APPENDIX B

Extracted Traffic Analysis from Options Selection Report

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3 TRAFFIC ANALYSIS

At project commencement, RPS developed draft high-level proposals to assess what implications potential urban realm improvements may have on existing traffic flows and traffic congestion.

These proposals will each compliment and facilitate urban realm improvements by removing unnecessary traffic from the core retail area to enhance and increase the safety of the pedestrian environment. Removal of traffic from these areas will also facilitate the redistribution of road space to urban realm space.

3.1 Traffic Model

In order to assess the traffic implications of the high-level proposals, a traffic model was used to predict the potential traffic congestion and trip patterns. The 'Paramics' software package was used to model and carry out this assessment.

3.1.1 Traffic Data

This assessment is based on an existing traffic model, created in the Paramics software package and provided to RPS by Tipperary County Council in April 2019. The traffic model was based on surveys carried out on Tuesday 8th May 2018, over an 11-hour period between 07:30 to 18:30, using Automatic Number Plate Recognition cameras. The survey involved a cordon of 12 sites (A-M), plus 4 additional sites (i-iv) at locations inside the cordon. These sites are illustrated below in **Figure 3-1.**

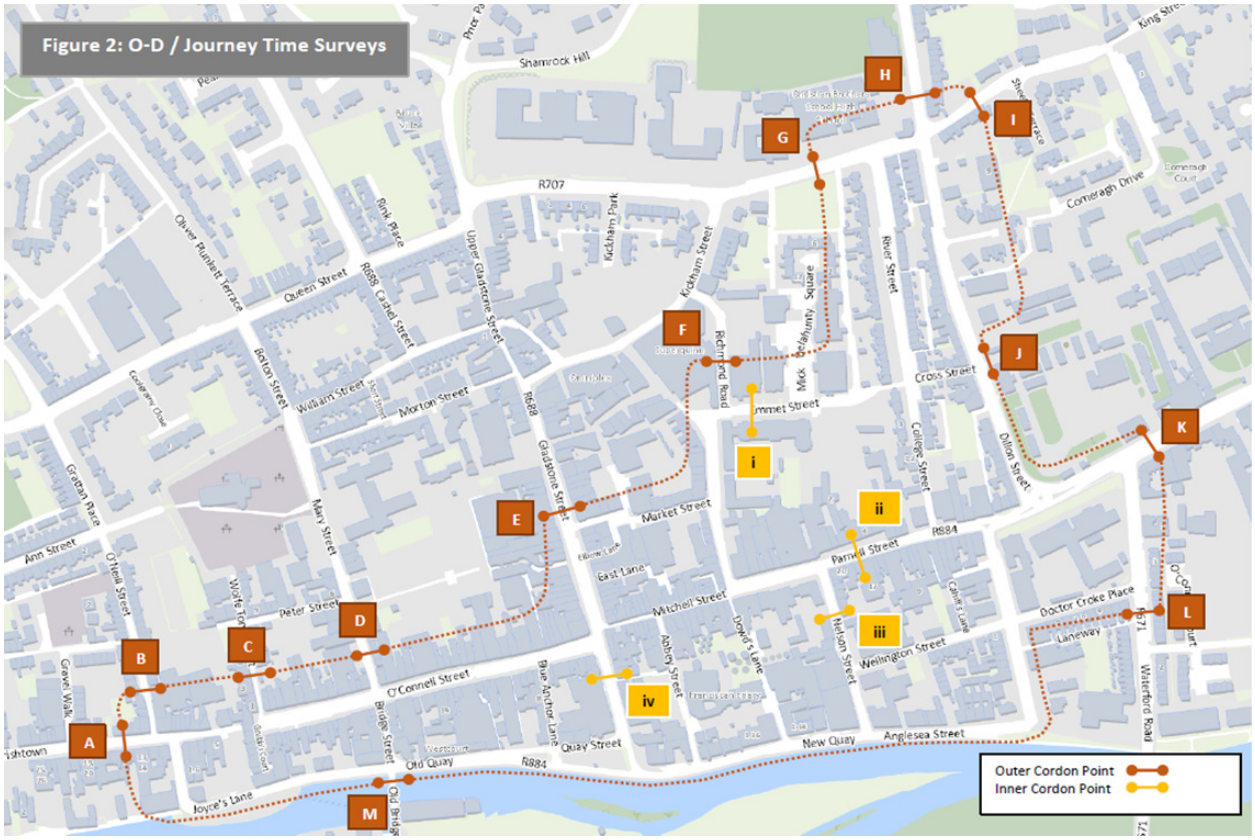


Figure 3-1 Traffic Survey Locations

RPS commissioned a parking survey, that was carried out on 14th June 2019, to assess the usage of both on-street parking areas within the town centre and the off-street car parks which provide an alternative. Results are summarised in Section 6 of this Report.

