Chapter 12:

Traffic and Transport

12 TRAFFIC AND TRANSPORT

12.1 INTRODUCTION

This Chapter discusses the impact on Traffic and Transport as the result of the construction and operation of the scheme. The Lower Lee (Cork City) Drainage Scheme consists of a number of distinct elements, including flood forecasting and early warning mechanisms, optimised dam operating procedures, upstream flood storage, and more physically defined items such as direct flood defences and flow control measures. Structural measures include new flood defence walls and embankments in addition to replacing or upgrading existing river walls. Demountable defences and road surface regrading are also proposed in a number of locations.

As set out in Chapter 3, the scheme has been divided into a number of distinct phases for implementation. It has been assumed that works in the Morrison's Island area are undertaken first, (due to frequent flood occurrences) with the remaining phases ensuing. The phasing sequence is set out as follows:

- Phase 0 – Morrison's Island;
- Phase 1/2 – works to the west of the Waterworks Weir and works between Thomas Davis Bridge and Grenville Place;
- Phase 3 – Cork Central Island;
- Phase 4 – North Channel Central Island; and
- Phase 5 – South Channel Central Island.

Figure 12.1 below shows the extent of the phasing.

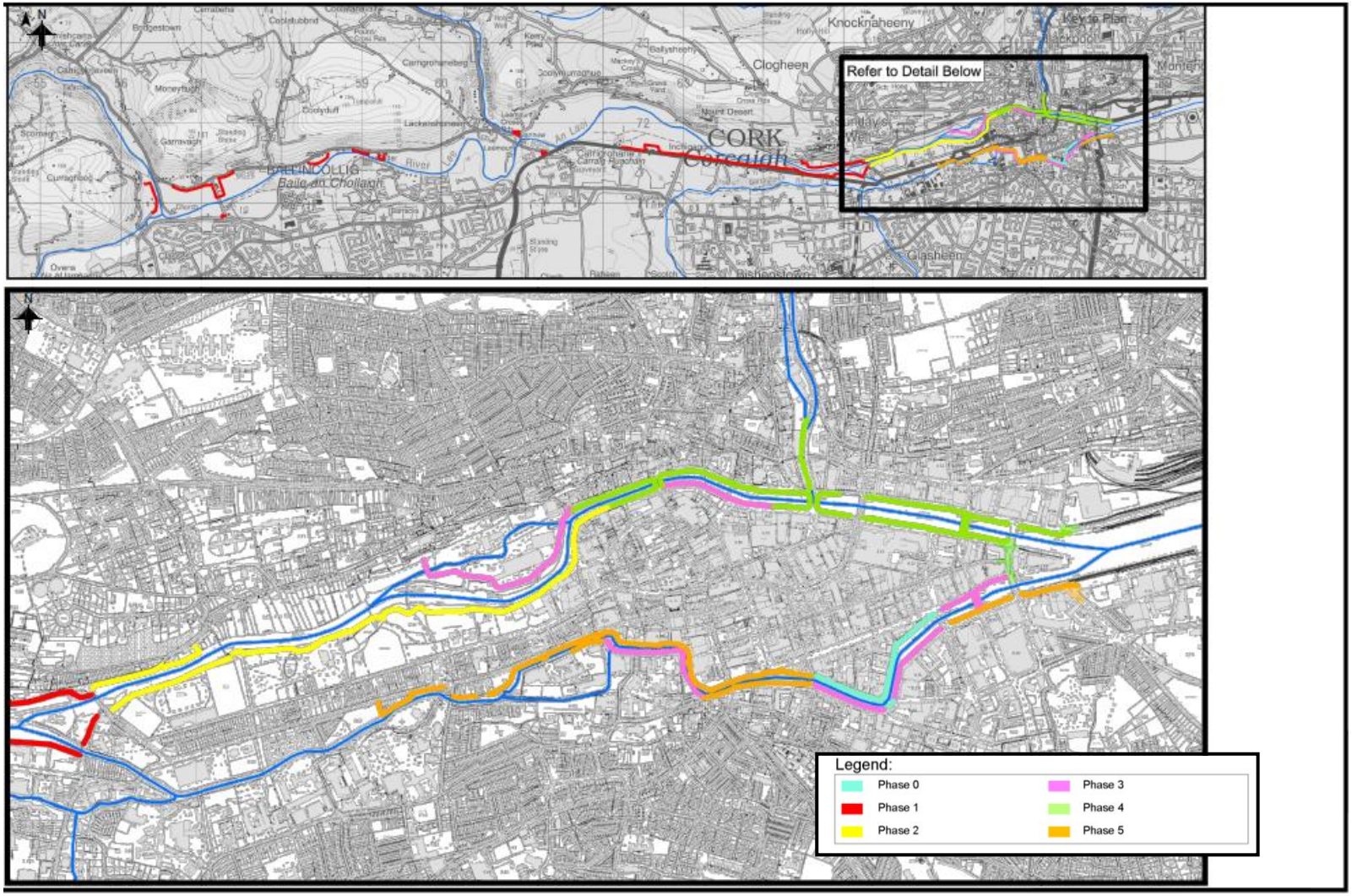

Figure 12.1 Proposed Phasing

The majority of the works in the Cork City central island area will comprise new parapet construction on existing walls, replacement or upgrade of existing walls, demountable defences, and bridge parapet raising or strengthening. In addition to these structural works, a number of ancillary measures are proposed, including a number of surface water pumping stations, construction of a number of backing walls, re-grading of the existing road surface. This will result in amendments to vehicle and pedestrian accesses during construction to accommodate embankment works.

It is estimated that the works will take several years to complete. The individual phases will be carried out in sequence, and have been arranged in the most advantageous order in terms of interim benefits.

The Lower Lee (Cork City) Drainage Scheme will not result in any residual impact on the traffic and transport network in the long-term, as the majority of the impacts will be associated with the construction of the works. No loss of access or reduction in capacity of the existing transport network will occur as a result of the scheme itself.

However, there are likely to be significant temporary impacts associated with the scheme construction, due to the requirements to limit or to exclude traffic from the various works areas during construction, and the temporary loss of parking in many locations during construction in order to facilitate works.

12.2 EXISTING RECEIVING ENVIRONMENT

12.2.1 Morrison's Island

Figure 12.2 Morrison's Island – Road Network

The road network in Morrison's Island includes Father Matthew Quay, Morrison's Quay and side street accesses from Father Matthew Street, Keeffe Street and Fitton Street. Father Matthew Quay is accessed from Father Matthew Street and from the R610 immediately south of Parliament Bridge. Keeffe Street and Fitton Street access onto Morrison's Quay.

The road network on Father Matthew Quay and Morrison's Quay has extensive on-street perpendicular parking along the majority of the route, on the quay side. Typically, the remaining carriageway is not wide enough to facilitate two-way traffic flow (although two-way traffic is permitted along the majority of the route). On the northern side of the route there is a footpath present along its entire length. There is a Public Bike hire station on Morrison's Quay.

Major trip attractors here include the College of Commerce, the Lavitt Gallery, the Holy Trinity Parish Church, the Irish Passport Office and RTÉ Cork offices.

Carriageway width is typically 7.5-9.5m (on-street, including existing perpendicular parking areas), increasing to approximately 10-12m when footpaths are included.

12.2.2 Phases 1/2 – works to the west of the Waterworks Weir and works between Thomas Davis Bridge and Grenville Place/Bachelor's Quay

Phase 1 – Works West of Waterworks Weir

Phase 1 comprises works to the west of the Waterworks Weir. The road network in Phase 1 will include the Lee Road to the north of the River Lee, and the N22 Carrigrohane Road to the south of the river. The Lee Road is a busy suburban route connecting the west of Cork City to Sunday's Well Road and to the N22 via Thomas Davis Bridge. The N22 is a national route linking Cork City with Ballincollig and to the N40 South Ring Road.

Phase 1 also comprises local works in the vicinity of the entrance to Ballincollig Regional Park.

It is noteworthy that in Phase 1, the majority of the works will be offline and will have minimal impact on the road network apart from the haulage of material and movements of construction staff. It is not envisaged that there will be any requirement to reduce the operating capacity of the existing road network in the majority of locations as part of Phase 1.

Localised works to the west of the city will not have a significant impact on the traffic network, as these locations again are mostly comprised of offline sites. There are works proposed on the Lee Road to the west of Thomas Davis Bridge, which will likely require temporary closure of the road during construction.

Phase 2 – Thomas Davis Bridge to Grenville Place/Bachelor's Quay

As with Phase 1, the proposed works between Thomas Davis Bridge and Prospect Row will largely comprise offline works along the river edge, and will have minimal impact on the existing road and street network. At Grenville Place/Bachelor's Quay, the works will transition to Phase 4 (See Section 12.1.4).

Access to the works sites will be via the Western Road and via Mardyke Walk, using a number of existing routes which access the river bank along the north of Fitzgerald's Park, and the Cricket and Tennis grounds. The N22 at Dyke Parade will also be used as a potential access location to the works area in the vicinity of Presentation Brother's College.

In addition, there are localised works on Sunday's Well Road to the east of Thomas Davis Bridge, which will likely result in temporary reduction of the road capacity (although full closure is not envisaged).

Figure 12.3 – Road Network – Thomas Davis Bridge to Prospect Row

Grenville Place/Bachelor's Quay

Grenville Place and Bachelor's Quay link Prospect Row and Henry Street with Grattan Street and onwards to North Gate Bridge. This is a heavily-trafficked area, with the Mercy Hospital located on Henry Street, and numerous residential and commercial properties also present.

Grenville Place is a two-way route between Henry Street and Grattan Street, while Bachelor's Quay is also a two-way route between Grattan Street and North Gate Bridge.

Along Grenville Place, carriageway width varies significantly. There is uncontrolled parallel on-street parking occurring along the quay wall on Grenville Place, and perpendicular on-street parking for cars and ambulances along the side of the Mercy Hospital. Further north, Grenville Place reduces in width extensively as it passes Boole House, with insufficient room for two-way traffic and no parking permitted on-street.

On Bachelor's Quay, perpendicular parking is provided in front of Pat McDonnell Paints, and parallel parking is provided in front of the apartment buildings up to the junction with Grattan Street. The route is wide enough here for two-way traffic flow. Between Grattan Street and North Gate Bridge, the route is four lanes wide, with two eastbound and two westbound lanes, and with on-street parallel parking provided in front of the apartment buildings on the south side of the road.

Footpath provision is also varied. Along Grenville Place, there is no footpath along the quay wall, and the footpath on the opposite side varies in width, becoming extremely narrow in places. On Bachelor's Quay, there is a footpath on the south side only between Grenville Place and Grattan Street. Between Grattan Street and North Gate Bridge, there are footpaths on both sides of the carriageway, but the northern footpath along the quay wall is approximately 400mm wide and is not suitable for pedestrian use.

Typical width on Bachelor's Quay is approximately 11.5m (kerb-to-kerb, including on-street parking), and approximately 13.5m including footpaths. Carriageway width on Grenville Place is varied in width; at

specific locations (for example passing Boole House) the route is only capable of accommodating single lane traffic flow.

Figure 12.4 – Grenville Place / Bachelor's Quay – Road Network

12.2.3 Phase 3 – Cork Central Island

Works proposed as part of Phase 3 include the following locations:

- Kyrl's Quay;
- Coal Quay;
- Crawford Hall/Wandesford Quay;
- Crosse's Green Quay;
- George's Quay;
- Union Quay;
- Lee Distillery Fields; and
- Lapps Quay.

Kyrl's Quay/Coal Quay/Lavitt's Quay

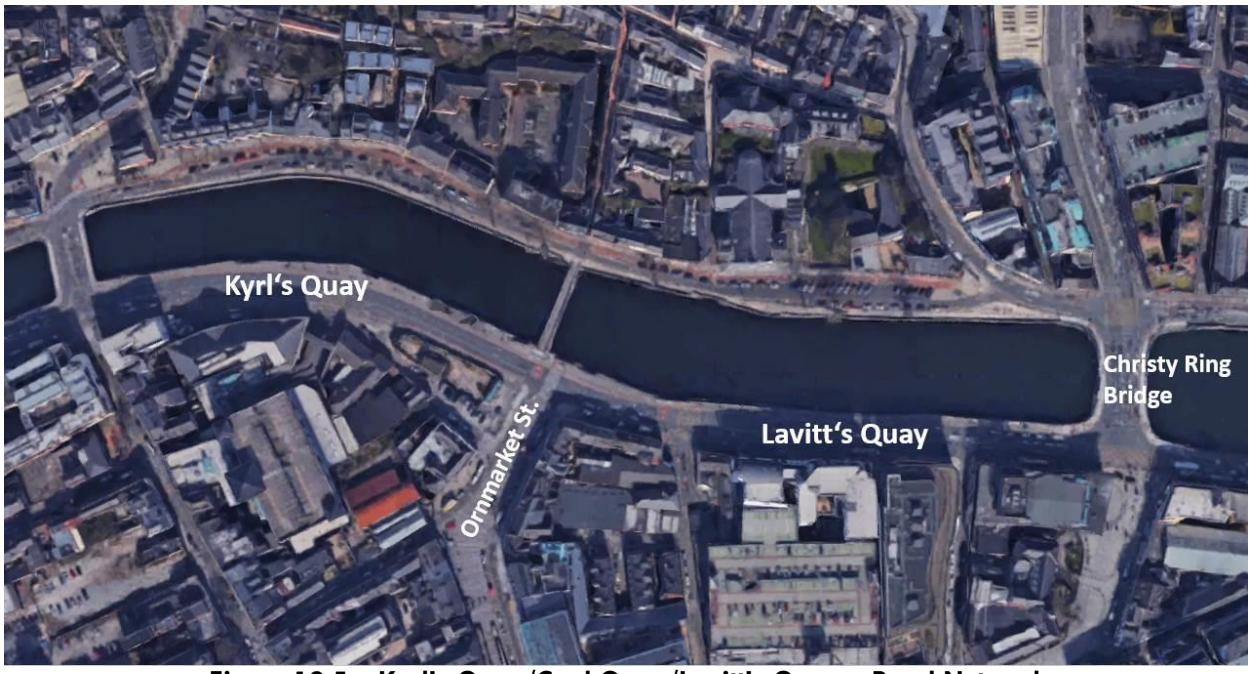

Figure 12.5 – Kyrl's Quay/Coal Quay/Lavitt's Quay – Road Network

Kyrl's Quay, between North Gate Bridge and Cornmarket Street, is a heavily-trafficked route. Approaching North Gate Bridge from the east, the route is 4 lanes wide, with on-road cycle tracks present on both sides of the carriageway, and with footpaths present on either side. West of Kyrl's Street car park, the route is three lanes wide, with on-road cycle tracks on both sides, and with footpaths on both sides.

