Cork City Council

Morrison's Island Public Realm and Flood Defence Project

Transport Assessment

REP/1

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Job number 230436-00

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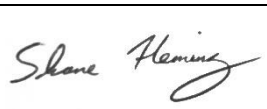
		Signature			
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General

Arup has been appointed by Cork City Council to undertake a Transport Assessment for a proposed streetscape enhancement of Morrison's Island in conjunction with proposed flood defence measures along Fr. Mathews Quay and Morrison's Quay in, Cork City. The proposed study area is the area bounded by the River Lee, South Mall and Parliament Street, it is located in the centre island of Cork City and within the Cork City Council jurisdictional area. The proposed development will upgrade approximately 530m of Father Matthew Quay and Morrison's Quay. This Transport Assessment assesses the likely alterations in traffic associated with the study area, and whether these alterations will have a negative impact on the operation of transport modes on the existing road network and at key junctions in the vicinity of the scheme.

For the purpose of this assessment it has been assumed that the new streetscape enhancement will be fully constructed and operational by 2019.

Traffic surveys carried out have indicated that the peak hours in this area occurred between 12:00-13:00 and 17:00-18:00. The calculated traffic generation associated with the alteration to the street layout identified that there will be 45 less vehicles entering and 45 less vehicles exiting the study area during the midday peak (12:00 to 13:00) and 63 less vehicles entering and 39 less vehicles exiting the study area during the PM peak (17:00-18:00). The reduction in vehicles entering and existing the study area is due to the proposed reduction in on-street public parking being provided along these two quays.

The proposed street enhancement will be constructed on an existing street with approximately 148 on street parking spaces and will involve the re-arrangement of parking in the area. This will result in a net loss of 115 car parking spaces. In addition to the alteration of the street layout, the proposed scheme will result in alterations to the traffic flow within the study area whereby existing routes within the study area will become one-way streets in order to provide additional space to pedestrian facilities.

The streetscape enhancement scheme proposed that vehicles entering the study area will now all do so via the junction of Morrison's Street and South Mall. Traffic exiting the study area shall now do so via either the junction of Fr. Mathew Street and South Mall or the junction of Fr. Mathew Quay and Parliament Street. The junction of Morrison's Quay and South Mall shall be closed to vehicular traffic permitting the expansion of the pedestrian plaza located at the end of South Mall. It is proposed the Morrison's Street and Morrison's Quay shall be one-way southbound, Fr. Mathew Street shall be one-way westbound, Fr. Mathew Street shall become one-way northbound. Fitton Street, Catherine Street and Keeffe Streets shall remain one-way in their current directions.

Impact of the Development

Chapter 5 of this report presents results of analysis of the four main junctions in the vicinity of the proposed development:

- Junction 1 – Parliament Street and Father Matthew Quay

- Junction 2 – South Mall and Parliament Street.
- Junction 3 – South Mall and Father Matthew Street

Junction 4 – South Mall and Morrison's Street

The analysis was carried out using LinSig and PICADY traffic modelling software packages.

LinSig: a computer software package for the assessment and design of traffic signal junctions either individually or as a network of junctions.

The software package was developed by JCT Consultancy Ltd. and is used by traffic engineers to construct a model of a junction or network which can then be used to assess different designs and methods of operation. LinSig was used to assess the impact of the proposed scheme at the junction of Parliament Street and South Mall.

PICADY: a computer program for predicting capacities, queues and delays at major/minor priority junctions. PICADY was developed in the UK by the Transportation Research Laboratory (TRL). PICADY was used to assess the impact of the junctions of Fr. Mathew Quay / Parliament Street, Fr. Mathew Street / South Mall and Morrison Street / South Mall.

The impact of the proposed alterations to the street network on the local road network has been assessed by examining the projected traffic flows on the local road network, during both the peak hours, for scenarios without and with the proposed development, for both the 2019 opening year and in the year 2024 (5 years after opening).

The results of the analyses indicate that in the 2024 design year of the proposed development, all of the junctions within the study area will continue to operate satisfactorily below capacity and that the alterations to the street network will have an insignificant impact on the junctions in both the opening year and design year.

1 Introduction

Arup has been commissioned by Cork City Council and the OPW to undertake a Transport Assessment to examine the traffic impact anticipated as a result of a proposed streetscape enhancement and introduction of a one-way system at Morrison's Island, Cork City. This report describes the existing environment, estimates the future traffic anticipated to utilise the street network and assesses the impact of the proposed enhancement and one-way network will have on the local road network. This report also examines the existing and proposed parking within the study area.

The proposed streetscape enhancement, in conjunction with proposed flood defence infrastructure is located in the area bounded by the River Lee, South Mall and Parliament Street. It is located in the centre island of Cork City and within the Cork City Council jurisdictional area. The proposed scheme will upgrade approximately 530m of Father Matthew Quay and Morrison's Quay. The scheme will be constructed on an existing street which currently provides approximately 148 on-street parking spaces and will include the re-arrangement of parking quantum and configuration in the area. The proposed scheme will result in a net loss of approximately 115 car-parking spaces along both Quays.

This development will result in the Morrison's Island area becoming more attractive to pedestrian and cyclist usage and it is anticipated that the scheme will aid to induce additional city centre trips by sustainable modes. The footpath will be widened and made a shared surface for pedestrians and contra-flow cyclists. Cyclists travelling in the same direction of vehicular traffic will used the carriageway and will benefit from the reduced speed of the traffic resulting in a more comfortable environment for cycling.

2 Study Methodology

This Transport Assessment has been carried out to accompany the Part 8 planning application for the proposed flood defence infrastructure and streetscape enhancement of Morrison's Island, Cork City. A brief description of the methodology behind this Transport Assessment is presented below:

- Chapter 3 of this Transport Assessment describes the *'Existing Receiving Environment'*. It describes the location of the proposed development in its context to Cork City and gives a detailed description of the local road and street network. It also sets out the existing traffic patterns on the local road and street network.
- Chapter 4 of this Transport Assessment sets out the '*Characteristics of the Proposed Development'*. Within this chapter, the nature of the proposed scheme is set out, in terms of the proposed alterations to the existing roads, streets, junctions, footways and cycling facilities. It also details the projected traffic changes and the future distribution of traffic on the local road network This chapter also examines the proposed parking provision associated with the proposed streetscape enhancements.
- Chapter 5 of this Transport Assessment sets out the *'Impact of the Proposed Development'*. This chapter details the expected background traffic during the opening year of the development, taking into account the approved future year growth rates in accordance with the TII's *'Project Appraisal Guidelines' Unit 5.5 (Link-Based Traffic Growth)'.* The projected traffic associated with the proposed scheme is then applied to the future one-way local road network. This enables an assessment to be carried out on the local road network, and a comparison between the 'without' and 'with' the proposed scheme scenarios both for the opening year and for 5 years into the future after opening. The final section of this chapter sets out the critical junctions and provides a capacity and operational assessment of each with a summary of the findings in terms of the 'Ratio of Flow to Capacity' and mean maximum queuing.
- Chapter 6 of this Transport Assessment describes the *'Mitigation Measures'* proposed to reduce the impact of the proposed development on the receiving environment.