3.1.2 Traffic Model Development

A significant upgrade of the existing model was undertaken:

- The modelled area was extended slightly to take in the Kickham Street car park and the Mary Street car park.
- The original survey dataset was re-analysed to distinguish through traffic from trips making a stop within the town centre.
- The external zones of the model where traffic enters and leaves the model area were supplemented by a set of internal zones representing public car parks and on-street parking areas within the survey cordon.
- Trips to and from the town centre were distributed amongst these internal zones in proportion to usage figures from the parking survey.
- The expanded traffic model was calibrated to observed journey times for through traffic on a number of key routes through the town centre.

Having verified that the model is a satisfactory representation of base year 2018/2019 conditions, a future year scenario was developed to represent traffic conditions as they are likely to be in 2024/2025. This scenario included:

- standard traffic growth rates as published by TII, applied to traffic volumes entering/exiting the study area on major roads
- half of that growth rate applied to traffic volumes to and from other zones within the model, reflecting scope for mode-switching for shorter-distance journeys
- explicit representation of development proposals considered to be "committed" (i.e. very likely or near-certain to happen prior to 2024/2025)

This model represents a "Do-Nothing" future scenario, illustrating likely levels of traffic congestion in the absence of any traffic management measures being applied within the town centre.

3.2 Traffic Analysis Process

The following appraisal process was carried out to analyse the effects of the draft proposals on traffic congestion within the study area;

1. Option identification - generating a range of options to address congestion issues and/or remove traffic from streets within the retail centre in order to improve the urban realm,
2. Sifting the original list down to a shortlist of feasible options which merit more detailed consideration,
3. Using the traffic model to assess the traffic consequences of each option to determine the likely impact on congestion.
4. Refining the design of each option to mitigate any undesirable consequences and build on the strengths of the scheme.

Note that the model covers the town centre area only. Wider-area measures that might take through traffic out of the town centre area altogether were not assessed as part of this study.

3.3 Traffic Management Options Identified

In order to improve the urban realm to enhance pedestrian usage, footpath widening will be required. To provide wider footpaths, space will need to be taken from the road carriageway along the core retail area and some adjacent streets. Significantly different options can be facilitated where a street is pedestrianised (either entirely or allowing vehicular entry for access only) or reduced from two-way to one-way.

In generating these options, the particular focus is on the Main Guard and the streets approaching this historic central location. The Brief notes that *"It is intended that the Main Guard will be the town's meeting point, the focal point for festivities and the location for many town and civic events."*

Each option specifies reductions in road space for moving traffic that may be environmentally desirable in order to facilitate improved urban realm. There may be traffic management measures that are necessary in order to get this to work satisfactorily.

A total of 10 traffic management proposals were identified as listed below;

Baseline – Make no change to the existing traffic system (Do-Nothing)

Traffic Proposal 1 – Make O'Connell St. one way eastbound from junction with Bridge St. to the Main Guard.

Traffic Proposal 2 – Pedestrianize O'Connell St between Mary St and Sarsfield St.

Traffic Proposal 3 – Pedestrianize Sarsfield St., make O'Connell St. one way eastbound from junction with Bridge St. to the Main Guard, and change the one-way system on the New Quay road to two-way from the south of Sarsfield St. to the south of Anglesea St.

Traffic Proposal 4 – As Option 1 and including pedestrianizing the section of Gladstone St. between Market St. and the Mary St. car park entrance

Traffic Proposal 5 – Make O'Connell St. one way eastbound from the junction with Bridge St. to the Main Guard, reverse the one-way system on Sarsfield St. to southbound, change the one-way system on the New Quay road to two-way from the south of Sarsfield St. to the south of Anglesea St., pedestrianize Gladstone St. between Market St. and Market Place

Traffic Proposal 6 - Make O'Connell St. one way eastbound from junction with Bridge St. to the Main Guard, reverse the one-way system on Sarsfield St. to southbound, create one-way system westbound along the Quay road between south of Sarsfield St. and south of Bridge St., reverse one-way system on Bridge St. from southbound to northbound, create two-way system along the Quay Road from Irish Town to south of Bridge St., reverse one-way system along Wolfe Tone St. from southbound to northbound, create one-way system along Peter St. eastbound and make no other changes to the existing traffic system

Traffic Proposal 7 – Create a left turn only from Sarsfield St.

Traffic Proposal 8 – Create one-way system on Gladstone St. between Market St. and Mary St. car park entrance, reverse one-way system on Market St. from eastbound to westbound, and change the one-way system on the New Quay road to two-way from the south of Sarsfield St. to the south of Anglesea St.