Carriageway widths on Kyrl's Quay are between 13-14m in width between North Gate Bridge and Kyrl's Street Car Park, and reduce to approximately 12m (kerb-to-kerb) between Kyrl's Street Car Park and Cornmarket Street.

Footpath widths on the north side of the quay are generous in numerous locations, with up to 4-5m available in certain locations. Kyrl's Quay includes access to North Main Street Shopping Centre for loading vehicles, and also access to Kyrl's Street Multi-Storey Car Park.

Coal Quay/Lavitt's Quay, between Cornmarket Street and Christy Ring Bridge, is also a heavily-trafficked route. Between Cornmarket Street and Paul Street Car Park, the route is three lanes wide, with parallel on street parking to the south, on-street cycle tracks on both sides and footpaths on both sides. Between Paul Street Car Park and Christy Ring Bridge, the route widens to 4 lanes in width, but the cycle tracks terminate (footpaths are still present on both sides). Typical width is approximately 15m where the route is 4 lanes wide, and up to 21m wide including footpaths. Where the route narrows to three lanes, typical kerb-to-kerb width is up to 17m due to car parking and cycle tracks, and up to 23m wide including footpaths.

Crawford Hall/Wandesford Quay/Crosse's Green Quay

Figure 12.6 – Wandesford Quay – Road Network

This section of the scheme runs from St. Finbarr's Bridge, along Wandesford Quay, past Clarke's Bridge and on to Crosse's Green Quay. On Wandesford Quay, between Sharman Crawford Street and St. Finbarr's Bridge, the carriageway is two-way, with access to St. Finbarr's QPark. Between Sharman Crawford Street and Clarke's Bridge, Wandesford Quay is one-way eastbound only, with on-street parallel parking along one or both sides of the carriageway, and footpaths present on both sides. There is also a Public Bike hire station on Wandesford Quay at this location.

Passing Clarke's Bridge, on to Crosse's Green Quay, the route remains one-way eastbound and southbound, with on-street parallel parking on both sides of the carriageway (and footpaths on both sides).

Typical width on Wandesford Quay is between 7.5m and 10m (depending on the presence of on-street parking), and approximately 12-14m including footpaths. On Crosse's Green Street, the route width is typically approximately 8.5m including parking, and approximately 13m including footpaths. At the southern extent of Crosse's Green Street, the route narrows significantly to a width of approximately 2.5m, with a single 1.2m wide footpath present on the west side.

George's Quay/Union Quay

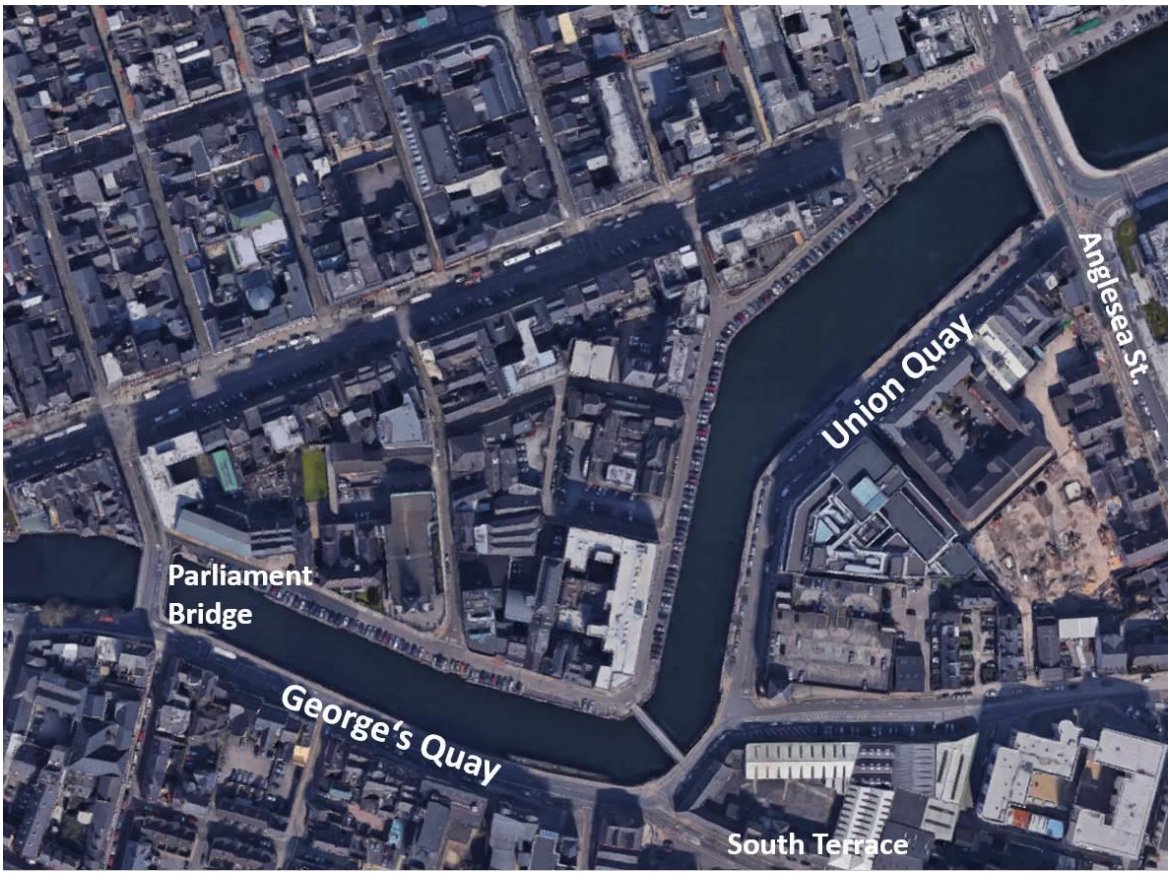

Figure 12.7 – George's Quay/Union Quay – Road Network

George's Quay, from its' junction with South Terrace to Parliament Bridge, is a one-way westbound route, with two traffic lanes and an adjacent bus lane along the majority of the length, when then terminates and becomes an on-street cycle track approaching Parliament Bridge. Footpaths are provided on both sides of George's Quay, but the northern footpath is restricted in width.

Typical carriageway width on George's Quay is approximately 10m kerb-to-kerb, increasing to approximately 14m including footpaths.

Union Quay, between George's Quay and Anglesea Street is a two-way, two lane route, with on-street parallel parking provided on both sides along the majority of the route, as well as footpaths on both sides, and a Public Bike hire station. Union Quay and George's Quay provide access to the College of Commerce via Trinity Bridge (pedestrian bridge) and to Cork School of Music.

Typical kerb width on Union Quay is approximately 12-14m kerb-to-kerb (including on-street parking), increasing to approximately 16-19m including footpaths, although there is a localised pinch point at Trinity Bridge, where the carriageway is less than 7m wide.

Lapp's Quay

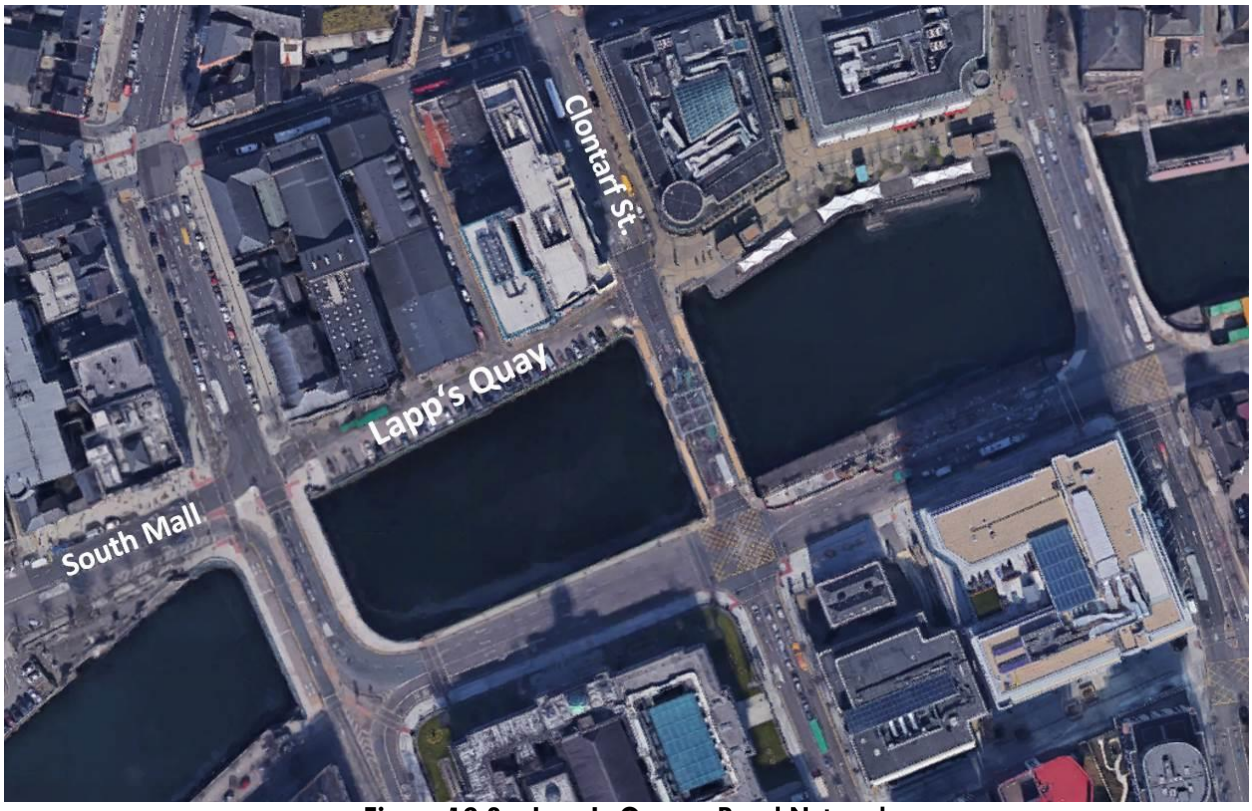

Figure 12.8 – Lapp's Quay – Road Network

Lapp's Quay is a short route connecting the South Mall with Clontarf Street, and is a one-way westbound route, with on-street parking provided at the quay side. There is also extensive perpendicular parking along the quay side of the route for the majority of its length, as well as a Public Bike hire site. Lapp's Quay is the principal terminus within the city centre for the Black Ash Park and Ride bus service. The route also has a footpath on the northern side only.

Typical carriageway width is approximately 13m, including on-street parking, and this width increases to approximately 16-17m including the existing footpath.

East of the junction with Clontarf Street, Lapp's Quay continues along the river boardwalk in front of the Clarion Hotel. This area is pedestrianised at present and does not carry any traffic flow.

Lee Distillery Fields

The Lee Distillery Fields site is segregated from the external road network, and is within private lands. Access to the lands will be via the North Mall or via the Lee Road. The proposed works in this area are on the waterfront edge, and are away from the existing road network.

12.2.4 Phase 4 – North Channel Central Island

Phase 4 consists of numerous works elements along various quays on the north channel of the central island of Cork City, including the following works to the south of the channel:

- Custom House Quay (North);
- Anderson's Quay (East – Downstream);

- Anderson's Quay (East – Upstream);
- Anderson's Quay (West);
- Merchant's Quay; and
- Lavitt's Quay (East).

To the north of the channel, the works include the following areas:

- Castleview Terrace;
- McMahon's Wall (East and West);
- North Deepwater Berth;
- Turning Basin Wall;
- Horgan's Quay;
- Fishguard Wharf;
- Penrose Quay (East and West);
- St. Patrick's Quay;
- Camden Place;
- Pope's Quay (East and West);
- North Mall; and
- Wise's Quay.

Lavitt's Quay

Lavitt's Quay, between Christy Ring Bridge and St. Patrick's Street, lies on the N20 National Primary Route, and is a significant traffic route within the city centre, with strategic traffic from Blackpool, north Cork and Mallow/Buttevant/Charleville/Limerick, etc. routing into the city centre via this link, as well as localised traffic from the northside of the city.

The route is three lanes wide, with two westbound lanes and one eastbound lane. There is no on-street parking along the route, and there are footpaths provided on either side. The route has access to Emmet Place (and to Cork Opera House), and also to Half Moon Street, which is an extensively-used local access route for traffic to get in to the city centre core. Typical width (kerb-to-kerb) is 10-10.5m, and 14.5-15.5 including footpaths.

Figure 12.9 – Lavitt's Quay West/Christy Ring Bridge – Road Network

Merchant's Quay

Merchant's Quay, between St. Patrick's Street and Parnell Place, lies on the N8 National Primary Route, and is also a significant traffic route within the city centre, carrying the aforementioned strategic traffic flow from the north and west, and also carrying strategic traffic flow from the south, east and from the north-east of the city, including being the main traffic approach for strategic traffic from the N8 looking to access the city centre. The route accesses directly to St. Patrick's Street, and also accesses the city bus station at Parnell Place.

In addition, the route also serves as a terminus for the 202 bus service, one of the busiest routes in the city at present.

The route is four lanes wide, with an additional eastbound cycle lane on the quay side. There are three westbound lanes (of which one is a bus lane) between Clontarf Street and the existing signalised pedestrian crossing at the entrance to Merchant's Quay Shopping Centre. West of this, the route has three general westbound traffic lanes, and one eastbound traffic lane. Towards the eastern end, the route widens to provide bus bay areas on the quay side. Although parking is not permitted along the route, there is a localised loading area, which is also regularly used as a set-down/pick-up area in front of the main entrance to Merchant's Quay Shopping Centre, which is approximately 20m long.

There are generous footpaths on both sides, with localised flaring of the footpath on the quay side due to the presence of street furniture and the non-linear alignment of the existing quay walls.

Typical width is approximately 14-15m (kerb-to-kerb), increasing to approximately 22-23m including footpaths.

