	1	1	35	0.1	0.0	1.4	91	0.3	0	0.0	1.7	65	70		
9401	4	566	1850	31	16	2	0.0	0.2	3.1	2	0.3	0	0.0	3.5				
9501	5	10	9999	1	1	35	0.1	0.0	1.4	91	0.3	0	0.0	1.7	60	65		
9600	6	198	1850	11	16	2	0.0	0.1	0.8	1	0.1	0	0.0	0.9				
9601	6	850	1850	46	16	3	0.1	0.4	6.8	11	3.0	7	0.0	9.8				
9602	6	10	9999	1	1	35	0.1	0.0	1.4	91	0.3	0	0.0	1.7	36	41		

Appendix 10d – Final TRANSYT model outputs for Masterplan Preferred Option (Model #8) - PM Peak Period

TRANSYT Link Results Summary																		
PM																		
Link	Node	Actual Flow (PCU/H)	Sat. Flow (PCU/H)	Degree Of Saturation (%)	Mean Cruise Time Per PCU (sec)	Mean Delay Time Per PCU (sec)	Uniform Delay (PCU-H/H)	Rand + OverSat Delay (PCU-H/H)	Cost Of Delay (£/H)	Mean Stops Per PCU (%)	Cost Of Stops (£/H)	Mean Max Queue (PCU)	Average Excess Queue (PCU)	P.I. (£/H)	Green1 Start	Green1 End	Green2 Start	Green2 End
21	2	613	1850	58	16	15	1.8	0.7	35.8	62	12.3	9	0.0	48.0	66	31		
22	2	176	1850	69	23	42	0.9	1.1	28.7	120	6.8	5	0.0	35.4	36	46		
23	2	539	1850	51	10	14	1.6	0.5	29.3	56	9.6	7	0.0	38.9	66	31		
41	4	315	1850	17	5	2	0.0	0.1	1.5	1	0.1	0	0.0	1.6				
42	4	401	1850	22	10	2	0.0	0.1	2.0	2	0.2	0	0.0	2.2				
43	4	224	715	40	16	6	0.0	0.3	4.6	0	0.0	0	0.0	4.6				
44	4	509	715	81	5	18	0.4	2.1	35.6	62	10.2	10	0.0	45.8				
45	4	575	715	92	16	31	0.1	4.7	68.1	52	9.7	11	0.0	77.7				
51	5	539	1850	63	15	9	0.4	0.8	17.1	23	4.1	4	0.0	21.2	62	18		
52	5	328	1850	71	23	32	1.6	1.2	40.1	98	10.3	8	0.0	50.5	23	42		
53	5	556	1850	65	7	23	2.6	0.9	49.3	78	14.0	10	0.0	63.3	62	18		
54	5	120	1850	50	2	34	0.6	0.5	15.7	89	3.4	2	0.0	19.1	62	20		
61	6	295	1850	47	3	19	1.0	0.4	21.0	35	3.3	2	0.0	24.3	70	16		
62	6	181	1850	87	16	91	1.8	2.8	64.3	152	8.8	7	0.0	73.1	36	44		
65	6	276	1850	75	4	49	2.3	1.4	53.0	111	9.9	7	0.0	62.9	70	5		
66	6	261	1850	83	3	50	1.4	2.2	50.5	105	8.8	7	0.0	59.3	70	16		
67	6	345	1850	88	5	64	2.9	3.2	85.8	130	14.4	11	0.0	100.2	49	65		

Appendix 10e – Final TRANSYT model outputs for Masterplan Preferred Option (Model #8) - PM Peak Period

TRANSYT Link Results Summary																		
PM																		
Link	Node	Actual Flow (PCU/H)	Sat. Flow (PCU/H)	Degree Of Saturation (%)	Mean Cruise Time Per PCU (sec)	Mean Delay Time Per PCU (sec)	Uniform Delay (PCU-H/H)	Rand + OverSat Delay (PCU-H/H)	Cost Of Delay (£/H)	Mean Stops Per PCU (%)	Cost Of Stops (£/H)	Mean Max Queue (PCU)	Average Excess Queue (PCU)	P.I. (£/H)	Green1 Start	Green1 End	Green2 Start	Green2 End
111	11	340	1850	18	5	2	0.0	0.1	1.6	2	0.2	0	0.0	1.8				
112	11	493	715	77	16	13	0.0	1.6	23.9	23	3.7	4	0.0	27.5				
113	11	473	715	74	5	12	0.1	1.4	21.8	35	5.3	6	0.0	27.1				
114	11	9	1850	1	16	2	0.0	0.0	0.0	1	0.0	0	0.0	0.0				
115	11	345	1850	19	5	2	0.0	0.1	1.6	1	0.2	0	0.0	1.8				
121	12	566	1850	31	13	2	0.0	0.2	3.1	2	0.3	0	0.0	3.4				
131	5	838	1850	45	7	2	0.0	0.4	5.9	2	0.6	0	0.0	6.5				
9200	2	610	1850	33	16	2	0.0	0.2	3.5	2	0.4	0	0.0	3.8				
9201	2	10	9999	1	1	38	0.1	0.0	1.5	92	0.3	0	0.0	1.8	51	56		
9401	4	668	1850	36	16	2	0.0	0.3	4.0	2	0.4	0	0.0	4.4				
9501	5	10	9999	1	1	38	0.1	0.0	1.5	92	0.3	0	0.0	1.8	47	52		
9600	6	186	1850	10	16	2	0.0	0.1	0.8	1	0.1	0	0.0	0.9				
9601	6	1038	1850	56	16	4	0.3	0.6	12.9	28	9.4	17	0.0	22.3				
9602	6	10	9999	1	1	38	0.1	0.0	1.5	92	0.3	0	0.0	1.8	21	26		