Traffic Proposal 9 – Pedestrianize O'Connell St. from West Gate to Main Guard, Pedestrianize Sarsfield St., pedestrianize Gladstone St. from the Main Guard to Market St., create a two-way system along the Quays road from Irish Town to the south of Anglesea St., reverse the one-way system along Wolfe Tone St. from southbound to northbound, and make Peter St. one-way eastbound.

Traffic Proposal 10 – change the one-way system so as to allow two-way traffic along the Quays, to attract through traffic away from shopping streets.

3.4 Option Refinement

Elements from the above initial traffic proposals that were considered feasible and likely to be acceptable to Tipperary County Council were combined and refined in order to form a shortlist of three traffic management proposals. These are the proposals subject to modelling, appraisal and comparison in this report.

Figure 3-2 shows the Do-Nothing situation, in which the existing one-way system and junction layouts remain.

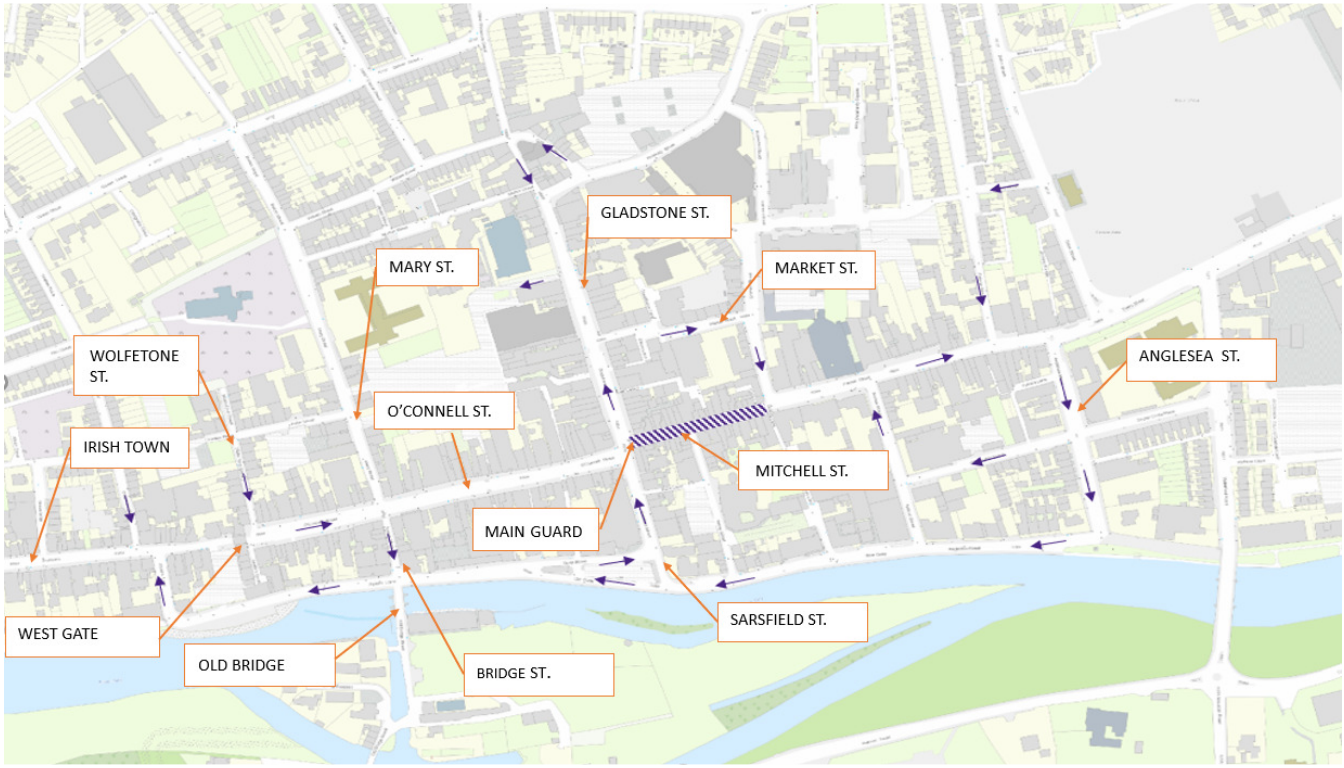


Figure 3-2 Do-Nothing Situation

Option 1, as shown in **Figure 3-3,** is focused on the main retail streets, simultaneously reducing the width of the operating carriageway (so as to reallocate to pedestrian usage and public open space) and improving traffic flow by targeted junction improvements.