Figure 12.10 – Merchant's Quay – Road Network

Anderson's Quay (west)

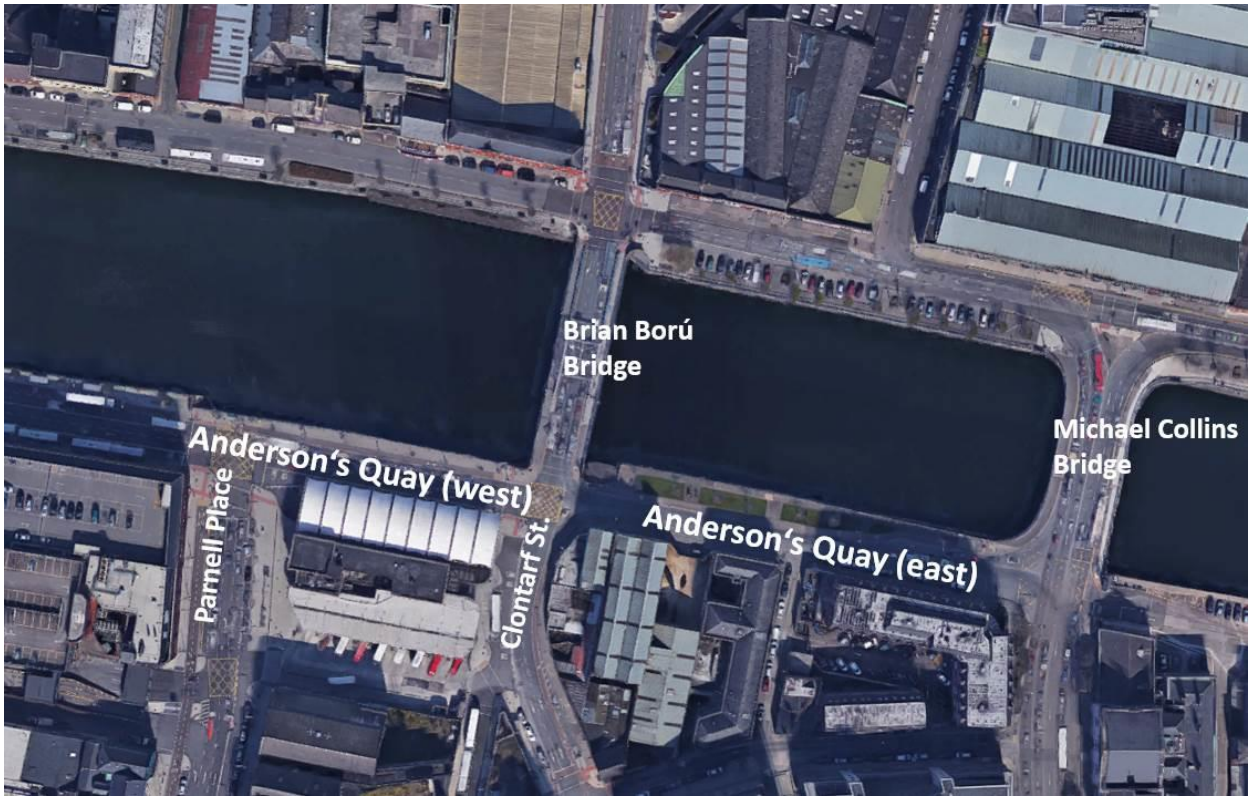

Figure 12.11 – Anderson's Quay (east & west) – Road Network

Anderson's Quay, between Parnell Place and Brian Ború Bridge, is a continuation of the arrangement on Merchant's Quay – i.e. the route is on the N8 National Primary Route. The route is 4 lanes wide, with a westbound bus lane, one eastbound lane, one westbound lane, and one lane that is shared eastbound-westbound. Anderson's Quay fronts the city bus station to the south, and the existing westbound bus lane is regularly used for termini for bus and coach services. There are footpaths provided on both sides, and on

the south side, there is an off-road cycle track provided on the footpath. Typical width is approximately 12m kerb-to-kerb, and approximately 18m including footpaths.

Anderson's Quay (east)

Between Clontarf Street and Michael Collins Bridge, Anderson's Quay is also a continuation of the N8 route and links to the N27 at Michael Collins Bridge. This is also a heavily trafficked route, linking directly to the N27 South Link and carrying heavy traffic flow. The route is two-way, two-lane carriageway, with localised widening approaching Michael Collins Bridge to facilitate an additional left-turning lane. On street parking is provided at the eastern end, in front of Jury's Inn hotel. Footpaths are provided on both sides of the route, and on the quay side there are extensive grassed areas with seating, etc. between the carriageway and the quay wall.

Typical width is 8m (kerb-to-kerb), increasing to approximately 11.5m where there is a left-turning lane and on-street parallel parking. The width increases to a typical 12.5m including footpaths, and up to 20m including the grassed areas on the north side of the route in front of the quay wall.

Custom House Quay (North)/Custom House Quay (South)

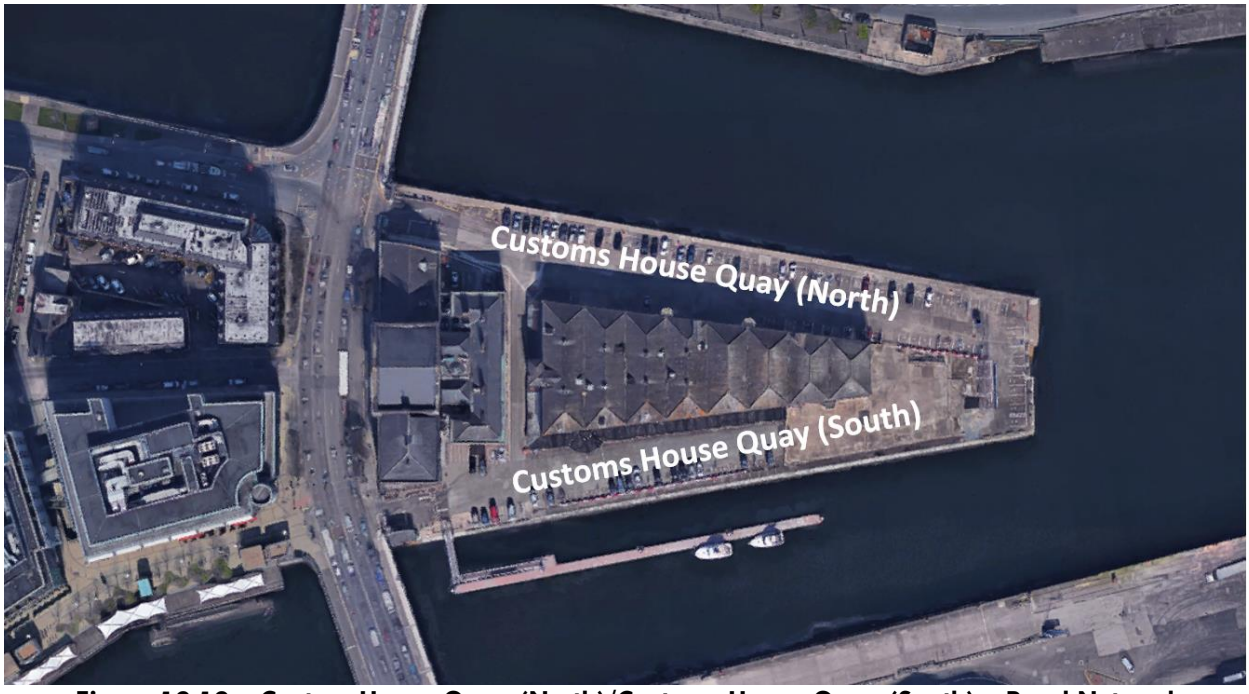

Figure 12.12 – Custom House Quay (North)/Customs House Quay (South) – Road Network

The proposed works in Customs House Quay (North) and Custom House Quay (South) are on private lands, currently in the ownership and control of the Port of Cork. Both sections are part of the eastern tip of the quays within the central island; there is therefore no through route for traffic and consequently there are very low traffic flows and extensive available areas to undertake the proposed works. Although there are no proposed works along the quays themselves, road re-grading works are proposed on Custom House Street, which impacts on the junctions with Custom House Quay (north) and Customs House Quay.

North Mall/Wise's Quay

Figure 12.13 – North Mall / Wise's Quay – Road Network

The North Mall, between Wise's Quay and North Gate Bridge, is a connecting route between the remainder of the quays and Sunday's Well Road. The route is a two-lane, two-way route, with on-street parallel parking on the northern side, and footpaths provided on both sides of the route. Typical width is approximately 8m kerb-to-kerb, and up to approximately 14m including footpaths.

Pope's Quay

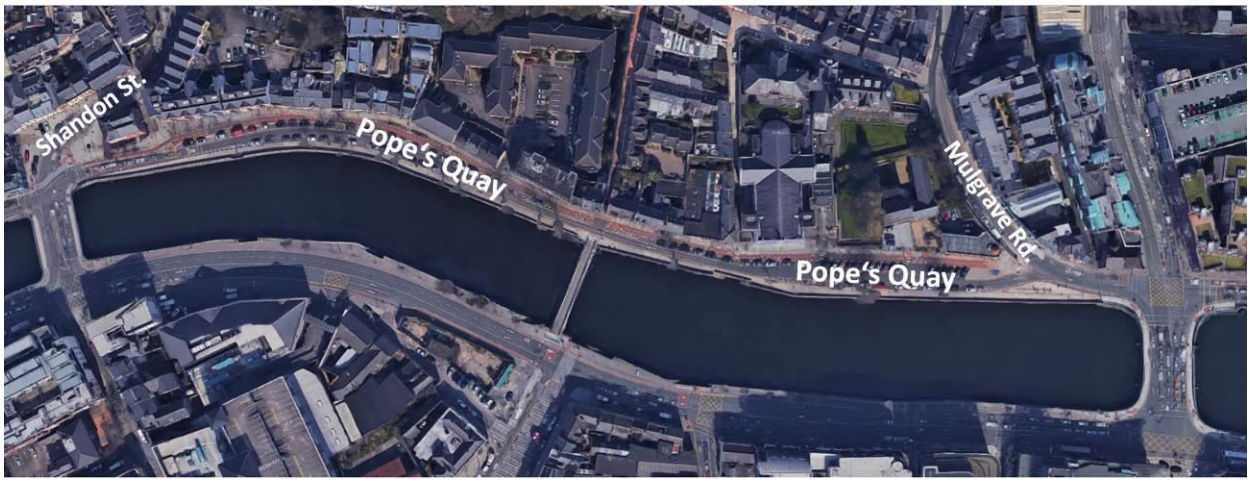

Figure 12.14 – Pope's Quay – Road Network

Pope's Quay, between John Redmond Street and Shandon Street, is a busy route connecting Camden Quay and from Lavitt's Quay (via Christy Ring Bridge), with Shandon Street, North Mall and Bachelor's Quay (via North Gate Bridge). The route is one-way westbound, single-lane traffic for the entire length. There is on-street parking provided on one or both sides of the route in varying locations, as well as herringbone parking provided at the eastern end in front of St. Mary's Church. There is also an on-street, segregated two-way cycle track along the majority of the route on the northern side (with either road markings or physical separation from general traffic), recently installed as part of the Cork City Cycle

Network program. There are footpaths on both sides, and at the eastern end there is a Public Bike hire station. There is also a pedestrian footbridge (Shandon Bridge) linking Pope's Quay with Cornmarket Street. Carriageway width (kerb-to-kerb) is varied, and a typical width is not possible to state, however at Shandon Bridge, where the route is narrow, kerb-to-kerb width is approximately 9m, and approximately 14.5m including footpaths.

Camden Place

Figure 12.15 – Camden Place – Road Network

Camden Place, between the N20 and St. Patrick's Quay, is a heavily trafficked link facilitating traffic flow bypassing the south side of the channel heading to north Cork. It also provides a critical link for inbound bus services from the northside of the city. The route is three lanes wide, with two westbound traffic lanes, and an eastbound contra flow bus lane. There are footpaths provided on both sides also. Typical width is approximately 9m, and approximately 13.5m including footpaths.

St. Patrick's Quay

St. Patrick's Quay is a busy route along the north side of the north channel linking the N8 to MacCurtain Street via Bridge Street, and to the N20 and the northside of Cork City via Camden Place. The route is one-way westbound, widening locally to three lanes approaching the junction with Bridge Street. On-street parallel parking is provided on the north side of the route, while the south side of the route provides parallel, on-street parking for numerous regional, tourist and intercity coach services. There are footpaths present on both sides of the route. There are accesses to numerous off-street private car parks along the route.

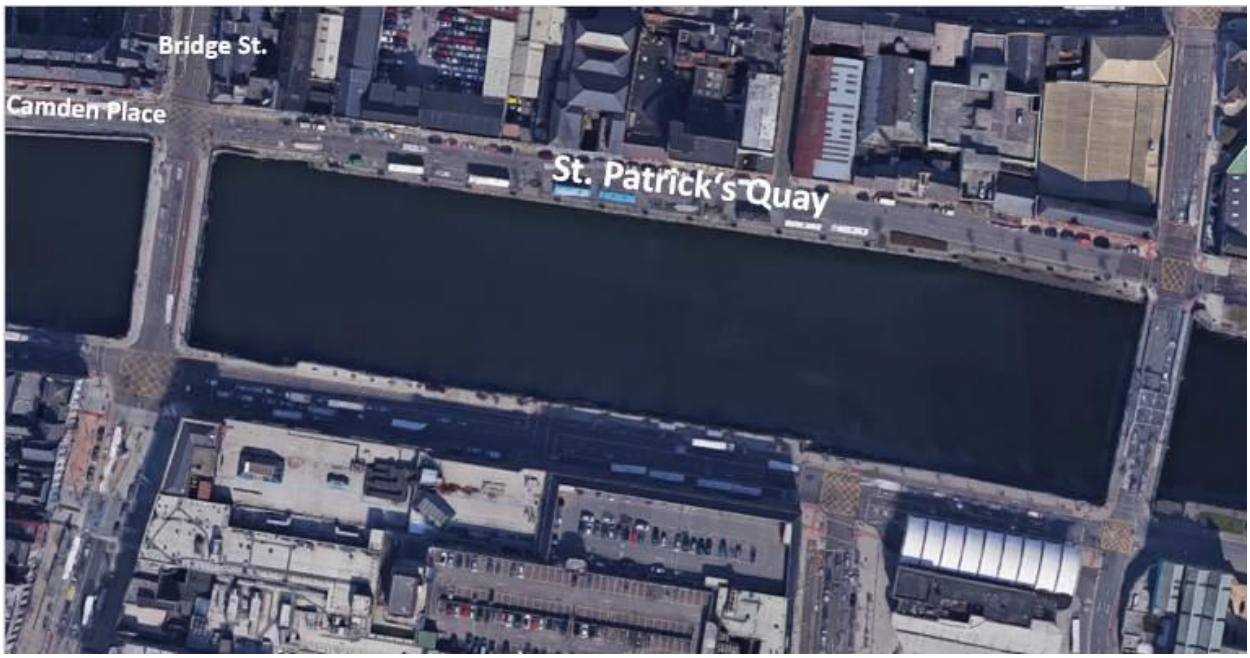

Figure 12.16 – St. Patrick's Quay – Road Network

Midway along the route, access to MacCurtain Street is provided via Harleys Street. Typical width along the route is approximately 12.5m (including on-street parking on both sides), and approximately 17.5m including footpaths.