The main findings of this report are summarised in the *'Executive Summary'* provided to the front of this report.

3 The Existing Receiving Environment

3.1 Site Location

The site of the proposed Street Scape Enhancement is located on Morrison's Island in the Cork City Centre. Morrison's Island is the area bounded by South Mall, Father Matthew Quay and Morrison's Quay. The area is currently used for vehicular parking and pedestrian access to the City Centre from Union Quay. It contains business, churches and educational centres. It is accessed by car from Parliament Street and South Mall and as well as these routes pedestrians can access it from Union Quay via Trinity Bridge. A map showing the site location is presented in **Figure 1** below.

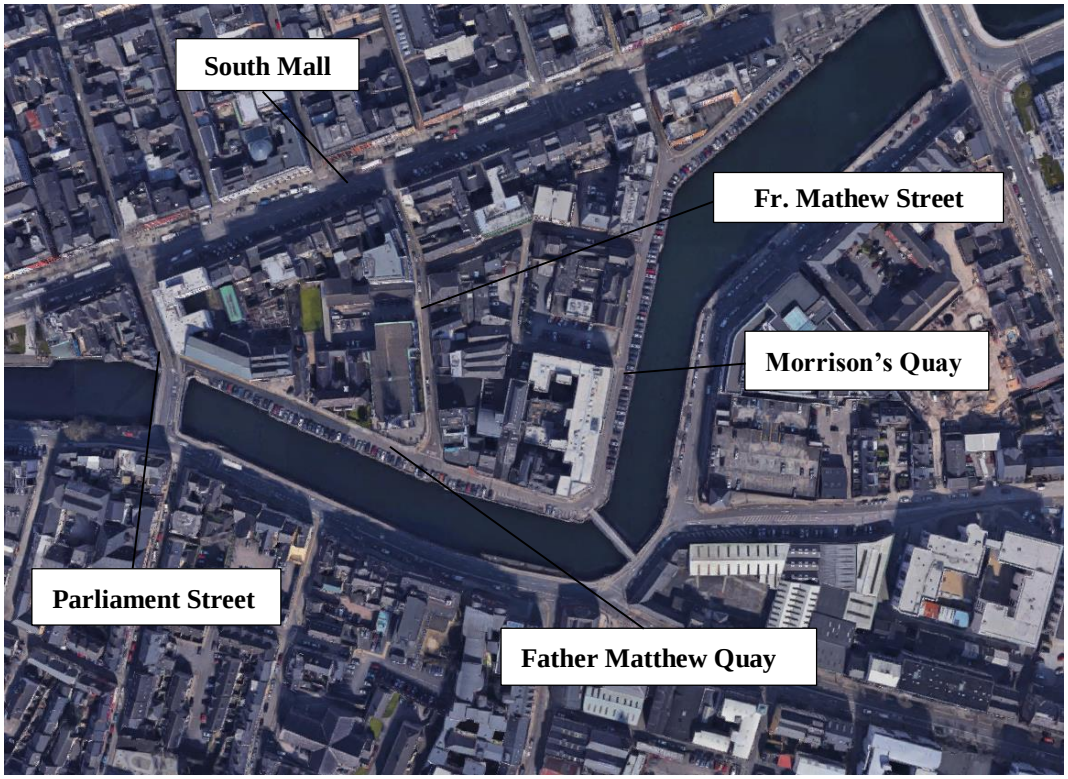

Figure 1: Site Location

3.2 Local Road Network

3.2.1 General

A brief description of the local road and street network within the study area is provided below. The layout of the local road and street network is presented in **Figure 2** below.