Option 1 – Core Scheme;

- O'Connell St. to be one lane, one-way eastbound from West Gate to Main Guard. Footpaths to be widened using space taken from road following reduction to one lane,
- Gladstone St. to be one lane, one-way from the Main Guard to the Mary St. car park entrance. Footpaths to be widened using space taken from road following reduction to one lane.
- Re-construct the junction of Anglesea St. and Parnell St. so that right and left turns into the two traffic lanes on Anglesea St can happen simultaneously.
- Remove existing herring bone car parking arrangement at western section of O'Connell St with a parallel parking arrangement to increase visibility and safety for vehicles and cyclists by reducing conflicts as vehicles currently must reverse on to the carriageway to leave parking bays.
- Upgrade the pedestrian crossing on The Quay to a zebra crossing to facilitate pedestrian access between the Old Bridge and Bridge St.

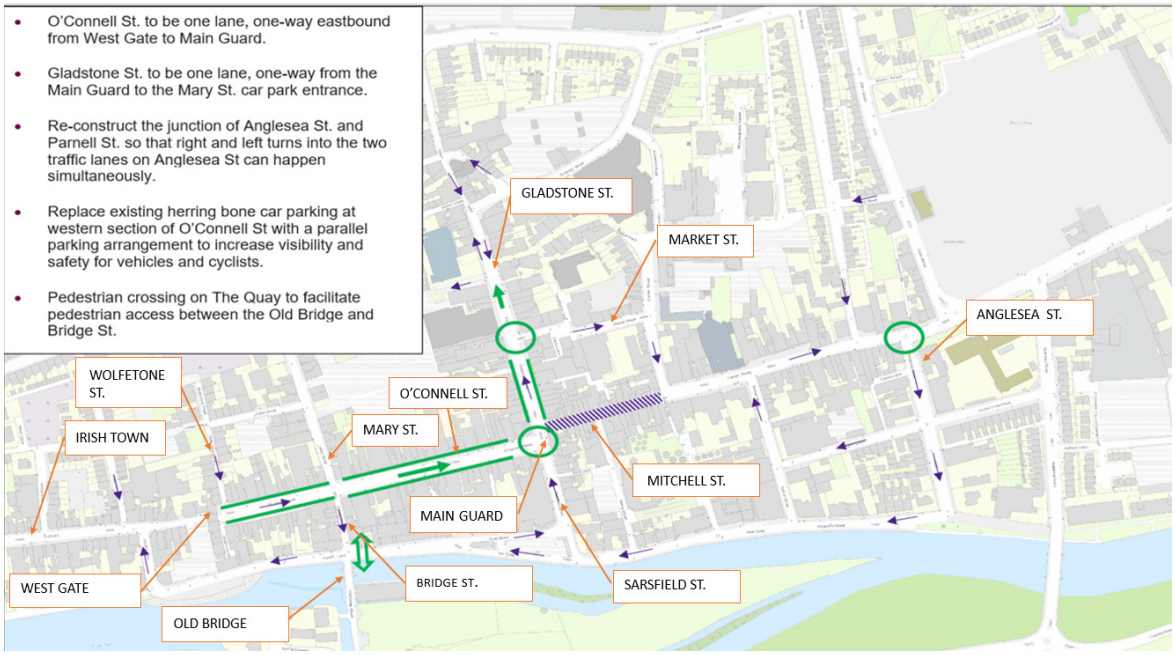


Figure 3-3 Option 1

Option 2, illustrated in **Figure 3-4**, extends this core scheme to include further traffic management proposals to improve on the overall urban realm experience for pedestrians. Measures shown in green are the same as in Option 1, measures shown in red are additional. Note that Peter St. is a narrow street, with sufficient space for 2 cars to pass only at a low speed. It is proposed that the existing parking restrictions on Peter St. will remain to ensure clear passage is maintained.

Option 2 – Extended Scheme, as Option 1 but including;

- Reversed one-way system along Wolfe Tone St. and Nelson St.,
- Mary St. to become one-way southbound from junction with Peter St.,
- Gladstone St. to be one-way northbound for its entire length