Penrose Quay

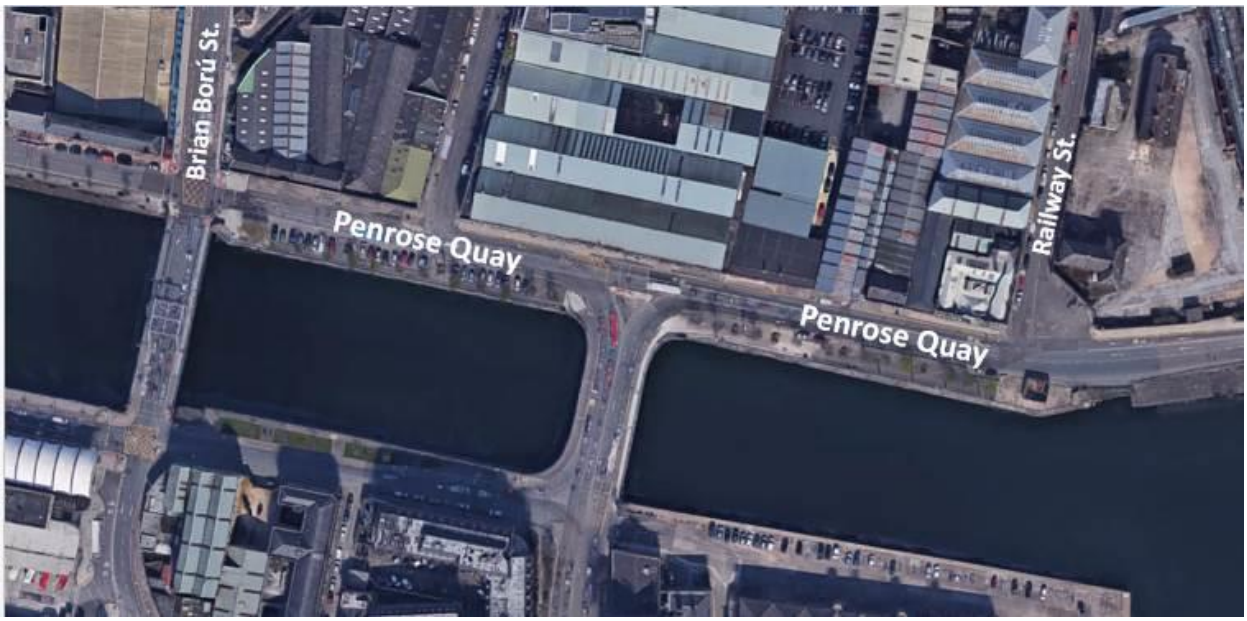

Figure 12.17 – Penrose Quay – Road Network

Penrose Quay, between Brian Ború Street and Railway Street is a heavily-trafficked route, being on the N8 inbound approach to Cork City. The route connects with the N27 via Michael Collins Bridge, and to Merchant's Quay via Brian Ború Bridge. It also connects to the Lower Glanmire Road via Ship Street and Railway Street. The route is one-way westbound and three lanes wide between Railway Street and the

N27 at Michael Collins Bridge (of which one is a westbound bus lane). Between Michael Collins Bridge and Brian Ború Bridge, the route is three lanes wide, with no bus lane. The right-hand most lane is for access to Ship Street, following which the route becomes a two-lane westbound route. There is on-street perpendicular parking provided on the southern side of the route, and access to a number of private off-street car parks on the northern side.

Typical width varies, but where there is parking adjacent to traffic flow, the typical width is approximately 18m kerb-to-kerb, and approximately 24m including footpaths. Where there is no on-street perpendicular parking, the route is typically 12m kerb-to-kerb, and approximately 24m including footpaths. Along the southern side of the route, there are significant footpath widths between the quay wall and the carriageway where perpendicular parking is not provided.

Horgan's Quay

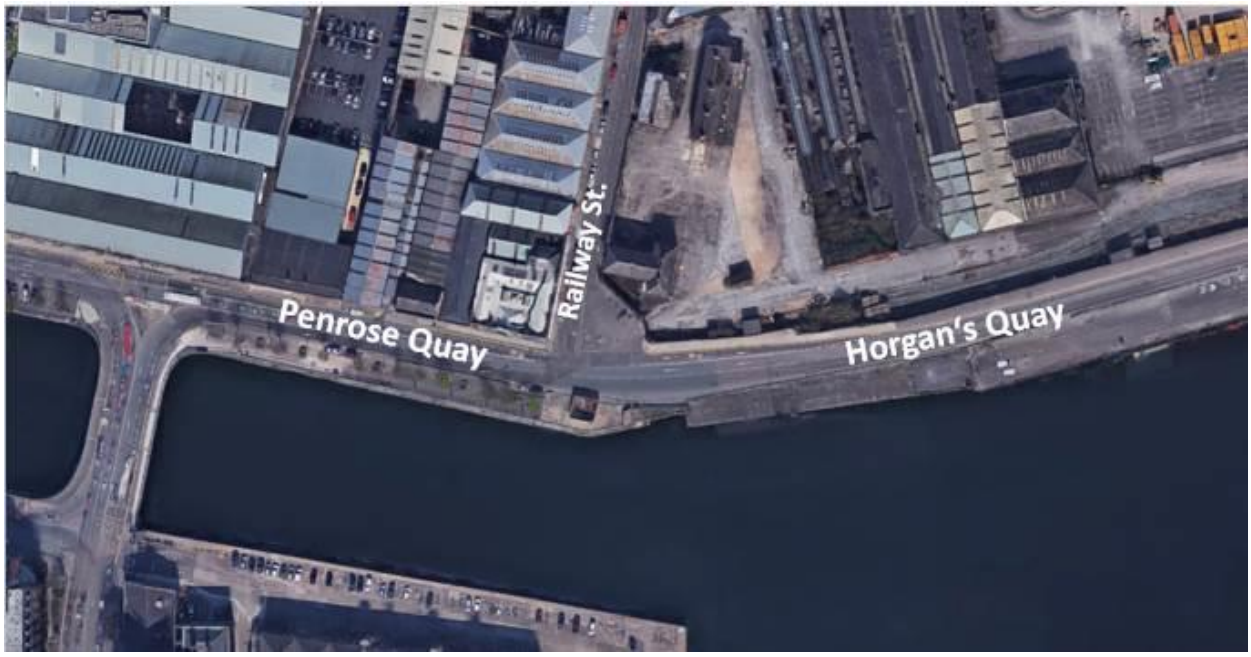

Figure 12.18 – Horgan's Quay – Road Network

The proposed works on Horgan's Quay are in the general vicinity of the junction with Railway Street. Horgan's Quay, as with Penrose Quay is the principal approach to the city on the N8 from the east. The route is heavily trafficked. It is one-way westbound, with three lanes (one of which is a westbound bus lane). There is a footpath provided on the northern side only, and no on-street parking permitted. In the vicinity of the junction with Railway Street, the typical width is approximately 10.5m kerb-to-kerb, and approximately 14m including footpaths.

North Gate Bridge

North Gate Bridge carries a two-way two-lane road with a central median approximately 14.5 metres in width kerb-to-kerb and approximately 19 metres including footpaths. The bridge spans is approximately 29 metres. It facilitates traffic from the North Mall, Shandon Street and Pope's Quay travelling southbound, as well as Bachelor's Quay, Kyrl's Quay and North Main Street travelling northbound.

Christy Ring Bridge

Christy Ring Bridge is part of the N20 national route to Limerick which incorporates three lanes travelling northbound and two lanes southbound with an approximate width of 14 metres kerb-to-kerb and approximately 21.5 metres including footpaths.

The northbound lanes include two straight ahead lanes onto Carroll's Quay and one left turn lane onto Pope's Quay. The southbound lanes allow right and left turn movements on the inside lane and right turn movements only on the outside lane.

Brian Ború Bridge

Brian Ború Bridge carries three lanes of one way traffic travelling southbound approximately 10 metres in width kerb-to-kerb and 15 metres including footpath. Brian Ború Bridge connects traffic from Brian Ború Street and Penrose Quay to Merchants Quay, Anderson Quay and Clontarf Street. The bridge forms part of the N8 national route from the M8 and North Esk Business Park.

12.2.5 Phase 5 – South Central Island

The proposed works in the south channel of the central island include the following locations:

- Albert Quay (east);
- Albert Quay (west);
- Terence MacSwiney Quay (& South Mall properties);
- Grand Parade Quay;
- Dún Mhuire;
- City Car Park;
- Beamish & Crawford;
- Wandesford/Hanover Street;
- Labour Exchange;
- Waterside Quay;
- Fisherman's Wharf;
- Sullivan's Quay; and
- French's Quay.

Albert Quay (east)

Figure 12.19 – Albert Quay (east) – Road Network

Albert Quay, east of its junction with Eamon De Valera Bridge, is a busy route for traffic leaving the city centre, connecting with Monahan's Road and Victoria Road. The route is one-way eastbound as far as Victoria Road Roundabout. The route is two lanes wide, with a footpath on the southern side, and the existing working quay to the north. Parallel, on-street parking is provided along portions of the southern side of the route.

Typical width is approximately 10m (carriageway), increasing to approximately 14m including the southern footpath, and up to 28m including the large wharf area to the north.

Albert Quay (west)/Terence MacSwiney Quay

Albert Quay (west)/Terence MacSwiney Quay, between Eamon De Valera Bridge and Parnell Bridge, is a heavily-trafficked route carrying traffic flow from the south and east of the city in to the city centre, and vice versa.

Albert Quay (west) is one-way eastbound and is three lanes wide between Clontarf Bridge and Eamon De Valera Bridge, with an on-road cycle track on the north side, and footpaths on both sides. Albert Quay (west) also has a wharf (in very poor condition) to the north of the footpath. Terence MacSwiney Quay, between Clontarf Bridge and Parnell Bridge, the route is one-way westbound and four lanes wide, with no cycle facilities and with footpaths on either side.

Typical width is approximately 12m (kerb-to-kerb) on Albert Quay (west), increasing to approximately 17m including footpaths, and up to approximately 25m including the wharf on the northern side. On Terence MacSwiney Quay, the typical width is approximately 14.5m kerb-to-kerb, increasing to up to 22m including footpaths.

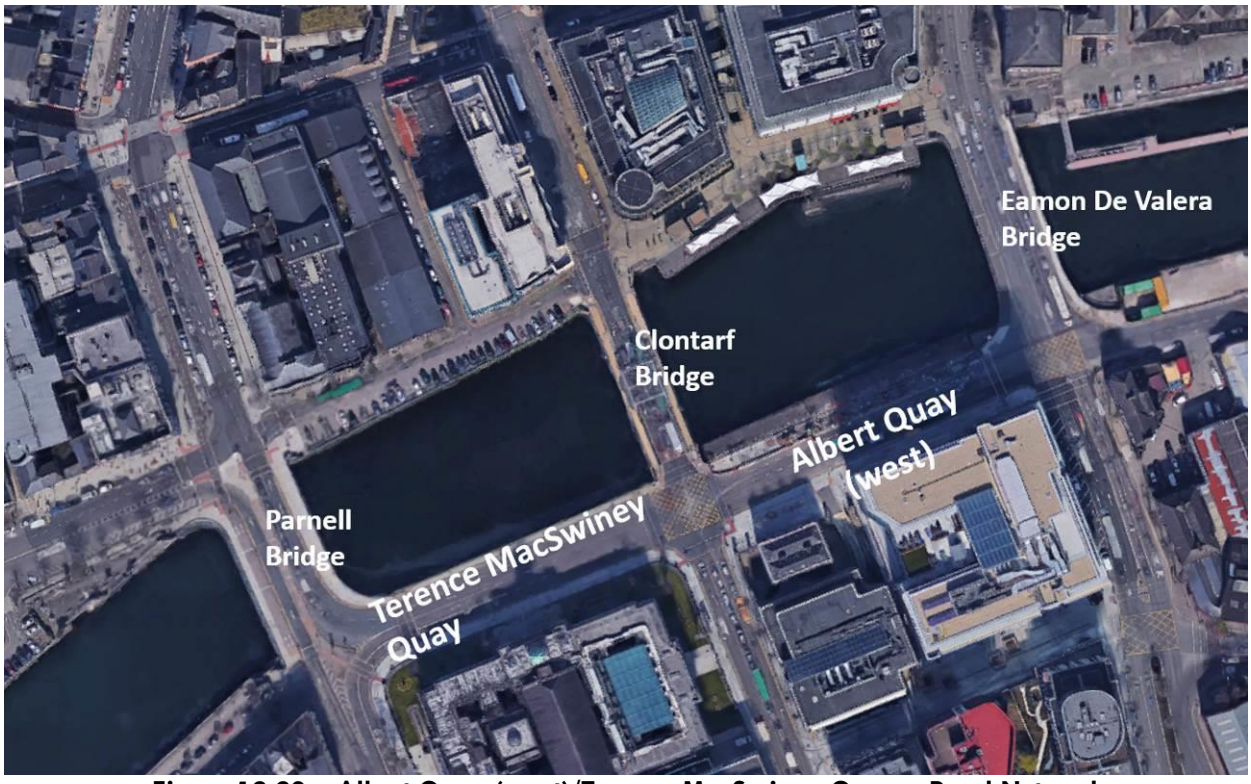

Figure 12.20 – Albert Quay (west)/Terence MacSwiney Quay – Road Network
Grand Parade Quay

Figure 12.21 – Grand Parade Quay – Road Network

The works at Grand Parade Quay will be in lands along the river edge, away from the main road network, therefore there will be slight impact apart from site accessibility.