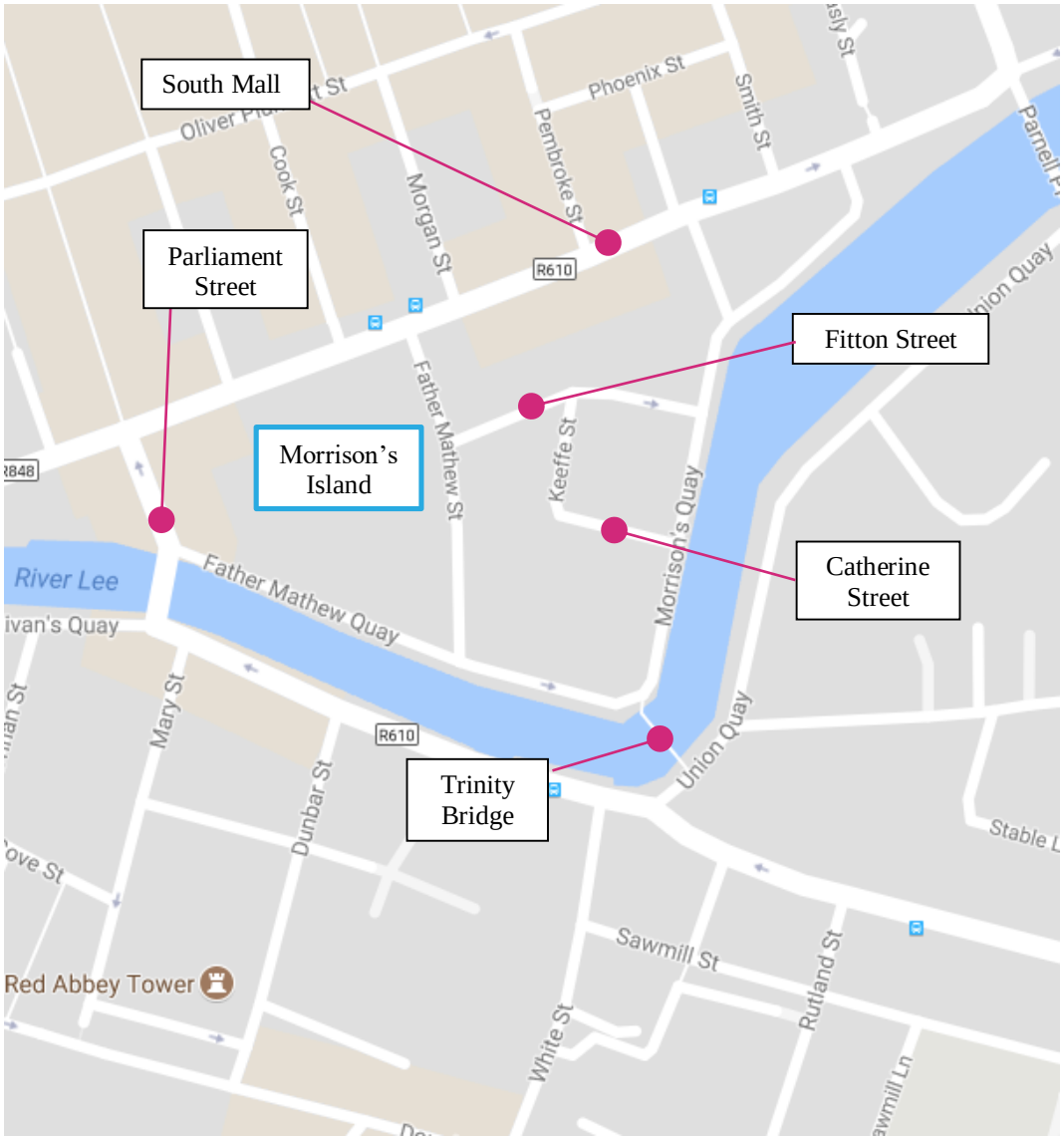

Figure 2: Local Road Network *(source: Google)*

3.2.2 Access and Egress to Morrison's Island

Vehicular access to the Morrison's Island area is provided from Parliament Street at the end of Parliament Bridge on to Father Matthew Quay and from the South Mall on to Father Matthew Street, Morrison's Street and Morrison's Quay. Vehicular egress from Morrison's Island is provided from Father Matthew Quay on to Parliament Street at the end of Parliament Bridge and from Morrison's Street and Morrison's Quay on to the South Mall. Pedestrians can access the area via the same access points as vehicles in addition to a pedestrian access via Trinity Bridge.

3.2.3 Public Transport

The area is well served by public transport. There are 16 bus routes on South Mall adjacent to the development. The Coke Zero Bike-Share Scheme has a hub on Father Matthew Quay and on South Mall.

The bus stops are served by the number 203 'Parklands Drive to Manor Farm' service, the number 206 'South Mall – Grange' service, the number 207 'Glenheights Park – Donnybrook' service, the number 209A 'Lower Connolly Road to Merchants Quay' service, the number 214 'CUH A and E – Patrick Street' service, the number 215 'Mahon Point – Cloghroe' service, the number 215A Mahon Point – Cloghroe' service, the number 220 'Srelane Croos – Fountainstown' service, the number 220X 'Grange Road to Crosshaven' service, the number 223 'South Mall – Haulbowline' service, the number 226 'Kinsale – Cork Institute of Technology' service, the 233 'Cork – Macroom' service, the 235 'Cork – Rylane' service, the 236 'Cork – Castletownbere' service, the 237 'Cork – Goleen' service and the 239 'Cork – Bandon' service.

The approximate frequency of these services is presented in **Table 1**.

Table 1: Public Transport Service Frequencies

Bus Service	Approximate Frequency
Bus No. 203 'Parklands Drive to Manor Farm'	Every 15-45 mins
Bus No. 206 'South Mall – Grange'	Every 15-45 mins
Bus No. 207 'Glenheights Park – Donnybrook'	Every 15-45 mins
Bus No. 209A 'Lower Connolly Road – Merchants Quay'	Every 2-4 hours
Bus No. 214 'CUH A and E – Patrick Street'	Every 15-45 mins
Bus No. 215 'Mahon Point – Cloghroe'	Every 15-45 mins
Bus No. 215A 'Mahon Point – Cloghroe'	Every 15-45 mins
Bus No. 220 'Srelane Cross – Fountainstown'	Every 15-45 mins
Bus No. 220X 'Grange Road – Crosshaven Service'	Every 45-90 mins
Bus No. 223 'South Mall- Haulbowline'	Every 15-45 mins
Bus No. 226 'Kinsale – Cork Institute of Technology	Every 45-90 mins
Bus No. 233 'Cork – Macroom'	Every 45-90 mins
Bus No. 235 'Cork- Rylane'	Every 45-90 mins
Bus No. 236 'Cork- Castletownbere'	Twice Daily
Bus No. 237 'Cork Bandon'	Every 2-4 hrs

3.3 Existing Traffic Conditions

Traffic surveys were undertaken on Thursday 26th of May 2016 at the junctions marked 1-5 in Figure 3 below. Due to a camera fault, the survey at sites 4 and 5 captured insufficient information and was required to be re-surveyed. This re-survey was carried out on Thursday 9th June 2016. The traffic surveys were undertaken from 07:00-19:00.

The peak traffic periods were identified as 12:00-13:00 and 17:00-18:00.

The results of the traffic surveys for these peak periods are presented in **Table 2** below.