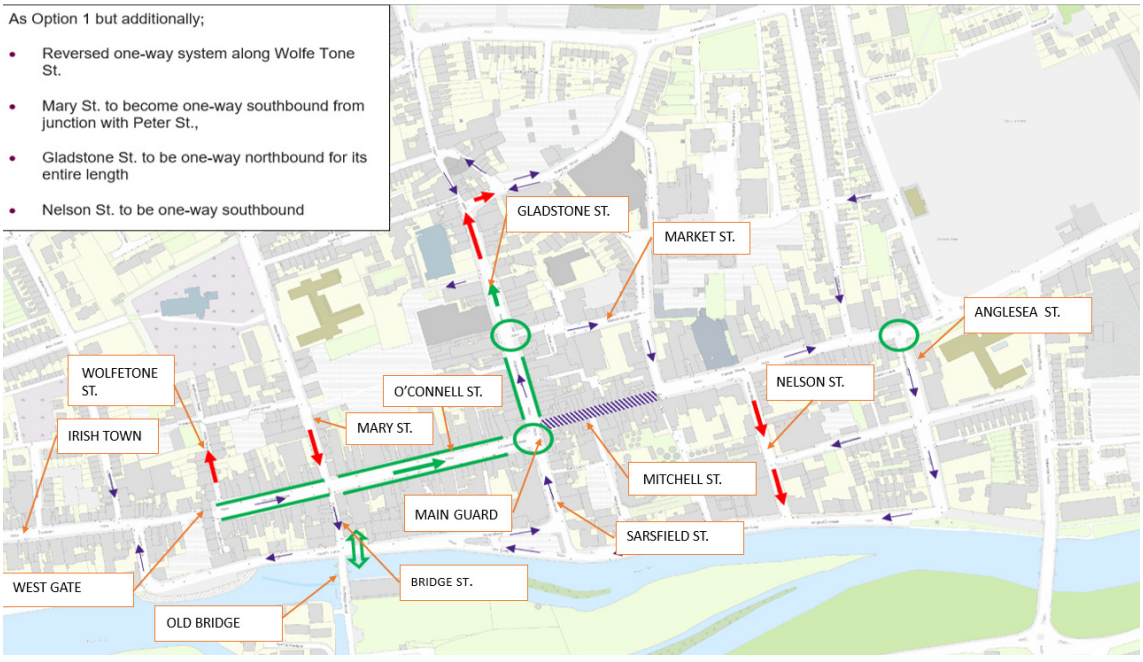


Figure 3-4 Option 2

Option 3 includes the core scheme proposal, but additionally a reversed one-way system along Wolfe Tone St., and for Mary St. to become one-way southbound from the junction with Peter St., Option 3 also provides an alternative traffic route outside of the core retail area, so as to further reduce the traffic volumes within the core retail area and thus improve further the urban realm experience for pedestrians. This is summarised in **Figure 3-5.** Measures shown in green and red are the same as in Options 1 and 2. Measures shown in blue are additional.

This option replaces the one-way system on the R884 New Quay road with two-way operation from the south of Sarsfield St. to the south of Anglesea St. Anglesea St. becomes two-way from New Quay road to its junction with Dr. Croke Place.

In order to implement this, changes would be required at four key junctions:

- Introduction of a mini-roundabout at the junction of Anglesea St. with Dr. Croke Place
- A short right turn lane to be installed on Dr. Croke Place to Old Waterford Road. This would require some land take
- Changes to the junction at the Old Bridge, banning the right turn from the bridge, giving prioirity at the junction to left turn movements from the Old Bridge over all other movements. Traffic from Bridge St. will have priority over traffic approaching along The Quay Road and will yield to traffic from the Old Bridge.
- The southern end of Sarsfield St, past the Quay car park, to become two-way, to allow eastbound travel along the quays.
- Widening of the Old Bridge to mitigate potential conflicts for space from larger vehicles using this narrow bridge. It is noted that this widening is not modelled in the traffic model and is proposed only to provide for easier passage of pedestrians.