Sullivan's Quay

Figure 12.22 – Sullivan's Quay – Road Network

Sullivan's Quay, between Parliament Bridge and South Gate Bridge, is a single-lane, one-way westbound route, with an on-road cycle track also provided. The eastern portion of the route facilitates parallel parking on the northern side, and perpendicular parking on the southern side for a short duration, and has a westbound cycle track on the southern side. The western portion of the route provides on-street parking for loading purposes, and an eastbound, contra-flow, segregated on-road cycle track on the northern side. Approaching South Gate Bridge, there is no on-road parking permitted. There are footpaths on both sides along the entirety of the route. Typical width along the route is very varied, but at the most constrained area to the west, the width is approximately 5m (kerb-to-kerb) and approximately 8m including footpaths.

On the northern side of the channel, opposite Sullivan's Quay, the works are primarily within private lands on the quay edges, including the off-street car park within the car park located off Grand Parade, and within the Beamish & Crawford site, leading around to Crosse's Green Quay. There is also a Public Bike Hire site at the western end of the route.

French's Quay/Proby's Quay

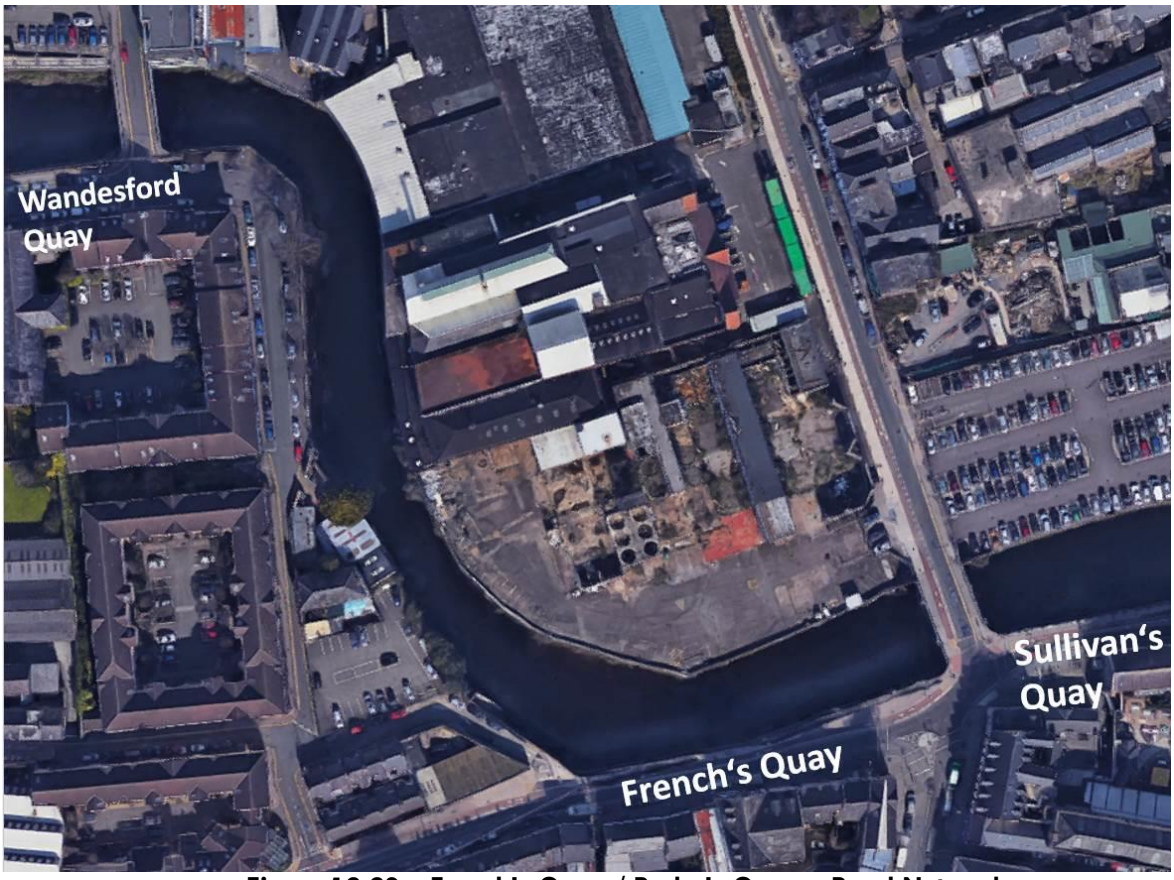

Figure 12.23 – French's Quay / Proby's Quay – Road Network

French's Quay and Proby's Quay connect Sullivan's Quay to Bishop Street and on to Wandesford Quay/Western Road. Both routes are one-way, single lane westbound, with an on-road contra flow cycle lane heading eastbound. On-street, parallel parking is provided on the southern side. Typical width on French's Quay is approximately 7m kerb-to-kerb, and approximately 11-12m including footpaths.

As with Sullivan's Quay, works on the northern side of the river at this location are within private lands, including the Beamish & Crawford site, along Crosse's Green Quay and on the northern side of the river on Wandesford Quay, behind private properties.

Lancaster Quay/Western Road

Lancaster Quay, between Washington Street and the Western Road, is a busy route on the N22, carrying heavy volumes of westbound traffic exiting the city centre. It also connects with Wandesford Quay to the east, and Woods Street and Mardyke Street to the west.

The route is one-way westbound, and is two-lanes wide (one traffic lane and one bus lane). There is also on-street parallel parking provided on the northern side of the route, and a segregated, on-street contra-flow cycle lane on the northern side, between the parking area and the existing footpath.

Typical width is approximately 9-11m kerb-to-kerb, and approximately 15-17m including footpaths.

Figure 12.24 – Lancaster Quay/Western Road – Road Network

Further west, on Western Road, the works will be on the river bank edge, behind the residential properties to the south of the route. In the vicinity of the junction with Donovan Road, the majority of the proposed works will also be offline or along the river edge behind properties.

Clontarf Bridge

Clontarf Bridge continues on from Brian Ború Bridge and Clontarf Street to the north and carries a three lane one way road onto Albert Quay and Terence MacSwiney Quay. Clontarf Bridge is approximately 10 metres in width and 15.5 metres including the footpaths.

12.3 KEY TRIP ATTRACTORS / GENERATORS

There are numerous major trip attractors and generators within the central city area and its environs. These include the principal shopping thoroughfares, numerous schools and third level institutions, transport interchanges, Churches, Hospitals and Civic buildings. Figure 12.25 below illustrates the prominent features.

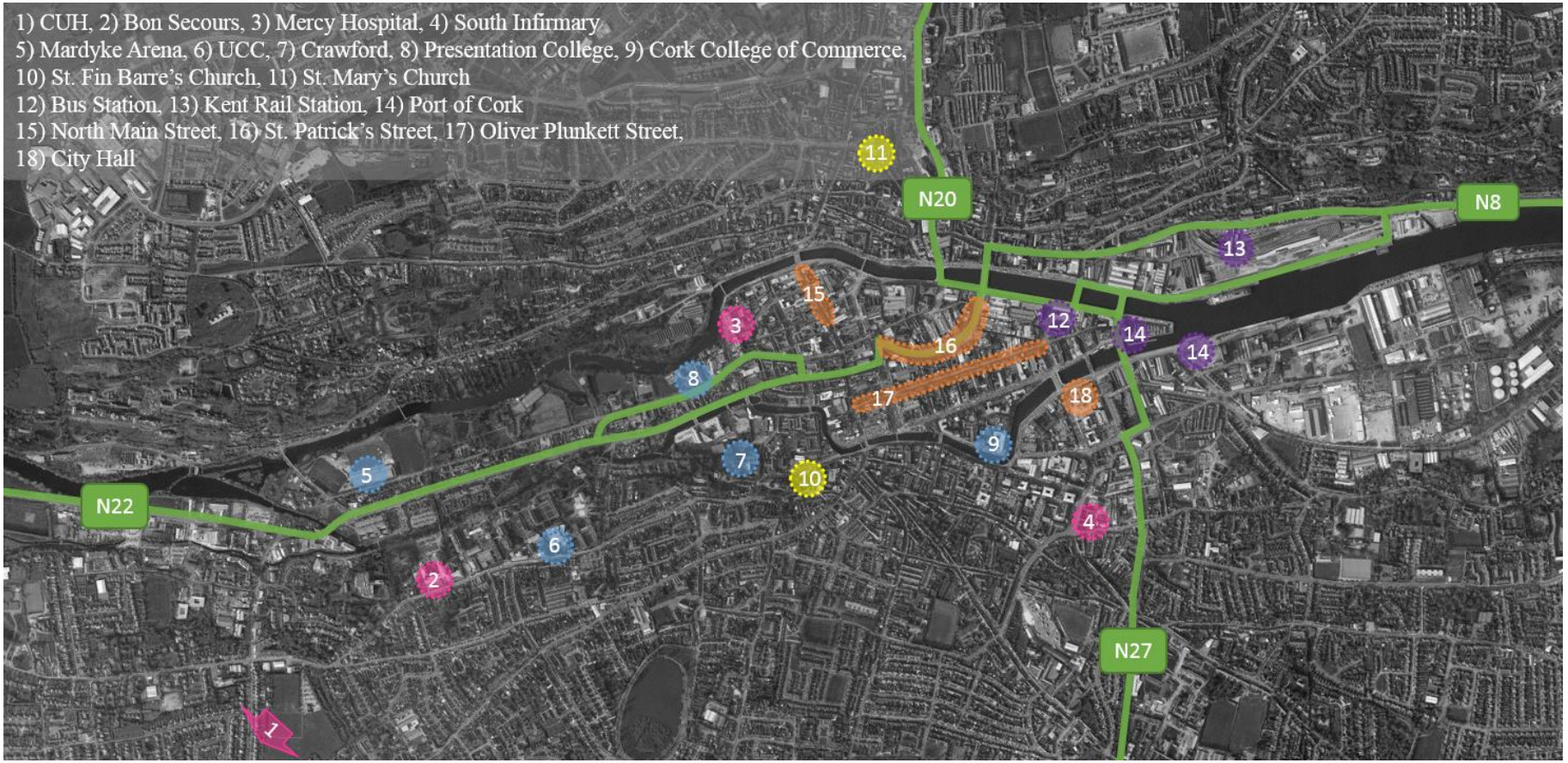

Figure 12.25 – Key Trip Attractors & Generators

12.4 EXISTING TRAFFIC FLOWS

Traffic data was obtained from the National Transport Authority (NTA) Regional Model for the South-West (SWRM), which covers the greater Cork Metropolitan area and the wider county. The model provides traffic flows along the major streets and at junctions within the City area, for the AM and PM peak periods and for 24-hour (AADT)(Annual Average daily Traffic) periods.

The model is validated to 2012 base year data, and was therefore used as the basis for evaluating the potential impacts associated with the proposed flood defence scheme, as it represents a comprehensive capture of traffic data across the entire city road network, as opposed to localised traffic counts from subsequent years which are not representative of the entire network. The 2012 traffic data also provides 24-hour flows for the City, which is not typically captured in localised traffic surveys.

For robustness, to account for intervening traffic growth between the years of 2012 and 2016, a 10% increase was applied to traffic flows obtained from the SWRM.

Tables 12.1-12.5 below provide the traffic data extracted from the South-West Regional Model for the streets which form part of various phases of the works (i.e. Phase 0, 1, 2, 3, 4 and 5 as outlined above).

Table 12.1 Phase 0 – Morrison's Island – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (vehs)	AM Peak Flow (vehs)	PM Peak Flow (vehs)
Father Matthew Quay	6,626	586	649
Morrison's Quay	5,289	396	466

Table 12.2 Phase 1/2 – West of Cork City – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (vehs)	AM Peak Flow (vehs)	PM Peak Flow (vehs)
Carrigrohane Road (east of Inchigaggin Lane)	15,496	1,317	1,356
Lee Road	8,353	974	847
Sunday's Well Road	24,807	2,177	2,149
Grenville Place	7,809	662	562
Bachelor's Quay	17,574	1,758	1,577

Table 12.3 Phase 3 – Cork Central Island – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (vehs)	AM Peak Flow (vehs)	PM Peak Flow (vehs)
Lavitt's Quay west	13,148	1,509	860

Road Name	24-H Traffic Count (AADT) (vehs)	AM Peak Flow (vehs)	PM Peak Flow (vehs)
(approaching Christy Ring Bridge)			
Christy Ring Bridge	16,522	1,812	1,199
North Gate Bridge	20,909	2,110	1,879
Union Quay (approaching Anglesea Street)	1,794	138	146
George's Quay	13,745	1,381	1,137
Parliament Bridge	7,993	824	696
Proby's Quay	10,286	1,092	843
Wandesford Quay	5,865	486	483

Table 12.4 Phase 4 – North Channel Central Island – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (vehs)	AM Peak Flow (vehs)	PM Peak Flow (vehs)
Lavitt's Quay (east)	11,340	873	934
Merchant's Quay	14,934	1,261	1,157
Anderson's Quay (west)	7,291	568	645
Anderson's Quay (east)	4,171	334	356
Custom House Street	22,471	2,365	1,569
North Mall/Wise's Quay	9,779	900	1,037
Pope's Quay	14,161	1,194	1,192
Camden Place	8,432	700	619
St. Patrick's Quay	7,945	688	620
Penrose Quay	19,943	1,707	1,683
Horgan's Quay	14,155	1,596	1,084
North Gate Bridge	20,909	2,110	1,879

Road Name	24-H Traffic Count (AADT) (vehs)	AM Peak Flow (vehs)	PM Peak Flow (vehs)
Christy Ring Bridge	16,522	1,812	1,199
Brian Ború Bridge	15,138	1,659	1,218
Michael Collins Bridge	19,840	2,032	1,697

Table 12.5 Phase 5 – South Channel Central Island – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (vehs)	AM Peak Flow (vehs)	PM Peak Flow (vehs)
Albert Quay (west)	7,648	569	800
Albert Quay (east)	5,371	729	377
Terence MacSwiney Quay	15,554	1,580	1,264
Sullivan's Quay	4,605	440	361
French's Quay/Proby's Quay	8,834	956	699
Lancaster Quay/Western Road	5,270	702	402
Clontarf Bridge	12,640	1,150	1,191
Parliament Bridge	7,992	824	696

12.5 OTHER PENDING MAJOR WORKS / SCHEMES

This section describes a number of major projects that are in development or that are pending in the Cork City area that will have the potential to impact due to their interaction with the Lower Lee (Cork City) Drainage Scheme. The following list of schemes is non-exhaustive, and others may arise during the lifetime of the scheme.