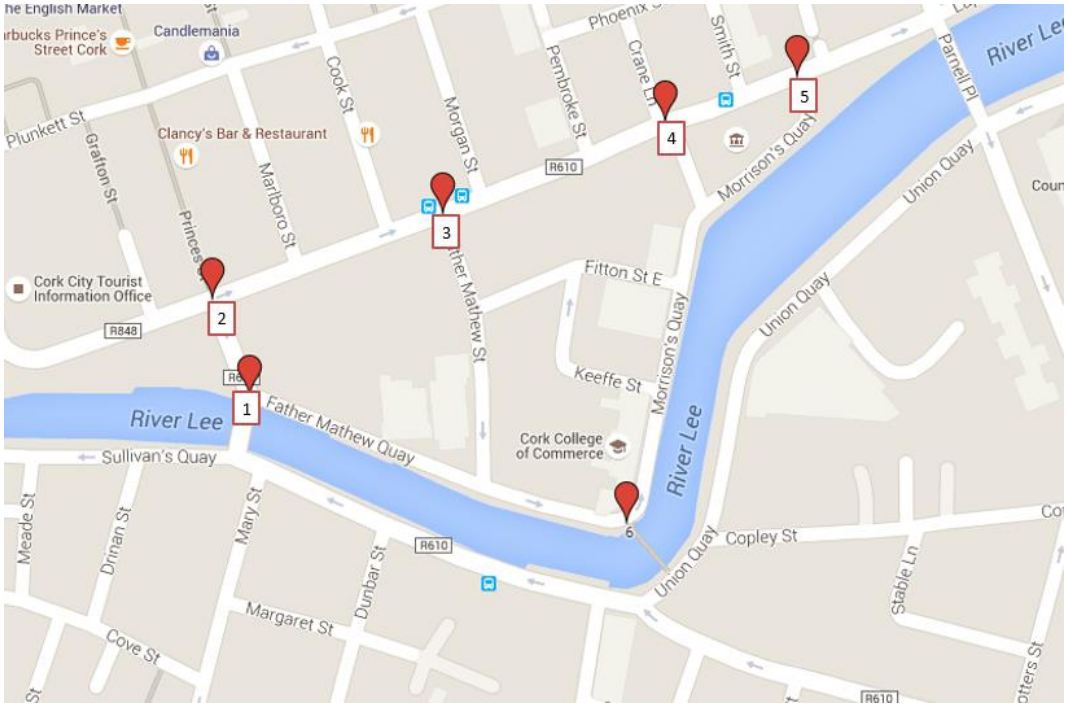

Figure 3: Traffic Survey Locations

Table 2: Existing Two-way Traffic Flows

Link and Related Junction(s)	Midday Peak (12:00 –13:00)	PM Peak (17:00 – 18:00)
Parliament St before Parliament Bridge*	853	908
Father Matthew Quay at Parliament Street End	110	61
Parliament Street before junction with South Mall*	803	884
South Mall west of junction with Parliament Street	926	1010
South Mall east of junction with Parliament Street*	795	913
South Mall after junction with Father Matthew Street*	745	901
Father Matthew Street at junction with South Mall*	46	25
South Mall after junction with Morrison's Street*	866	1038
Morrison's Street at junction with South Mall	149	136
South Mall after junction with Morrison's Quay*	875	1056
Morrison's Quay at junction with South Mall	39	33

*One way streets

The above traffic count data indicates that the busiest roadways in terms of traffic are Parliament Street and South Mall. The majority of the traffic coming over Parliament Bridge continues on to South Mall (east and west). During the PM peak hour a small number of vehicles continue straight onto Princes Street.

Comparatively, there is a very low volume of traffic on Father Matthew Quay and this generally moves then onto Morrison's Quay and back on to the South Mall. Traffic coming on to Morrison's Quay from the South Mall can only progress as far as Catherine Street before it becomes one-way and they must then go down Catherine Street and loop around on Keeffe Street and Fitton Street East back on to Morrison's Quay and towards South Mall. It was observed however, during site visits, that a number of motorists are either unaware of the existing one-way system in operation or wilfully ignore it, as drivers were observed driving southbound, contrary to the northbound only one-way system in operation. Vehicles can turn from South Mall on to Father Matthew Street and use this street to access both Father Matthew Quay and Morrison's Quay via Fitton Street East, however as it is one-way it cannot be used to access South Mall from the Island.

3.4 Existing Parking Provision

The site in question currently provides approximately 148 on-street parking spaces, including 6 disabled spaces, as well as 20 no. bicycle parking spaces and a Coke Zero Bike-Share Station which provides spaces for 32 no. bicycles. There are also 4 private car parks in the area. The on-street parking in this area in heavily utilised with the majority of traffic in the area seeking a parking space.

The majority of existing car-parking spaces are unmarked, with motorists tending to park perpendicular to the quay walls. For this reason, the stated 148 parking spaces is an approximation based on observation.

4 Characteristics of the Proposed Development

4.1 Nature of the Proposed Development

The proposed development is a Streetscape Enhancement of the Morrison's Island Area and Flood Defence Scheme along Father Matthew Quay and Morrison's Quay. It is proposed to make the area more pedestrian friendly by widening the footpath on the building side and adding a wide footpath on the quay side. Currently there is only a narrow footpath along the majority of the whole scheme on the building side and none on the quay side.

Parking is being reconfigured to facilitate the proposed pedestrian and street enhancements in the area. At present there are approximately 148 parking spaces and the vast majority of these are perpendicular on the quay side of the street. These perpendicular parking space will be replaced with 33 parallel space recessed into the footpaths on the quay side.

As part of the Proposed Streetscape Enhancement an extensive public lighting scheme is planned for the area. This will ensure a safe environment for all users of the area after dark.

Cyclists will benefit from the reduced speed on the carriageway as well as a shared footway area on the footpath for pedestrians and cyclists traveling against the one-way system. Cyclists travelling in the same direction as the one-way system are expected to use the carriageway.

The widening of the entrance to Trinity Bridge will allow easier access for both cycles and pedestrian to Morrison's Island.

A clockwise one-way system will be introduced to the island to avoid traffic conflict and allow easy access the different areas on the island.

For the purposes of this study, it has been assumed that vehicular trips to and from Morrison's Island, mot associated with on-street parking will remain constant.

4.2 Projected Traffic Generation

4.2.1 Trip Reduction

It is anticipated that there will an overall reduction in the number of vehicular trips to the area of the development. The large amount of on-street parking was a significant generator of traffic that caused many trips to the area. With the removal of 77% of the on-street parking, it is anticipated thatfewer vehicles will be drawn to the area. Surveys were undertaken to calculate the number of vehicles arriving and departing the island per parking space during peak hours. This was then use to currently predict the impact the removal of 115 on-street parking spaces will have on the arrival and departure figures of the area.

The derived trip rates and trip numbers for the Midday and PM peak periods are shown in **Table 3** and **Table 4** below respectively:

Table 3: Trip Rates

	Arrival Rate per parking space	Departure Rate per parking space	Total Rate per parking space
Midday Peak (12:00 – 13:00)	0.39	0.39	0.78
PM Peak (17:00 – 18:00)	0.55	0.34	0.89

Table 4: Trip Generation

	Arrivals	Departures	Total
Midday Peak (12:00 – 13:00)	-45	-45	-90
PM Peak (17:00 – 18:00)	-63	-39	-102

The above vehicle trip generation in **Table 5** shows that there will be 90 fewer two-way vehicle trips in the Midday peak traffic period (12:00 – 13:00) and 102 fewer two-way vehicle trips in the PM peak traffic period (17:00 – 18:00) to and from the proposed study area.