All revised junction layout options are illustrated in **Appendix A**

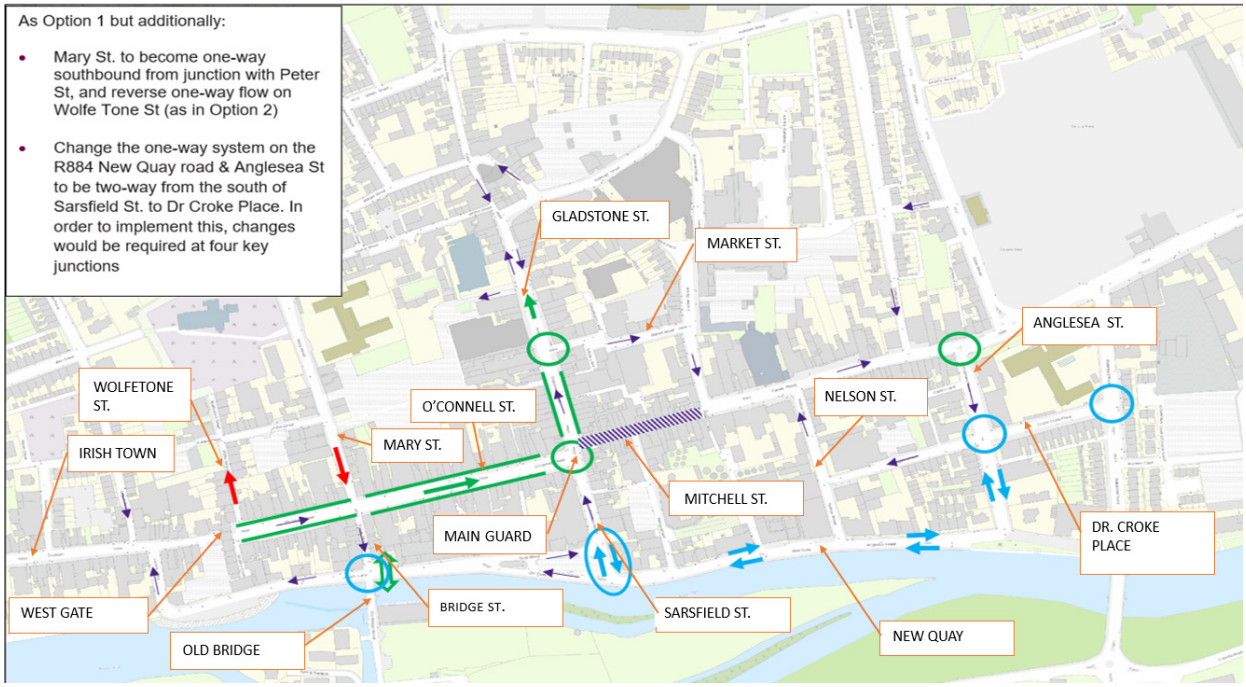


Figure 3-5 Option 3

3.5 Summary of Traffic Analysis Results

Options 1 to 3 above were modelled using the Paramics software.

Table 1-1 summarises the results of the model and analysis of other effects.

Option 1	Option 2	Option 3
Positive Effects	**Positive Effects**	**Positive Effects**
• Reduces traffic congestion in the town centre • Gives opportunity to increase public realm space on O'Connell St. and Gladstone St. • Gives opportunity to widen footpath on Bridge St.	• Reduces traffic congestion in the town centre • Gives opportunity to increase public realm space on O'Connell St. and Gladstone St. • Gives opportunity to widen footpath on Bridge St. and Mary St.	• Reduces traffic congestion in the town centre • Reduces congestion at West Gate and Sarsfield St. • Gives opportunity to increase public realm space on O'Connell St. and Gladstone St. • Gives opportunity to widen footpath on Bridge St.
Negative Effects	**Negative Effects**	**Negative Effects**
• Loss of 27 on-street car parking spaces on O'Connell St. • Loss of 19 on-street car parking spaces on Gladstone St. • Loss of 4 on street car parking spaces on Sarsfield St. • Total 50 on-street car parking spaces lost	• Loss of 27 on-street car parking spaces as per option 1 • Loss of 19 on-street car parking spaces on Gladstone St. • Loss of 4 on-street car parking spaces on Sarsfield St. • Traffic volume on Peter St. increases • Total 50 on-street car parking spaces lost	• Loss of 27 on-street car parking spaces as per option 1 • Loss of 19 on-street car parking spaces on Gladstone St. • Loss of 4 on-street car parking spaces on Sarsfield St.Loss of 42 on-street car parking spaces along the New Quay road • Loss of 1 space on Anglesea St. • Increased pressure on traffic lights at Davis Road, due to changes in turning movements • Requirement for improvements at key junctions to cope with changes in traffic patterns • Widening of Old Bridge is likely to be costly as it spans across the Suir River Special Area of Conservation and will require significant environmental mitigation measures. • Total 93 on-street car parking spaces lost

Table 3-1 Traffic Option Analysis Summary

Error! Reference source not found.**Table 3-2** shows the modelled reduction in traffic queuing arising from each option.

In each case there are two measures of queueing, each of which is summed over the whole of the modelled network and averaged over each hour of the modelled day. The software reports, for each modelled half-hour, the typical length of queue (50th percentile) and the length of queue that is only occasionally exceeded (95th percentile). Queue lengths are in metres. For example, in the future Do-Nothing, the typical queue length (50th percentile) is 10.3m, approximately two car-lengths.

Percentage changes are relative to the future year Do-Nothing situation.