12.5.1 Cork City Centre Movement Strategy

The City Centre Movement Strategy (CCMS) was a key recommendation arising from the Cork Area Transit System (CATS) study, completed in 2010. The CCMS is designed to increase overall levels of accessibility to the Core City Centre area, and contribute to the sustained residential, retail and commercial growth of this key area.

The key principles of the City Centre Movement Strategy include:

- The re-allocation of road space on the city centre streets to ensure a more appropriate balance between the different transport modes serving the city and provide travellers to the city with a greater choice of travel mode; and
- The management of through traffic within the central city streets, this will act to improve the environment for all users including public transport users, pedestrians and cyclists.

The key objective associated with the City Centre Movement Strategy is to:

"*Improve the general vibrancy of Cork City Centre to promote sustained economic growth, to deliver a much more attractive environment for shoppers, visitors and tourists and to help encourage sustained inward investment*".

The sub-objectives for this project to achieve the key objective above include the following:

General Vehicular Access:

- Identify a street hierarchy within the city centre to clearly identify the main routes into and through the City Centre;
- Maintain accessibility to the City Centre off-street car parks; and
- Manage access for deliveries within the City Centre.

Public Transport Movement:

- Deliver a more efficient public transport operating environment; and
- Improve the reliability of the existing bus service.

Pedestrian Movement:

- Deliver streets that provide a more pleasant shopping environment; and
- Make it easier to cross the city streets at key locations.

Cycling Access:

- Provide a traffic management system that encourages cycling in the City Centre.

The City Centre Movement Strategy was adopted by the members of Cork City Council on March 25th 2013.

The CCMS is divided into a total of 8 distinct phases. The implementation of Phases 1 and 2 was approved by the elected members of Cork City Council in September 2016. As part of Phase 1, vehicular access will be restricted to St. Patrick's Street between 15:00 and 18:30 daily (with the exception of buses, taxis, cyclists and emergency vehicles, and ancillary associated works). Phase 3 includes works at Grenville Place, which include amendments to traffic circulation on certain links and at certain junctions. Both Phases are progressing through detailed design at present, and are expected to become operational in early 2018.

Later phases of the scheme include improvements and some amendments to traffic circulation on key streets such as McCurtain Street, Merchants Quay, South Mall, North Main Street, South Main Street, Proby's Quay and North Mall.

12.5.2 Dunkettle Interchange Upgrade Scheme

The Dunkettle Interchange represents the junction of the N8, N25 and N40 national routes, to the west of Cork City. The junction is of national strategic significance, and carries in excess of 100,000 trips per day, and connects to the N40 Cork South Ring Road via the Jack Lynch Tunnel.

Proposals to upgrade the scheme to fully free-flowing were granted planning permission in 2013, and the scheme currently forms part of the capital investment programme. While no commencement date for construction has been announced, it is likely that this scheme may commence in 2018/2019.

12.5.3 Harleys Street Bridge

Cork City Council intends to construct a pedestrian and cyclist bridge from St. Patricks' Quay to Merchants Quay. The bridge will be located in the vicinity of the junction of Harleys Street with St. Patricks' Quay. The Harleys Street Bridge has been identified in the CCMS as a component of a later phase including works on McCurtain Street. Tender documentation for consultants has been issued for the scheme, which is expected to be completed in 2018/2019.

12.5.4 Event Centre

The Event Centre site on the former Beamish & Crawford facility, will be a 6,000-seater centre, and will be accessed via South Main Street. Demolition works are ongoing on site, and internal design of the scheme is yet to be finalised. It is estimated that the scheme will be complete in 2019/2020.

12.5.5 Kent Station Re-Development

CIE are progressing the major re-development of Kent Railway Station in Cork City, which will re-orient the station to face southwards to Horgan's Quay, improving linkages and permeability through the site and strengthening the onward connection to the City Centre. This work is expected to be complete in early 2017.

12.5.6 St. Patrick's Quay Coach Parking

Cork City Council are developing proposals to rationalise and improve coach parking facilities along St. Patricks' Quay. This will involve the creation of dedicated coach parking areas, and localised footpath improvements. Resurfacing works and refreshment of the existing carriageway surface and road markings are also proposed, which will include narrowing of the existing carriageway lanes to facilitate the proposed improvements. These works are expected to commence in 2017.

12.5.7 Other Projects/Developments

- Public Realm Works at Morrison's Quay;
- Navigation House/Sullivan's Quay Office Developments;
- Albert Quay East – Contra-Flow Bus Lane;
- Grand Parade Quay – Proposed World War 1 Memorial;
- Lee Road Waterworks – proposed extension to water treatment plant;
- Port of Cork Ringaskiddy Re-Development Scheme; and
- N28 Motorway Upgrade Scheme.

12.6 DETAILS OF THE SCHEME

As detailed in Chapter 3, the following are the key components of the scheme:

- A new Fluvial Flood Forecasting Revised dam operation Designation of floodplains (washlands) upstream of Cork City;
- Direct defences (walls and embankments);
- Flow Control structure chamber at the upstream end of the South Channel of the River;
- Demountable flood gates (tidal) at a limited number of key bridges and critical locations within the eastern part of Cork city centre;
- Re-grading of ground and road ramping at a number of locations;
- Associated groundwater cut off walls and back-of-defence drainage infrastructure to intercept and manage groundwater seepage;
- Associated drainage infrastructure (including non-return valves on drainage outlets) and pumping stations to manage surface water/groundwater at back of defences; and
- Associated services/utility diversions.

Those works elements which are deemed to have a traffic impact are discussed in more detail below.

12.6.1 Direct & Demountable Defences

This component of the scheme comprises works on the existing quay walls and bridges, raising or re-construction of the quay walls and improvements to bridge parapets. This work also includes earthwork embankments & flow control structures in specific locations.

12.6.2 Pumping Stations

At a number of locations in the city centre, existing quays have no parapet and drainage is either overland over open quays or else through discrete regular outfalls through the quay walls. In addition, a number of major piped or culverted drains outfall to the channel.

The construction of raised parapets and flood defence walls will prevent the existing drainage systems from functioning at present either permanently or more so in the majority of cases, in the temporary situation during a flood event. Therefore to ensure that pluvial flooding is not worsened on the dry side of flood defences, new 'collector' drains and pumping stations will be constructed to safely discharge surface water during a flood event thus preventing back of wall surface water flooding. Pumping stations will incorporate permanent submersible pumps in underground wet wells with only control kiosks as above ground elements.

The greatest impact of these pumping stations is in terms of traffic restrictions during construction as they will require excavations of up to 5m in depth. Wet wells will typically be 3m to 4m internal diameter on plan. Currently, it is envisaged that circa 30 no. pumping stations could be required. The sites of pumping stations have been deliberately chosen to minimise disruption during construction and to provide access locations for maintenance that will require minimum future traffic management.

12.6.3 Backing Walls & Pointing/Re-Grouting Works

Backing Walls are proposed in locations where the internal face of quay walls requires deep reinforcement, necessitating significant excavation of the carriageway and footpath adjacent to the wall in question. Pointing & Re-grouting works are less intrusive and do not require significant excavation.

12.6.4 Ramps and Road Re-grading Works

At a number of locations, it is proposed to re-grade roads, footpaths and other areas of ground either to raise ground level above flood defence level (and so provide a direct flood defence) or in other instances reduce the effective height of a flood defence wall relative to the dry side ground level to retain the social amenity relationship with the river. Such re-grading is generally limited to changes in elevation of less than 1m.

12.6.5 Utility & Service Diversions

Like all similar civil engineering projects undertaken in large historic urban areas, it will be necessary to locate, uphold or divert numerous existing services/utilities. The full extent of such work cannot be known until detailed design stage, but every effort will be made to minimise the impact to existing services and the need for any diversions or outages. Such works will be particularly significant along the city quays on the central island.

12.6.6 Construction Traffic

Construction traffic associated with the scheme will involve delivery vehicles bringing plant to specific sites (and bringing materials associated with setting up a works compound in certain locations), the delivery of construction materials (i.e. concrete, fill material, etc.) and the removal of excavated material.

Within the central city area, during typical working operations, it is envisaged that there will typically be 4 HGV's to and from works sites per hour (one-way) resulting in a total of 8 two-way HGV trips. In the suburban areas to the west of the city where there are extensive earthwork elements proposed, this will typically be 10 HGV's to and from works sites per hour (a total of 20 two-way HGV trips). Assuming an 8-hour working day, this would therefore result in 64 two-way HGV trips per day in the city centre, and 160 two-way HGV trips per day.

The above figures are representative of typical working operations. There may be scope during summer periods to intensify work activities in order to expedite the progress of works; this intensification would likely coincide with road closures during periods of lower background traffic flows, however for analysis purposes the above values are used.

12.6.7 Construction Workforce

As with construction traffic, the associated construction workforce associated with the scheme will involve crews arriving and departing works sites.

It is envisaged that there will typically be up to 30 workers travelling to and from works sites per hour in the morning and evening (a total of 60 two-way workforce trips). It has been further assumed that 15 of these workers leave during lunch and 15 return at the end of lunch. Thus, the total two-way workforce movements are envisaged to be 90 per day.

As with construction vehicles, the above figures are representative of typical working operations. During summer periods where work activities are intensified in order to expedite the progress of works the

commensurate workforce numbers would also increase; however, this intensification would likely coincide with road closures during periods of lower background traffic flows, and again for analysis purposes the above values are used.

12.7 POTENTIAL IMPACTS

12.7.1 Increase in traffic flows

The construction vehicles and construction workforce traffic flows outlined above in Section 12.6.1 have been added to the 24-hour AADT flows presented in Section 12.3 and the proportional increases in traffic flows are presented in tables 12.6-12.10 below.

Table 12.6 Phase 0 – Morrison's Island – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (2-way) (vehs)	Daily Construction Vehicles (2-way)	Daily Construction Workforce (2-way)	Total Construction Traffic (2-way)	Total Traffic Flows (2-way)	% Increase
Father Matthew Quay	6,626	64	90	154	6,780	2.32%
Morrison's Quay	5,289	64	90	154	5,443	2.91%

Table 12.7 Phase 1/2 – West of Cork City – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (2-way) (vehs)	Daily Construction Vehicles (2-way)	Daily Construction Workforce (2-way)	Total Construction Traffic (2-way)	Total Traffic Flows (2-way)	% Increase
Carrigrohane Road (east of Inchigaggin Lane)	15,496	160	90	250	15,746	1.61%
Lee Road	8,353	64	90	154	8,507	1.84%
Sunday's Well Road	24,807	64	90	154	24,961	0.62%
Grenville Place	7,809	64	90	154	7,963	1.97%

Road Name	24-H Traffic Count (AADT) (2-way) (vehs)	Daily Construction Vehicles (2-way)	Daily Construction Workforce (2-way)	Total Construction Traffic (2-way)	Total Traffic Flows (2-way)	% Increase
Bachelor's Quay	17,574	64	90	154	17,728	0.88%

Table 12.8 Phase 3 – Cork Central Island – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (2-way) (vehs)	Daily Construction Vehicles (2-way)	Daily Construction Workforce (2-way)	Total Construction Traffic (2-way)	Total Traffic Flows (2-way)	% Increase
Lavitt's Quay west (approaching Christy Ring Bridge)	13,148	64	90	154	13,302	1.17%
Christy Ring Bridge	16,522	64	90	154	16,676	0.93%
North Gate Bridge	20,909	64	90	154	21,063	0.74%
Union Quay (approaching Anglesea Street)	1,794	64	90	154	1,948	8.58%
George's Quay	13,745	64	90	154	13,899	1.12%
Parliament Bridge	7,993	64	90	154	8,147	1.93%
Proby's Quay	10,286	64	90	154	10,440	1.50%
Wandesford Quay	5,865	64	90	154	6,019	2.63%

Table 12.9 Phase 4 – North Channel Central Island – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (2-way) (vehs)	Daily Construction Vehicles (2-way)	Daily Construction Workforce (2-way)	Total Construction Traffic (2-way)	Total Traffic Flows (2-way)	% Increase
Lavitt's Quay (east)	11,340	64	90	154	11,494	1.36%
Merchant's Quay	14,934	64	90	154	15,088	1.03%
Anderson's Quay (west)	7,291	64	90	154	7,445	2.11%
Anderson's Quay (east)	4,171	64	90	154	4,325	3.69%
Custom House Street	22,471	64	90	154	22,625	0.69%
North Mall/Wise's Quay	9,779	64	90	154	9,933	1.57%
Pope's Quay	14,161	64	90	154	14,315	1.09%
Camden Place	8,432	64	90	154	8,586	1.83%
St. Patrick's Quay	7,945	64	90	154	8,099	1.94%
Penrose Quay	19,943	64	90	154	20,097	0.77%
Horgan's Quay	14,155	64	90	154	14,309	1.09%
North Gate Bridge	20,909	64	90	154	21,063	0.74%
Christy Ring Bridge	16,522	64	90	154	16,676	0.93%
Brian Ború Bridge	15,138	64	90	154	15,292	1.02%
Michael Collins Bridge	19,840	64	90	154	19,994	0.78%

Table 12.10 Phase 5 – South Channel Central Island – Traffic Flows on Road Network

Road Name	24-H Traffic Count (AADT) (2-way) (vehs)	Daily Construction Vehicles (2-way)	Daily Construction Workforce (2-way)	Total Construction Traffic (2-way)	Total Traffic Flows (2-way)	% Increase
Albert Quay (west)	11,340	64	90	154	11,494	1.36%
Albert Quay (west)	7,648	64	90	154	7,802	2.01%
Albert Quay (east)	5,371	64	90	154	5,525	2.87%
Terence MacSwiney Quay	15,554	64	90	154	15,708	0.99%
Sullivan's Quay	4,605	64	90	154	4,759	3.34%
French's Quay/Proby's Quay	8,834	64	90	154	8,988	1.74%
Lancaster Quay/Western Road	5,270	64	90	154	5,424	2.92%
Clontarf Bridge	12,640	64	90	154	12,794	1.22%
Parliament Bridge	7,992	64	90	154	8,146	1.93%

12.7.2 Impact due to construction works

The most significant impacts in terms of traffic are expected within the city centre area, where the proposed works are more extensive and comprise numerous works elements in isolation or in combination. Works to the west of the city are considered to have a much lesser potential impact on traffic, and include off-line works such as embankments.