Due to the nature of the Streetscape Enhancement, the amount of traffic passing through the area is expected to decrease. Fewer parking spaces will result in fewer vehicles frequenting the area. Additionally, the presence of the clockwise one-way system will prevent vehicles from using the area as a rat-run to avoid Parliament Street and the majority of the South Mall.

Due to the implementation of a clockwise one-way system, it is expected that there will be a small increase in traffic on Parliament Street and the South Mall in advance of the junction with Morrison's Street. Vehicles were previously able turn off Parliament Street onto Father Matthew Quay and turn off South Mall on to Father Matthew Street. These turning movement are now prohibited and all traffic now wishing to access Morrison's Island will now do so by turning right on to Morrison's Street. Through traffic will now exit the island out on to Parliament Street from Father Matthew Quay and on to South Mall by Father Matthew Street.

Table 5: Total Traffic Generated at Morrison's Island

	Arrivals	Departures	Total
Midday Peak (12:00 – 13:00)	144	109	253
PM Peak (16:30 – 17:30)	37	116	153

Note: figures will have been rounded up or down during calculations

4.3 Traffic Generation/Distribution

The point of access to Morrison's Island will be from the South Mall at Morrison's Street. This will be the only vehicular access to the area. There are two exit points, from Father Matthew Quay on to Parliament Street and Father Matthew Street on to South Mall.

Figure 4 and **Figure 5** below show the anticipated trip distribution for the arrivals and departures to and from the study area in the Midday Peak and the PM Peak respectively. The distribution is shown for the junctions immediately adjacent to the site. These movements disperse further as the distance from the site increases.

Figure 4: Midday Peak Trip Distribution

Figure 5: PM Peak Trip Distribution

The above trip distribution profile is based on the existing turning movements from the recent traffic survey information and applying these turning movements to the proposed one-way system. Note that there is a different arrivals and departures profile in the Midday and the PM, to reflect the survey information. These profiles have been applied to the trip generation from **Table 5** and added to the baseline traffic for the Opening Year of 2019 to establish the projected two-way traffic flows for the 'With' scenario.

Table 6: Opening Year 2019 Two-way Traffic Flows

Link	Midday Peak (12:00 – 13:00)	PM Peak (17:00 – 18:00)
Parliament St south of Parliament Bridge*	789	894
Father Matthew Quay at Parliament Street End	26	19
Parliament Street in advance of junction with South Mall*	802	903
South Mall west of junction with Parliament Street	957	998
South Mall east of junction with Parliament Street*	838	919
South Mall east of junction with Father Matthew Street*	823907	1020
Father Matthew Street at junction with South Mall*	83	99
South Mall after junction with Morrison's Street*	779	984
Morrison's Street at junction with South Mall*	145	38

*One way streets

4.4 Parking Provision

4.4.1 On-Street Parking

Currently there are approximately 148 Parking spaces along the quay side of the street. The majority of these are perpendicular parking space and result in a very narrow carriageway with, in places, space for only one vehicle on the carriageway that is designated as two-way. These parking spaces are being replaced by 33 parallel space that will be recessed into the proposed footpath and not encroach on the carriageway.

4.4.2 Electric Car Parking Provision

The Cork City Development Plan stipulates that developments providing ten or more parking spaces will provide at least one parking space equipped with a functioning EV charging point and at least 10% of space shall incorporate ducting to allow for future fit out of a charge point.

There are 4 electric vehicle charge points proposed as part of the streetscape enhancement, fulfilling the Cork City Development Plan's requirements.

4.4.3 Disabled Parking Provision

The Cork City Development Plan stipulates that 5% of car parking spaces provided should be set aside for disabled car parking.

At present 4% of existing parking provision is designated as disabled parking (6 spaces) and it is proposed to replace this with 12% of future parking provision being designated as disabled parking (4 spaces).

4.4.4 Cycle Parking

It is proposed to install parking facilities for 32 bicycles in two blocks comprising of eight and sixteen being located by the public plaza at the termination of Morrison's Quay and South Mall, and a further block of 8 being located outside the College of Commerce, this will replace the 20 bicycle parking facilities being removed form Morrison's Quay and either side of Trinity Bridge.

As part of the proposed scheme, the Coke Zero Bike-Share Scheme Station is being relocated to the southern end of Morrison's Quay. It is proposed that it be split into two blocks, each with a capacity of 16 bicycles.

4.4.5 Motorcycle Parking Provision

There are currently 20 motorcycle parking spaces located on South Mall, in the vicinity of the Public Plaza at the eastern end of the street. From continued observation, it has been identified that supply exceeds demand for motorcycle parking in this area. The extension of the existing public plaza area at the corner of South Mall and Parnell Bridge will encroach into the existing motorcycle parking area and the current motorcycle parking will be replaced with 3 motorcycle parking spaces on South Mall.

5 Impact of the Proposed Development

5.1 General

This chapter presents the assessment of the local road network and junction assessments of the critical junctions and accesses in the vicinity of the proposed Streetscape Enhancement.

The impact of the proposed street scape enhancement on the local road network has been assessed by examining the projected traffic flows on the local road network, during both the Midday and PM peak periods, 'without' and 'with' the proposed scheme. This has been carried out for the 2019 opening year and in the year 2024, 5 years after opening in accordance with the TII (formerly NRA) *'Guidelines for Transport Assessment'*.

For the purposes of this assessment it has been assumed that the new development will be fully constructed and operational by 2019.

Traffic volumes at the key junctions in the vicinity of the scheme have been increased using the following growth factors to account for anticipated background traffic annual growth in the years between 2016, 2019 and 2024 respectively, in accordance with the TII *'Project Appraisal Guidelines, Unit 5.5 Link-Based Traffic Growth Forecasting*:

- 2016-2019 – LV Traffic by 6.7% and HV Traffic by 5.8%
- 2016-2024 – LV Traffic by 19.0% and HV Traffic by 16.2%

5.2 Future Traffic Flows

Table 7 and **Table 8** below detail traffic flows for the peak traffic periods, i.e. 12:00-13:00 and 17:00-18:00, for the years 2019 and 2024, both 'Without' and 'With' the proposed scheme, together with the percentage increase or decrease due to the proposed development in each case, if any.

The junctions referred to for each link are shown in **Figure 3** above.