Average queue length (metres)		95th Percentile	50th Percentile
Do Nothing	**Average Queue Length**	**16.5**	**10.3**
Option 1	**Average Queue Length**	**15.3**	**9.95**
	% change on Do Nothing	*-7.35%*	*-3.2%*
Option 2	**Average Queue Length**	**16.5**	**10.00**
	% change on Do Nothing	-0.15%	-2.75%
Option 3	**Average Queue Length**	**15.3**	**9.86**
	% change on Do Nothing	-7.35%	-4.05%

Table 3-2 Network-wide Queuing Summary

These queue lengths are averages (for all the congested and uncongested roads modelled), over all the busy and less-busy times of day, as a high-level summary statistic that indicates the overall extent of queuing across the road network. These change for the different scheme options.

In terms of maximum queues (95th percentile), both Option 1 and Option 3 give a significant reduction, whereas Option 2 has little overall benefit.

In terms of typical queues (50th percentile), Option 3 performs better than Option 1, which in turn performs better than Option 2.

Figure 3-6 shows the key junctions affected by the scheme, and the approaches to each junction that are subject to queueing.

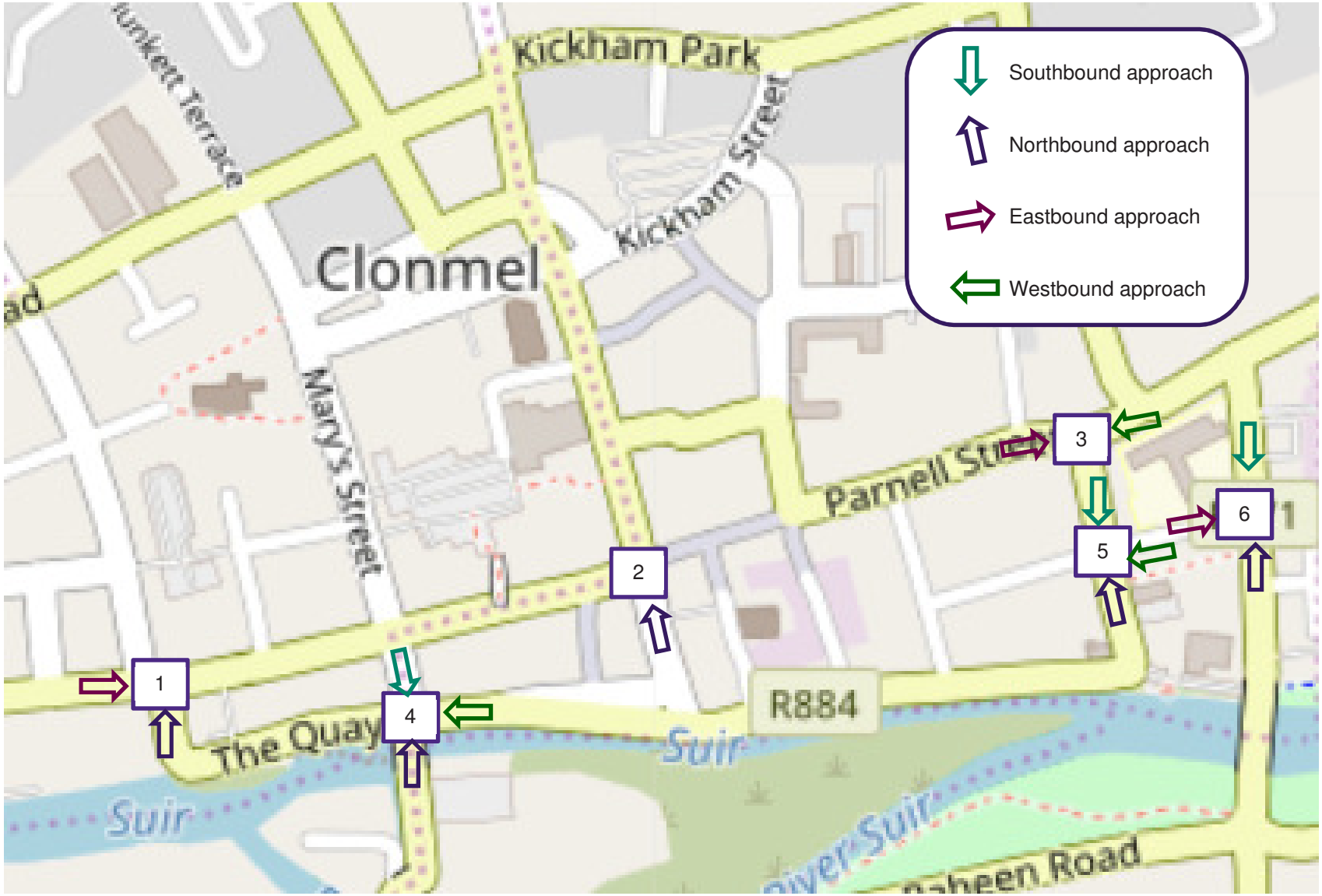
Error! Reference source not found. disaggregates the results presented in Error! Reference source not found.**,** to show the impact of each option on the different approaches to the town centre junctions that are most affected.