Within the city core, the proposed works that are either on or are adjacent to the carriageway edge include the following elements:

- Direct Defences on quay walls and bridge parapets;
- Pointing & re-grouting of existing quay walls;

- Construction of Backing Walls;
- Construction of Pumping Stations; and
- Road Re-grading works.

The above individual works elements have specific construction implications, in terms of the effective land take from the existing road cross section that is required to facilitate implementation. For the purpose of this assessment, the following typical land take requirements have been assumed for the individual works elements:

- Direct Defences on quay walls and bridge parapets – 6m working area width;
- Pointing & re-grouting of existing quay walls – 6m working area width;
- Construction of Backing Walls – 8m working area width;
- Construction of Pumping Stations – 8m working area width; and
- Road Re-grading works – full closure required – however this can be carried out in phases.

The impacts on the various streets and roads are discussed individually hereunder. The potential impacts have been summarised for each section under the following broad classifications –Slight/Moderate/ Significant.

Morrison's Island

Works at Morrison's Island is unlikely to significantly affect the flow of traffic, as the route is primarily used for access to parking spaces as opposed to a major traffic route. The proposed direct defence works will not impact on the functionality of the route as the existing parking areas along the quays will provide sufficient space to carry out the works. Depending on the phasing of the works along the quays here, traffic flow can be maintained to access parking areas that remain available. Father Matthew Street provides an alternative access to the quays at this location when Father Matthew Quay is unavailable for traffic flow.

The reduction in parking spaces will have to be taken into consideration and in particular any reduction in disabled parking spaces will need to be replaced elsewhere. Pedestrian access can be maintained along the route during the direct defence works.

A pumping station is proposed at Trinity Bridge, which will likely require a temporary closure of the carriageway at this location, or potentially a reduction in carriageway width at this location to single-lane only. However there will be no impact on the pedestrian bridge associated with this and pedestrian access will be maintained.

At the road re-grading stage, the route will need to be fully closed to allow for this element of the works. This will again likely be done in phases, and will facilitate traffic flow along the quays if necessary, although parking spaces will again be required to be removed temporarily.

Further consideration has to be given to the Public Bike hire site, which may have to be decommissioned and removed temporarily during the works. It is noted that the works at Morrison's Island are likely to be advanced ahead of the remainder of the Lower Lee (Cork City) Drainage Scheme, and will possibly be undertaken in tandem with urban realm improvement proposals for the area.

On Union Quay, between Copley Street and South Terrace there are two opposing lanes and no car parking. Direct defences and pointing/re-grouting works proposed here will likely necessitate the closure of the northbound traffic lane during the works. As with the works on Union Quay, traffic can divert via Sullivan's Quay, Parliament Bridge, the South Mall and Parnell Bridge.

Conclusion: Temporary Moderate Negative Impact

Phase 1 – West of Waterworks Weir

The majority of works associated with Phase 1 are located outside of Cork City Centre and as a result there is only localised impact expected in terms of traffic. Proposed works on the Carrigrohane Road are largely located off the road alignment and there are sufficient available lands adjacent to the main carriageway to accommodate working width requirements.

Works on the Lee Road and on Sunday's Well road include direct defences and construction of two pumping stations, and road re-grading on the Lee Road. The works on Sunday's Well will require temporary removal on on-street parking to facilitate single-lane traffic flow. Traffic from the north will be able to divert on to Sunday's Well Road (eastbound) and via the North Mall.

The proposed pumping station on the Lee Road will likely require a full road closure due to the reduced carriageway width at the proposed pumping station location and at the Environmental Research building where road re-grading is proposed. The temporary closure of the Lee Road will necessitate traffic diversions via Leemount Cross and the N22, or via Blarney Road/Shanakiel Road/Sunday's Well Road during these works.

Conclusion: Temporary Significant Negative Impact

Phase 2 – Thomas Davis Bridge to Bachelor's Quay

Works between Thomas Davis Bridge and Prospect Row will be concentrated on the river bank, and as such there will be minimal impact on traffic flow. Works in lands to the north of Mardyke Walk are off-line for the most part and will have minimal impact on traffic flow. Pedestrian routes such as Daly's Bridge and other routes along the northern river boundary of Fitzgerald's Park will be temporarily closed during this phase, however alternatives will be available.

Between Prospect Row and Bachelor's Quay, direct defences and pointing/re-grouting works will require a reduction of the existing carriageway width. At this location there is no footpath adjacent to the quay wall. Therefore, the removal of on-street parking (both designated and indiscriminate) along Grenville Place will be required to facilitate the works and to maintain traffic flow (reduced to single lane only). Grenville Place then narrows significantly approaching St. Vincent's Bridge, which will require a full closure of the carriageway once the works reach this location.

Road re-grading is proposed along Grenville Place and part of Bachelor's Quay, which will require temporary closure of the route (likely to be done in phases). Again, at St. Vincent's Bridge, the carriageway width is so narrow that no traffic flow can be maintained during the works. Vehicles will be able to divert via Grattan Street and Henry Street. The existing ambulance parking spaces on Grenville Place may have to be temporarily re-located to Henry Street along the front of the Mercy Hospital.

A pumping station is also proposed on Prospect Row in the vicinity of the junction with Henry Street, although this is envisaged to be constructed within the reclaimed lands adjacent to the carriageway and therefore there is no expected impact on traffic flow at this location.

The most significant impacts during Phase 3 relate to the loss of accessibility to the Mercy Hospital via Grenville Place and Prospect Row; however alternative nearby diversion routes are available which will minimise the routing for emergency services.

Conclusion: Temporary Significant Negative Impact

Phase 3 – Cork Central Island

Bachelor's Quay/Grenville Place/Kyrl's Quay/Lavitt's Quay (west)

On Bachelor's Quay, between Grenville Place and Kyrl's Quay, the footpath along the quay edge is quite narrow and missing in places, therefore it is likely that the direct defences and pointing/re-grouting works will necessitate a temporary closure of one lane in each direction to provide the necessary working area. Footpath improvements are also proposed along the quay wall, to tie in to the existing footpath at North Gate Bridge. A pumping station is also proposed in the vicinity of the junction with Grattan Street, on the quay side. The aforementioned reduction in carriageway width is also sufficient to carry out these works.

The area of Coal Quay/Kyrl's Quay and Lavitt's Quay (west) contains a reasonably wide footpath on the quay edge, and on-road cycle lanes adjacent to traffic lanes, which would assist in carrying out the works. In terms of direct defences and pointing & re-grouting, the impact on the road network is expected to be slight. There is also a left-turn only lane in place for access to Kyrl's Quay multi-storey car park, which will be available as an auxiliary lane.

On Lavitt's Quay (west), there are no on-road cycle lanes, which reduces the effective road width available for maintaining traffic flow; however the southern-most lane is only for access to Half Moon Street and Paul Street Car Park – this lane would be available to facilitate traffic flow.

Access to Paul Street Car Park and to Kyrl's Quay Car Park will need to be maintained for the duration of the works.

A pumping station is proposed at the junction of Kyrl's Quay/Coal Quay. Although this has been located proximate to the river edge, these will require a greater working width, and will likely involve the temporary closure of the northern footpath and nearside lane.

Road re-grading works are proposed along Kyrl's Quay and Coal Quay (approximately 160m) and this will require closure of the entire carriageway, in phases). This is likely to reduce the carrying capacity of the roadway to a single lane of traffic in both directions, and in particular on Kyrl's Quay may result in reduction to a single lane shuttle arrangement.

Conclusion: Temporary Significant Impact

Crosse's Green Street/Crawford Hall/Wandesford Quay

The area of Crosse's Green/Crawford Hall and Wandesford Quay contains car parking areas, which would be sufficient to accommodate direct defences and pointing/re-grouting works. A pumping station is proposed in the vicinity of Forde's Funeral Home behind French's Quay/Proby's Quay. The proposed

pumping station behind Forde's Funeral Home will require closure of the short section of carriageway that routes to the north of this. Traffic will be able to divert by remaining on Crosse's Green.

Quay wall reconstruction is proposed on Crosse's Green Quay, which will require temporary closure of Crosse's Green Quay between Clarke's Bridge and Convent Place. Traffic will be able to divert via Clarke's Bridge, Hanover Street and South Main Street.

Along Wandesford Quay, direct defences and pointing/re-grouting works are proposed between Sharman Crawford Street and Clarke's Bridge. On-street parking is provided on both sides of the street here, which will enable the works to be undertaken without impacting traffic flow. The public bike docking station along Wandesford Quay will require temporary decommissioning during the works.

A pumping station is also proposed on Wandesford Quay, in the vicinity of the junction with Sharman Crawford Street – this is likely to require reduction of the quay at this location to single lane only due to the available width.

Conclusion: Temporary Significant Impact

Union Quay/Copley Street/George's Quay

The area of Union Quay from Copley Street to Anglesea Street contains car parking on both sides which will provide sufficient space to accommodate the direct defence and pointing/re-grouting works. A pumping station is proposed at the southern extend of Union Quay, in the vicinity of the junction with Copley's Street. This will likely involve the temporary reduction of the route to single-lane traffic flow during the construction of the pumping station. Traffic accessing Union Quay from the north can divert via Anglesea Street and Copley's Street, while traffic accessing from the south can divert via Sullivan's Quay, Parliament Bridge, the South Mall and Parnell Bridge.

The area at George's Quay contains a relatively narrow footpath on the quay side, two westbound traffic lanes and a bus lane westbound, which would provide sufficient space to accommodate works. The temporary removal of a traffic lane or the bus lane would be required to facilitate the works. In the vicinity of the junction with Union Quay, the carriageway width is narrower (two lanes only), which would likely require a temporary reduction to single-lane only when the works are ongoing at this end of George's Quay. Similarly, at the eastern end of George's Quay, there are two traffic lanes (westbound) and a westbound cycle lane. It is likely that the works at this localised pinch point would require temporary reduction of the carriageway to a single lane westbound.

Conclusion: Temporary Significant Impact

Lapp's Quay/Clontarf Bridge

At the area of Lapp's Quay (west), there is relatively little through traffic and it contains a wide car parking area. This area is in use as the terminus for the Black Ash Park and Ride bus, and also contains a public bike hire station. Direct defences, pointing & re-grouting, a pumping station and road re-grading works are proposed in this location. Removal of the existing perpendicular parking along the quay wall will enable the Park and Ride terminus to remain during the majority of the works. During road re-grading works, the entire route may require closure due to the implications of shunting the Park and Ride bus south if re-grading works are to be done in two phases. Consideration will need to be given to the Public Bike hire station, which may have to be removed temporarily.

Direct defences are proposed on Clontarf Bridge, on both sides, on top of the steel barriers along the footpath edge (as opposed to the back of the footpath). This will require the temporary reduction in traffic flow over the bridge to single-lane only. Road re-grading is also proposed at the junction with Lapp's Quay, which may be undertaken in tandem with the restrictions on Clontarf Bridge itself. Works on the bridge parapet will be phased to retain single lane traffic flow as opposed to a full closure.

Works on Lapp's Quay, to the west of the junction with Clontarf Bridge, are located within a pedestrianised area, and are therefore deemed to have little impact on traffic.

Conclusion: Temporary Significant Negative Impact

Lee Distillery Fields

Works in the area of Lee Distillery Fields are considered to have little impact on traffic in terms of reduction in carrying capacity of the network.

Conclusion: Temporary Slight Negative Impact

Phase 4 – North Channel Central Island

Custom House Street

A significant area of road re-grading is proposed on Custom House Street, from the southern half of Michael Collins Bridge, through the junction with Anderson's Quay and the junction with Oliver Plunkett Street Lower and on to the northern half of Eamon De Valera Bridge. This work also includes the approaches to Custom House Street on the adjacent side streets. This section of Custom House Street will require temporary reduction in carriageway width to two lanes wide to enable these works to be done in phases, retaining a single lane of traffic in each direction. Similar restrictions will have to be implemented on Anderson's Quay and Lower Oliver Plunkett Street as part of these works.

Conclusion: Temporary Significant Negative Impact

Anderson's Quay/Merchant's Quay

The area of Anderson's Quay (east) contains a relatively wide green area between the quay and the road, which will be able to accommodate direct defence and pointing/re-grouting works. A pumping station is also proposed in the vicinity of the junction with Albert Street, however the verge and footpath area here is sufficient to accommodate the works.

Anderson's Quay (west) does not have as extensive an area to the north between the carriageway and the quay wall. Direct defences proposed along this section will likely necessitate the use of the existing footpath, off-road cycle lane and the nearside traffic lane. A pumping station is also proposed in the vicinity of the junction with Parnell Place – this will also require the use of the quay side footpath and the nearside bus lane.

The area of Merchant's Quay contains one eastbound lane and two westbound lanes as well as a westbound bus lane, and an eastbound bus bay area. Midway along the quay, the eastbound bus area is replaced with an eastbound on-road cycle lane. Direct defences are proposed along the quay, which can be accommodated within the northern footpath and existing cycle lane. Pointing & re-grouting works are proposed at the western end of the quay, which can also be accommodated within the footpath and cycle lane. A pumping station is proposed towards the western end of the quay, which potentially can be

accommodated within the northern footpath and cycle lane, however temporary removal of the eastbound traffic lane may be required to facilitate construction. This may be combined with the construction of the pumping station on Anderson's Quay (west) to coincide both works during a single lane restriction.

Conclusion: Temporary Significant Negative Impact

Lavitt's Quay

Along Lavitt's Quay (east), direct defences and pointing/re-grouting works are proposed along the quay wall. These works will require temporary use of the northern footpath and nearside traffic lane. The existing carriageway at this location contains one eastbound traffic lane and two westbound traffic lanes. It may be necessary to remove a westbound lane to retain two-way traffic flow on this portion of the quay.