Table 7: Future Two-way Traffic Flows – Opening Year 2019, 'Without' and 'With'

Link	2019 Midday Peak (12:00 – 13:00) 'Without'	2019 Midday Peak (12:00 – 13:00) 'With'	2019 PM Peak (17:00 – 18:00) 'Without'	2019 PM Peak (17:00 – 18:00) 'With'
Parliament St at Parliament Bridge	911	825 (-9.6%)	969	925 (-4.5%)
Father Matthew Quay at Parliament Street End	115	27 (-76.6%)	65	20 (-69.2%)
Parliament Street south of junction with South Mall	857	852 (-0.6%)	943	943 (0%)
South Mall west of junction with Parliament Street	988	1016 (+2.8%)	1066	1042 (+2.3%)
South Mall east of junction with Parliament Street	843	890 (+5.4%)	988	960 (-2.8%)
South Mall east of junction with Father Matthew Street	809	979 (+21.0%)	954	1064 (+7.3%)
Father Matthew Street at junction with South Mall	48	90 (+87.5%)	26	104 (+400%)
South Mall east of junction with Morrison's Street	933	826 (-11.5%)	954	1024 (+7%)
Morrison's Street at junction with South Mall	144	154 (+6.9%)	145	40 (-72.4%)

Table 8: Future Two-way Traffic Flows – Year 2024, 'Without' and 'With'

Link	2024 Midday Peak (12:00 – 13:00) 'Without'	2024 Midday Peak (12:00 – 13:00) 'With'	2024 PM Peak (17:00 – 18:00) 'Without'	2024 PM Peak (17:00 – 18:00) 'With'
Parliament St at Parliament Bridge	1015	920 (-9.4%)	1080	1031 (-4.5%)
Father Matthew Quay at Parliament Street End	130	30 (-76.9%)	72	23 (-68.1%)
Parliament Street south of junction with South Mall	955	948 (+0.7%)	1051	1049 (-0.2%)
South Mall west of junction with Parliament Street	1101	1131 (+2.7%)	1188	1161 (-2.3%)
South Mall east of junction with Parliament Street	939	991 (+5.5%)	1111	1069 (-3.8%)
South Mall east of junction with Father Matthew Street	812	1092 (+34.5%)	958	1186 (+23.8%)
Father Matthew Street at junction with South Mall	54	99 (+83.3%)	29	115 (+396.6%)
South Mall east of junction with Morrison's Street	1040	920 (-11.5%)	1238	1140 (-7.9%)
Morrison's Street at junction with South Mall	177	172 (-2.8%)	161	45 (-72.0%)

5.3 Junction Assessment – Site 1

Figure 3 shows the location of Site 1 in relation to the local road network, and its approach arms. It is a priority junction between Parliament Street and Father Matthew Quay. Parliament Street is currently two lane, one-way road in the direction of South Mall. Father Matthew Quay is a two lane, two-way road that joins Parliament Street at a priority junction and is right turn only onto Parliament Street. It is proposed to make Father Matthew Quay a one-way street westbound with right turn only permitted onto Parliament Street at a priority junction.

5.3.1 Opening Year (2019)

The background traffic flows recorded on 26th of May 2016 were applied to the junction at Site 1 and analysed using **Junctions 9** software, which is a dedicated software package for the analysis of standard priority junctions (containing the PICADY and ARCADY analysis packages). The 2019 Opening Year Midday and PM results are shown below in **Table 9** and **Table 10**, indicating 'Queue', 'Delay' and Ratio of Flow to Capacity 'RFC' values for the respective arms for both the 'Without' and 'With' scenarios.

Table 9: Junctions 9 Assessment – Site 1, 2019 Opening Year, Midday and PM Peaks – Without Development

Site 1	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm B – Father Matthew Quay	0.1	10	9	0.1	10	6
Arm C – Parliament Street	0.2	7	15	0.1	7	8

It can be seen in **Table 9** above that the Parliament Street/Father Matthew Quay junction will continue to operate well within capacity during the Midday and PM Peak period in the 2019 'Without' scenario.

Table 10: Junctions 9 Assessment – Site 1, 2019 Opening Year, Midday and PM Peaks – With Development

Site 1	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm B – Father Matthew Quay	0.1	10	7	0.1	10	6
Arm C – Parliament Street	0.0	0	0	0.0	0	0

It can be seen in **Table 10** above that Parliament Street/Father Matthew Quay junction will continue to operate well within capacity during the Midday and PM Peak period in the 2019 'With' scenario.

5.3.2 2024 Assessment Year - 5 Years Post-Opening

The 2024 Assessment Year - 5 Years Post-Opening Midday and PM peak period results are shown below in **Table 11** and **Table 12**, indicating 'Queue', 'Delay' and Ratio of Flow to Capacity 'RFC' values for the respective arms for both the 'Without' and 'With' scenarios.

Table 111: Junctions 9 Assessment – Site 1, 2024 Assessment Year - 5 Years Post-Opening, Midday and PM Peaks – Without Development

Site 1	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm B – Father Matthew Quay	0.1	11	11	0.1	11	7
Arm C – Parliament Street	0.2	7	17	0.1	7	9

It can be seen in **Table 11** above that the Parliament Street/Father Matthew Quay junction will continue to operate well within capacity during the Midday and PM Peak period in the 2024 'Without' scenario.

Table 122: Junctions 9 Assessment – Site 1, 2024 Assessment Year - 5 Years Post-Opening, Midday and PM Peaks – With Development

Site 1	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm B – Father Matthew Quay	0.1	10	8	0.1	10	7
Arm C – Parliament Street	0.0	0	0	0.0	0	0

It can be seen in **Table 12** above that the Parliament Street/Father Matthew Quay junction will continue to operate well within capacity during the Midday and PM Peak period in the 2024 'With' scenario.

5.4 Junction Assessment – Site 2

Figure 3 shows the location of Site 2 in relation to the local road network, and its approach arms. It is a signal controlled junction between Parliament Street and South Mall. Parliament Street is currently a two lane road, one-way in the direction of South Mall with the left lane turning towards Grand Parade and the right lane going either straight on to Princes Street or right along South Mall. South Mall is a two lane, one-way road away from Parliament Street. The South Mall approach to this junction from the Grand Parade is a single lane two-way carriageway, which has recently been upgraded to incorporate a second approach lane along South Mall

5.4.1 Opening Year (2019)

The background traffic flows recorded on 26th of May 2016 were applied to the junction at Site 2 and analysed using **LinSig** software, which is a dedicated software package for the analysis of signalised junctions. The 2019 Opening Year Midday and PM peak period results are shown below in **Table 13** and **Table 14**, indicating 'Queue', 'Delay' and Degree of Saturation 'Deg. Sat.' values for the respective arms for both the 'Without' and 'With' scenarios.