In the Do-Nothing situation, the traffic model shows the Joyce's Lane / Irishtown Junction affected by queues blocking-back from the Mary St / O'Connell St junction and from parking delays on O'Connell St West. Option 1 improves this a little. Option 2 appears to improve this significantly by diverting a proportion of the traffic via Wolfe Tone St. Option 3 then worsens the situation a little relative to Option 2 as traffic cannot divert through Wolfe Tone St. as it is one-way southbound in Option 3.

On Davis Road, Option 3 reduces the efficiency of the signalised junction by increasing the proportion of traffic that is right-turning. This impact is included in the total queuing statistics, and is not expected to be disproportionately large.

Changing the priority at the Old Bridge junction (Junction 4) does increase queuing for westbound traffic along the Quay. Otherwise, Option 3 generally performs best of the three options in terms of reducing traffic congestion and traffic volumes within the primary retail area.

Figure 3-6 Key junctions and approaches subject to queuing



	Average queuing - 50th percentile							Average queuing - 95th percentile						
	Do-Nothing	Option 1		Option 2		Option 3		Do-Nothing	Option 1		Option 2		Option 3	
1. Irish Town Rd / Joyce's Lane														
	Queue Length (m)	**Queue Length (m)**	**Change from Do-Nothing**	**Queue Length (m)**	**Change from Do-Nothing**	**Queue Length (m)**	**Change from Do-Nothing**	**Queue Length (m)**	**m Queue Length (m)**	**Change from Do-Nothing**	**Queue Length (m)**	**Change from Do-Nothing**	**Queue Length (m)**	**Change from Do-Nothing**
Northbound (Joyces Lane)	23.7	21.5	-10%	*9.77*	-59%	9.81	*-59%*	37.4	32.2	*-14%*	*11.6*	*-69%*	13.6	*-64%*
Eastbound (Irish Town)	25.0	24.9	0%	*7.51*	-70%	9.15	*-63%*	38.0	38.1	*0%*	*9.9*	*-74%*	11.9	*-69%*
2. O'Connell St / Sarsfield St														
Northbound (Sarsfield St.)	25.1	17	*-32%*	*25.89*	3%	16.98	*-32%*	44.1	31.9	*-28%*	*45.8*	*4%*	24.0	*-46%*
5. Parnell St/ Anglesea St														
Westbound (Anglesea St.)	13.55	10	*-26%*	*7.97*	*-41%*	6.21	*-54%*	22.4	15.3	*-32%*	*10.8*	*-52%*	8.6	*-62%*
Eastbound (Parnell St)	24.15	21.7	*-10%*	*15.86*	*-34%*	6.29	*-74%*	33.8	28.7	*-15%*	*19.4*	*-43%*	8.6	*-75%*
6. Bridge St / The Quay / Old Bridge														
Southbound (Bridge St.)	15.5	16.2	*5%*	*17.36*	*12%*	11.21	*-28%*	25.1	27.3	*9%*	*30.7*	*22%*	21.7	*-14%*
Westbound (The Quay Road)	17.35	17.9	*3%*	*17.01*	*-2%*	32.13	*85%*	24.2	34.4	*42%*	*32.0*	*32%*	59.4	*145%*
Northbound (Old Bridge)	8.5	8.1	*-4%*	8.09	*-4%*	2.16	*-75%*	17.1	16.2	*-5%*	16.4	*-4%*	2.3	*-87%*
7. Anglesea St/ Dr Croke Place														
Southbound (Anglesea St.)	6.75	0.25	*-96%*	*0*	*-100%*	2.13	*-68%*	10.8	0.3	-98%	*0*	*-100%*	2.5	*-77%*
Eastbound (Dr. Croke Place)	10.0	8.6	*-14%*	*7.93*	*-21%*	1.97	*-80%*	15.8	15.1	-5%	*13.4*	*-15%*	2.3	*-85%*
Northbound (Anglesea St.)						1.79							1.9	
8. Old Waterford Rd / Dr Croke Place														

Southbound (Old Waterford Road)	20.8	20.5	*-1%*	*19.5*	*-6%*	21.5	*4%*	29.6	29.1	*-2%*	*27.1*	*-8%*	30.9	*4%*
Northbound (Dr. Croke Place)	11.45	10.2	*-11%*	10.0	*-13%*	9.7	*-15%*	13.8	12.9	*-6%*	13.8	*0%*	13.9	*1%*