In addition, a section of backing wall is proposed along Lavitt's Quay (east) totalling approximately 60m. This works element will likely require reduction of Lavitt's Quay to a single westbound-only lane during construction.

During these works, eastbound traffic can be diverted via Lavitt's Quay (west), Cornmarket Street, Kyle Street and North Main Street, and on via South Main Street and Washington Street to reach Grand Parade. Alternatively, traffic approaching from the north could be diverted on to Camden Place (using the existing contra-flow bus lane) and over St. Patrick's Bridge or on to Leitrim Street/Coburg Street and MacCurtain Street.

Along Lavitt's Quay (west) direct defence works are proposed on the quay wall, which will likely require use of the quayside footpath and one of the eastbound traffic lanes for the duration of the works. A pumping station is also proposed in the vicinity of the junction with Half Moon Street, on the quay side. This will also require the use of the footpath and one of the eastbound traffic lanes.

Conclusion: Temporary Significant Negative Impact

Bachelor's Quay

On Bachelor's Quay, between Devonshire Street and North Gate Bridge, direct defences and pointing/re-grouting works are proposed along the quay wall, which will require temporary closure of two lanes along this section of the works (the existing quay side footpath is quite narrow at this location. A pumping station is also proposed in the vicinity of the junction with Grattan Street (on the quay side), which will also necessitate closure of two lanes of traffic. The westbound lane from Bachelor's Quay to Grenville Place could be utilised as an eastbound lane for the duration of these works.

Conclusion: Temporary Significant Negative Impact

North Gate Bridge, Christy Ring Bridge and Brian Ború Bridge

Direct defences are proposed on North Gate Bridge, Christy Ring Bridge and Brian Ború Bridges, on both sides of the bridges. At North Gate Bridge, where there are four traffic lanes and footpaths present either side, this will require temporary closure of an adjacent footpath and nearside lane on either side (independently) to facilitate these works. At Christy Ring Bridge, there are wider footpaths(up to 4m wide) present either side of the five lanes of traffic that are in place, however it is still likely that temporary removal of the nearside lane on either side will be required to facilitate construction. At Brian Ború Bridge, the improvement works are proposed on the footpath edge, which will likely require the temporary closure of a single lane of traffic either side to facilitate construction.

These works will be carried out independently, so as to minimise the reduction in capacity on the city's bridges.

Conclusion: Temporary Significant Negative Impact

North Mall

The area of North Mall would generally contain sufficient space to accommodate proposed direct defences and pointing/re-grouting works, as there is car parking on most of the northside lane, which can be temporarily removed to facilitate two-way traffic flow. Towards the eastern end of North Mall, in areas where there is no car parking, traffic lanes would likely be temporarily reduced to one lane eastbound; westbound traffic would be diverted to Blarney Street via Shandon Street. This diversion could be carried out in conjunction with closing the left lane northbound on North Gate Bridge, for example, to minimise the overall disruption.

In addition, pumping stations are proposed at Wise's Quay (internally within the Distillery Fields site) and towards the eastern end of North Mall. Within the Distillery Fields, there will be no impacts on traffic in the wider area. On North Mall, the pumping station construction will require the temporary reduction of the carriageway to a single eastbound lane.

Conclusion: Temporary Significant Negative Impact

Farren's Quay/Pope's Quay

The area of Farren's Quay and Pope's Quay contains a wide footpath as well as a parallel parking area and a two-way, segregated cycle facility. Generally, there is sufficient space to accommodate the proposed direct defences and pointing/re-grouting works, apart from some pinch points e.g. at Farren's Quay as well as Shandon Pedestrian Bridge, which may require the temporary removal of the on-street parking to facilitate a single lane of westbound traffic flow. At specific pinch points, for example in the vicinity of the Shandon Bridge, where there is no on-street parking, traffic flow may need to be temporarily diverted on to the two-way cycle track.

A pumping station is proposed to the east of the Shandon Bridge, which would also require traffic to be temporarily diverted onto the two-way cycle track. Further east, between Shandon Bridge and John Redmond Street, the route is wider, with on-street parking provided on one or both sides which can facilitate the works.

Between John Redmond Street and Christy Ring Bridge, there is a wide footpath and on-road cycle track adjacent to the quay wall, which is sufficient to carry out the works. There is also a Public Bike hire station at this location, which will need to be temporarily decommissioned.

Conclusion: Temporary Slight Negative Impact

Camden Place

The area of Camden Place contains two westbound lanes and one eastbound bus lane. Direct defence and pointing/re-grouting works in this area (which are confined to the western end) will likely require the bus lane to be temporarily removed to maintain two lanes westbound. A pumping station is also proposed at the western end of Camden Place, which will likely require the closure of two lanes of traffic and the quay side footpath to facilitate construction. Buses travelling eastbound can be diverted via Christy Ring Bridge to Lavitt's Quay and on to Merchant's Quay.

Conclusion: Temporary Significant Negative Impact

St. Patrick's Quay (west)

The area of St. Patrick's Quay (west) contains two lanes westbound as well as a 30m right-turning lane, an extensive coach parking area and wide footpaths adjacent to the quay wall. Direct defences and pointing/re-grouting works are proposed along the entire quay. To maintain traffic flow, it will be necessary to utilise the parallel car parking on the right hand side or alternatively to utilise the coach parking and footpath on the south side.

A pumping station is also proposed in the vicinity of the junction with Harley's Street. The existing coach parking area to the south (and associated footpath) is sufficient to accommodate this work.

Conclusion: Temporary Slight Negative Impact

St. Patrick's Quay (east)

The area of St. Patrick's Quay (east) and Penrose's Quay (west) contains three westbound lanes as well as a wide car parking area (on St. Patricks Quay only). The car parking area is sufficient to accommodate direct defence works proposed along St. Patrick's Quay, while the extensive footpath on Penrose's Quay can also accommodate the works.

A pumping station is also proposed in the vicinity of the junction with Ship Street; utilisation of the footpath and perpendicular parking areas are sufficient to accommodate construction.

Conclusion: Temporary Slight Negative Impact

Horgan's Quay

Road re-grading works are proposed at Horgan's Quay, which will likely be carried out in phases, but will likely require temporary closure of the westbound bus lane to facilitate two adjacent lanes of westbound traffic flow.

Conclusion: Temporary Slight Negative Impact

North City Link Road

The proposed works on the North City Link Road, while predominantly being undertaken from beneath the carriageway, will require a temporary closure of one of the outbound traffic lanes (the western lane) to facilitate the works.

Conclusion: Temporary Moderate Negative Impact

Phase 5 – South Channel Central Island

Phase 5 consists of works along numerous quays along the South Channel of Cork Central Island and each of these is considered from a traffic management perspective hereunder.

Albert Quay (east)

The area of Albert Quay (east) contains two wide eastbound traffic lanes with car parking as well as a wide working quay. There is sufficient space to accommodate the proposed direct defence works along the wide quay. A pumping station is proposed at the western end of the quay, which will likely require temporary closure of one of the eastbound traffic lanes. Road re-grading works are also proposed on

Albert quay (east) as it transitions to Victoria Road (heading east). Again, this will be undertaken in phases, and will likely require reduction in outbound traffic flow to a single lane over the works area.

Conclusion: Temporary Slight Negative Impact

Albert Quay (west)

The area of Albert Quay (west of Eamon De Valera Bridge) contains three lanes as well as relatively wide quays, which would be sufficient to accommodate the proposed direct defence and pointing/re-grouting works. A pumping station is proposed at the western end of the quay, as well as quay wall reconstruction along the quay. Both of these works elements will require temporary closure of the northern footpath and the on-road cycle track (and potentially one of the eastbound traffic lanes).

Conclusion: Temporary Significant Negative Impact

Terence MacSwiney Quay

The area of Terence MacSwiney Quay contains three traffic lanes and a bus lane westbound, which is sufficient to accommodate proposed direct defence works, which will likely require the temporary closure of one westbound lane. Road re-grading works are also proposed along the quay, which will require the route to be temporarily reduced from four lanes to two to maintain westbound traffic flow during the works.

Conclusion: Temporary Moderate Negative Impact

Sullivan's Quay

Sullivan's Quay (eastern end) contains a localised pinch points at each end (at the Sober Lane bar and Flying Enterprise Complex). The proposed direct defence and pointing/re-grouting works can be accommodated, although these portions of the quay will have to be temporarily reduced to a single lane (and the cycle lane on the southern side used to facilitate traffic flow). A pumping station is proposed in front of the Government Offices, which is also a location provided with parallel parking on the northern side, and perpendicular parking in front of the offices, with an on-road cycle lane also provided. There is sufficient space here to accommodate the works and facilitate westbound traffic flow. Further west, the route narrows as parking is removed, and there is an on-road contra-flow cycle track. It is possible that the footpath and cycle track area will be sufficient to accommodate the works, although a temporary closure may be required at the narrowest point. Traffic can divert via South Mall, Grand Parade and South Main Street.

Conclusion: Temporary Moderate Negative Impact

Grand Parade Quay

Works in the areas opposite Sullivan's Quay, the Beamish and Crawford Site, back of the Hanover St properties, Western Road/Lancaster Quay and at the back of the former Service Station site are considered to have little impact on traffic given that the works are predominantly offline.

On Lancaster Quay and Western Road in particular, utilisation of the nearside bus lane and footpath will be sufficient to accommodate direct defences and pointing/re-grouting.

Conclusion: Temporary Slight Negative Impact

12.7.3 Operational Impacts

Post-construction, there will be minimal operational impacts associated with the scheme. Demountable defences will have a slight impact associated with their deployment at specific locations around the city, however the majority of instances where demountable defences will be deployed will be flagged in advance by tidal and forecasting warnings.

The proposed pumping stations will facilitate surface access for maintenance purposes, which on rare occasions will necessitate a temporary closure of a portion of the existing carriageway to facilitate access.

Beyond the above examples, which will themselves be subject to traffic management procedures where necessary, there are little operational impacts expected.

12.8 PROPOSED MITIGATION MEASURES

A wide range of mitigation measures will be implemented in order to minimise the significance of the potential impacts of the Lower Lee (Cork City) Drainage Scheme on the wider transport network. These are discussed in more detail hereunder. Site-specific mitigation measures for works sites will be determined and agreed with all relevant stakeholders during the detailed design process. However, the mitigation measures listed below will be considered for all works sites.

12.8.1 Construction Traffic Management Plans

Although the scheme is divided into 5 principal phases, each individual phase is also likely to be sub-divided further into discrete 'blocks' for the purpose of construction. Each individual works element will require the preparation of a Construction Traffic Management Plan (CTMP), which will be subject to agreement with Cork City Council and An Garda Síochána prior to commencement of construction. The CTMP will set out specific working criteria for each individual works area and the appropriate measures to be implemented.

At specific works locations, the following mitigation measures will be included within a CTMP (where appropriate):

- Major works elements such as pumping stations, backing walls and road re-grading, where the impacts on key sections of the road network are expected to be significant, will be programmed to take place during the summer months. This is consistent with recent works in the city on a number of the major bridges, which necessitated full closure of the bridges in question over a number of months;
- Night-time works at specific locations will be considered to expedite the progress of works in sensitive locations;
- Direct defence and pointing/re-grouting works along the quay walls within the city centre will have a works area that can be set up and removed relatively quickly and easily. This will allow the works to be programmed to avoid the morning and evening peak periods on the transport network if necessary;
- Many locations within the city centre are provided with on-street parking, on one or both sides of the carriageway. It will be an objective to utilise these spaces where feasible to facilitate works, as opposed to removal of a dedicated traffic lane;

- It will be an objective for facilities for pedestrians along the works areas to be maintained, albeit in many locations in a reduced capacity. Due to the nature of works directly on or at quay walls it will not be possible to maintain footpaths within these works areas; however the contractor will ensure that alternative temporary footpaths are provided (where no other footpath is present);
- It will be necessary to liaise with the Traffic Control Division of Cork City Council to ensure that amendments are made to signalised junctions to account for temporary changes in traffic movements and flows;
- Within the central island, it will be necessary to ensure that when works on the northern channel and southern channel are ongoing, that they will not occur on both sides. This will ensure that at least one of the quays remains unaffected by the works and available for traffic diversions;
- Similarly, works on adjacent bridges at the same time will be avoided, to ensure that the impacts can be localised wherever possible;
- All works elements will require specific arrangements for facilitating emergency service access to the Mercy Hospital, South Infirmary Hospital and Cork University Hospital;
- Specific events that occur within Cork City during the year will be accommodated – for example the City Marathon, the Jazz Weekend, etc. as well as the annual Christmas moratorium when works do not occur around the city;
- Liaison will be required with the operators of the Jack Lynch Tunnel to ensure that works programmed within the city do not coincide with planned maintenance works at the tunnel itself, which leads to increased traffic flows within the city during tunnel closures;
- The phasing of works will have to be programmed to ensure that routes which form part of a diversion for a specific works element are not also programmed for construction works at the same time;
- Equally, where specific routes are subject to lane restrictions, it may be feasible to programme works on an adjacent link due to the reduction in traffic flow on that link;
- Existing bus stops and disabled parking spaces that are impacted by the works will require temporary relocation; and
- Access to properties, businesses and car parks will be maintained during the works – this may entail the construction of temporary accesses where necessary;

12.9 RESIDUAL IMPACTS

Although the above works elements will, with the mitigation in place, result in a temporary moderate to significant negative impact across the scheme extents, the impacts will be temporary only, will occur during construction works, and there will be no residual negative impacts post-completion of the scheme.

The Lower Lee (Cork City) Drainage Scheme will improve the resilience of the city transport network significantly by reducing the risk of flooding events reducing the capacity of the city transport network, which would typically cause it to break down. This improved resilience will be further enhanced by the improvement works to the numerous bridges connecting the north and south channels to the central island,

which have in the past caused extensive significant disruption across the entire city and the wider suburban areas when significant flooding events have occurred.

As has been evidenced by historical flooding events in Cork City, the existing transport network is highly volatile at times and is sensitive to even moderate levels of disruption. This can lead to significant propagation of traffic congestion, queuing and associated delay, which can then rapidly develop outwards from the city centre into the suburban areas.

The Lower Lee (Cork City) Drainage Scheme will therefore have a permanent significant positive impact on the city transport network once complete.

Conclusions: **Temporary Moderate to Significant Negative Impact**

Permanent Significant Positive Impact