Table 133: LinSig Assessment – Site 2, 2019 Opening Year, Midday and PM Peaks – Without Development

Site 2	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**Deg. Sat. (%)**	**Queue (PCU)**	**Delay (s)**	**Deg. Sat. (%)**
Arm A – South Mall	5.7	2	46	7	3	53
Arm D – Parliament Street	6.8	2	39	9	3	54

It can be seen in **Table 13** above that the South Mall/Parliament Street junction will continue to operate within capacity during the Midday and PM Peak periods in the 2019 'Without' scenario.

Table 144: LinSig Assessment – Site 2, 2019 Opening Year, Midday and PM Peaks – With Development

Site 2	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**Deg. Sat. (%)**	**Queue (PCU)**	**Delay (s)**	**Deg. Sat. (%)**
Arm A – South Mall	6.2	3	47	6.7	3	53
Arm D – Parliament Street	4.7	2	47	8.6	3	54

It can be seen in **Table 14** above that the South Mall/Parliament Street junction will continue to operate within capacity during the Midday and PM Peak periods in the 2019 'With' scenario.

5.4.2 2024 Assessment Year - 5 Years Post-Opening

The 2024 Assessment Year - 5 Years Post-Opening Midday and PM peak period results are shown below in

Table **15** and Table 16, indicating 'Queue', 'Delay' and Degree of Saturation 'Deg. Sat.' values for the respective arms for both the 'Without' and 'With' scenarios.

Table 155: LinSig Assessment – Site 2, 2024 Assessment Year - 5 Years Post-Opening, Midday and PM Peaks – Without Development

Site 2	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**Deg. Sat. (%)**	**Queue (PCU)**	**Delay (s)**	**Deg. Sat. (%)**
Arm A – South Mall	6.5	3	51	7.9	3	59
Arm D – Parliament Street	7.8	3	51	10.2	4	61.2

It can be seen in **Table 15** above that the South Mall/Parliament Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2024 'Without' scenario.

Table 166: LinSig Assessment – Site 2, 2024 Assessment Year - 5 Years Post-Opening, Midday and PM Peaks – With Development

Site 2	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**Deg. Sat. (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm A – South Mall	7	3	52	8	3	60
Arm D – Parliament Street	8	3	53	10	3.4	60

It can be seen in Table 16 above that the South Mall/Parliament Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2024 'With' scenario.

5.5 Junction Assessment – Site 3

Figure 3 shows the location of Site 3 in relation to the local road network, and its approach arms. It is the junction of South Mall and Father Matthew Street. South Mall runs perpendicular to Father Matthew Street and is a two lane one-way road. Father Matthew Street is currently one-way southbound from South Mall but it is proposed to reverse the direction Father Matthew Street in the proposed development scenario and make it one-way onto South Mall.

5.5.1 Opening Year (2019)

The background traffic flows recorded on 26th of May 2016 were applied to the junction at Site 3 and analysed using **Junctions 9** software. The 2019 Opening Year Midday and PM peak period results are shown below in **Table 17** and **Table 18**, indicating 'Queue', 'Delay' and Ratio of Flow to Capacity 'RFC' values for the respective arms for both the 'Without' and 'With' scenarios.

Table 17: Junctions 9 Assessment – Site 3, 2019 Opening Year, Midday and PM Peaks – Without Development

Site 3	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm C – South Mall	0.1	7	8	0.1	6	5

It can be seen in **Table 17** above that the South Mall/Father Matthew Street junction will continue to operate well within capacity during the Midday and PM Peak period in the 2019 'Without' scenario.

Table 18: Junctions 9 Assessment – Site 3, 2019 Opening Year, Midday and PM Peaks – With Development

Site 3	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm C – South Mall	0	0	0	0	0	0

It can be seen in **Table 18** above that the South Mall/Father Matthew Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2019 'With' scenario.

5.5.2 2024 Assessment Year - 5 Years Post-Opening

The 2024 Assessment Year - 5 Years Post-Opening Midday and PM peak period results are shown below in **Table 19** and **Table 20**, indicating 'Queue', 'Delay' and Ratio of Flow to Capacity 'RFC' values for the respective arms for both the 'Without' and 'With' scenarios.

Table 19: Junctions 9 Assessment – Site 3, 2024 Assessment Year - 5 Years Post-Opening, Midday and PM Peaks – Without Development

Site 3	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm C – South Mall	0.1	7	9	0.1	6	5

It can be seen in **Table 19** above that the South Mall/Father Matthew Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2024 'Without' scenario.

Table 20: Junctions 9 Assessment – Site 3, 2024 Assessment Year - 5 Years Post-Opening, Midday and PM Peaks – With Development

Site 3	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm C – South Mall	0	0	0	0	0	0

It can be seen in **Table 20** above that the South Mall/Father Matthew Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2024 'With' scenario.

5.6 Junction Assessment – Site 4

Figure 3 shows the location of Site 4 in relation to the local road network, and its approach arms. It is the junction of South Mall and Morrison's Street. South Mall runs perpendicular to Morrison's Street and is a two lane one-way road. Morrison's Street is currently two-way but it is proposed to make it one-way off the South Mall and the only vehicular entrance onto Morrison's Island.

5.6.1 Opening Year (2019)

The background traffic flows recorded on 26th of May 2016 were applied to the junction at Site 4 and analysed using **Junctions 9** software. The 2019 Opening Year Midday and PM peak period results are shown below in **Table 21** and **Table 22**, indicating 'Queue', 'Delay' and Ratio of Flow to Capacity 'RFC' values for the respective arms for both the 'Without' and 'With' scenarios.

Table 211: Junctions 9 Assessment – Site 4, 2019 Opening Year, Midday and PM Peaks – Without Development

Site 4	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm B – Morrison's Street	0.5	14	31	0.5	15	34
Arm C – South Mall	0.1	7	9	0.1	7	5

It can be seen in **Table 21** above that the South Mall/Morrison's Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2019 'Without' scenario.

Table 222: Junctions 9 Assessment – Site 4, 2019 Opening Year, Midday and PM Peaks – With Development

Site 4	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm B – Morrison's Street	0	0	0	0	0	0
Arm C – South Mall	0.4	9	28	0.1	7	7

It can be seen in **Table 22** above that the South Mall/Morrison's Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2019 'With' scenario.

5.6.2 2024 Assessment Year - 5 Years Post-Opening

The 2024 Assessment Year - 5 Years Post-Opening Midday and PM peak period results are shown below in **Table 23** and **Table 24**, indicating 'Queue', 'Delay' and Ratio of Flow to Capacity 'RFC' values for the respective arms for both the 'Without' and 'With' scenarios.

Table 23: Junctions 9 Assessment – Site 4, 2024 Assessment Year - 5 Years Post-Opening, Midday and PM Peaks – Without Development

Site 4	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm B – Morrison's Street	0.6	15	35	0.6	16	39
Arm C – South Mall	0.1	7	10	0.1	7	5

It can be seen in **Table 23** above that the South Mall/Morrison's Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2024 'Without' scenario.

Table 24: Junctions 9 Assessment – Site 4, 2024 Assessment Year - 5 Years Post-Opening, Midday and PM Peaks – With Development

Site 4	Midday Peak (12:00-13:00)			PM Peak (17:00-18:00)		
Approach Arm	**Queue (PCU)**	**Delay (s)**	**RFC (%)**	**Queue (PCU)**	**Delay (s)**	**RFC (%)**
Arm B – Morrison's Street	0	0	0	0	0	0
Arm C – South Mall	0.5	9	31	0.1	7	8

It can be seen in Table 24 above that the South Mall/Morrison's Street junction will continue to operate within capacity during the Midday and PM Peak period in the 2024 'With' scenario.

5.7 Summary of Analyses

Table 9 to **Table 24** indicate that the junctions are all functioning well within capacity, both in the opening year and in 2024. Due to the removal of existing parking the majority of the traffic volumes at each of the junctions is reduced. Each junction was analysed in isolation. It has been observed that queuing and delay occasionally occur on the road network surrounding Morrison's Island, primarily on Parliament Street. This is due to saturated conditions on the downstream road network towards Grand Parade. The modelling demonstrates that the proposed streetscape enhancement and associated one-way system will not have a negative impact on the surrounding road network.

6 Mitigation Measures

6.1 General

The following section details the various measures which have been included within the scheme, in order to reduce the potential impact on the transport environment in the vicinity of the proposed development.

6.2 Construction Traffic Management Plan

It is recommended that the appointed contractor for the scheme prepares a detailed construction traffic management plan to ensure safe access to Morrison's Island is maintained and the local road operates efficiently and safely during the course of the development. Due to the work on public roads, there will be distribution to traffic in and around Morrison's Island. Diversions will need to be put in place as many of the roads will need to be closed when works are being carried out on them.

The traffic generated by the proposed construction of the streetscape enhancement will be on a temporary basis.

It will be necessary to agree any traffic management plan with Cork City Council in advance of the project and that this plan is reviewed throughout the course of construction. Careful consideration must be given to the construction phase of the works to ensure minimal disruption to the transport network occurs during the construction stage.

6.3 Revised Signage/Wayfinding Plan

The existing traffic movements in Morrison's Island will be altered following the completion of the streetscape enhancement. New signage will be required to be erected to guide motorists around the new one-way system and the appropriate way to various destinations.

6.4 Potential Pedestrian Crossing

There is potential pedestrian walkway being considered to join Parliament Street to the bottom of Grand Parade. This would take the form of a boardwalk and would join the existing boardwalk outside Electric Bar and Restaurant to Parliament Street by extending it along the river. Should this happen, a pedestrian crossing will be installed across Parliament Street at the end of Parliament Bridge to facilitate the movement of pedestrians and cyclists. The proposed pedestrian crossing, in the form of traffic signals can be delivered in tandem with the signalisation of the Parliament Street/Father Matthew Street junction, which will control vehicles exiting from Morrison's Island via Parliament Street.

7 Summary and Conclusion

7.1 Summary

For the purpose of this assessment it has been assumed that the new streetscape enhancement will be fully constructed and operational by 2019. The proposed vehicle trip generation shows that there will be 90 fewer two-way vehicle trips in the Midday peak traffic period (12:00 – 13:00) and 102 fewer two-way vehicle trips in the PM peak traffic period (17:00 – 18:00) to and from the proposed streetscape enhancement.

The proposed study area is the area bounded by the River Lee, South Mall and Parliament Street, it is located in the centre island of Cork City and within the Cork City Council jurisdictional area. The proposed development will upgrade approximately 530m of Father Matthew Quay and Morrison's Quay. It will be constructed on an existing street with approximately 148 on street parking spaces and will involve the re-configuration of parking in the area. This will result in a net loss of approximately 115 car parking spaces. In addition to the alteration of the street layout, the proposed scheme will result in alterations to the traffic flow within the study area whereby existing routes within the study area will become one-way streets in order to provide additional space to pedestrian facilities.

Chapter 5 of this report presents results of analysis of the four main junctions in the vicinity of the proposed scheme.

The analysis was carried out using the LinSig software package, which is a dedicated software package for the analysis of signalised junctions; and PICADY, which is a software package for predicting capacities, queues and delays at major/minor priority junctions.

The impact of the proposed development on the local road network has been assessed by examining the projected traffic flows on the local road network, during both the Midday and PM peak periods, 'Without' and 'With' the proposed development, for both the 2019 opening year and the years 2024, 5 years after opening in accordance with the TII 'Guidelines for Transport Assessment'.

7.2 Conclusion

The proposed streetscape enhancement and flood defence scheme at Morrison's Island will result in the loss of approximately 115 no. on-street public parking spaces along Morrison's Quay and Father Matthew Quay. Public parking at Morrison's Island is a key generator of vehicular trips to and from the area. Due to the reduction in on-street parking provision, it is anticipated that the proposed scheme will result in fewer vehicular trip to and from the area.

The existing parking along Father Matthew Quay and Morrison's Quay is City Council Disc Parking, with a maximum stay duration of 2hrs. This is considered to be short stay, high turnover parking. Given its city centre location, it is anticipated that some vehicles which currently utilise this parking, will continue to utilise city centre parking including the number of multi-story carparks and surface carparks. It is further anticipated that the removal of parking spaces will aid modal shift to towards more sustainable terms of transport including walking, cycling and public transport. Morrison's Island will adequately serve all these modes.

The impacts of the proposed one-way system within the stud area has been analysed and it has been determined that the revised road network will have sufficient capacity to accommodate the predicted number of vehicular trips to and from Morrison's Island.