14 Roads and Traffic

14.1 Introduction

This chapter of the EIS consists of an appraisal of the proposed Douglas Flood Relief Scheme (including Togher culvert) under the heading of roads and traffic. This chapter initially sets out the methodology followed, describes the receiving environment and summarises the main characteristics of the proposed flood scheme which are of relevance for roads and traffic. The likely significant impacts of the proposed scheme on roads and traffic are described. Measures are proposed, where necessary, to mitigate likely significant impacts and residual impacts are described.

14.2 Methodology

The methodology for assessing the transport impact of the proposed flood scheme is as follows:

1. The existing receiving environment is examined, including the local road network, and the national road network in the vicinity of the scheme. A brief description of the character of the receiving environment is also presented;
2. The proposed development is described, with an emphasis on the individual components of the overall scheme;
3. The potential impacts of the scheme are described and classified in terms of their likely significance;
4. Possible mitigation measures are presented; and
5. Residual impacts following implementation of the scheme are discussed.

14.3 Receiving Environment

14.3.1 Existing Road Network

14.3.1.1 Douglas

The road network within the Douglas study area comprises the national road N40, the regional roads R851 and R609/R610 as well as numerous local and access roads.

The N40 South Ring Road (SRR) is a strategic national traffic route which routes broadly on an east-west axis to the north of Douglas Village, effectively dividing the built-up area to the north (mostly residential areas) from Douglas, Rochestown, Maryborough Woods, etc. to the south. The route acts as a barrier to movement in a north-south direction between Douglas and Cork City, which is facilitated via a number of routes which pass beneath the N40, including the R851 South Douglas Road and the R610 Douglas Road. There are two eastbound exits from the N40 SRR to Douglas and one westbound access to the N40 from Douglas.

The R851 links Douglas village to Cork city centre to the north via the South Douglas Road, and links Douglas village westward to the N27 Kinsale road and Cork Airport via Frankfield. The R851 is a key regional route, which also links parts of Douglas village both north and south of the N40 South Ring Road, and also crosses the Tramore River. In the Douglas area, the R851 goes through predominantly residential areas and housing estates, and the route also facilitates access to a number of amenity facilities and some commercial developments.

The R851 is a standard two-lane single carriageway road for the majority of the route with the provision of a bus-only lane in a single direction (eastbound). The bus lane is present along sections of Grange Terrace and Donnybrook Hill where the road width is approximately 9 metres in comparison to Douglas Road where the road width is approximately 6 metres. Footpaths are present on both sides along the R851. The route has direct access to a number of residential properties and has no hard shoulder.

As the R851 approaches Douglas from the west, the route is typically a two-lane carriageway, with localised widening in places to accommodate turning lanes. Further east between Frankfield and Douglas, the route widens to accommodate an eastbound bus lane, which routes from Grange Wood Court along Grange Terrace and on to the Douglas Road, before terminating at the junction with Inchvale Road. The route reverts to two-way single carriageway (with some localised widening at junctions) thereafter.

The R609 Carrigaline Road in Douglas village links to the R610 Douglas Road and the N28 south of Douglas (at the Fingerpost Roundabout). The R610 routes beneath the N40 SRR and continues east and south to the Fingerpost Roundabout, continuing east to Rochestown. The R609 commences at the Fingerpost Roundabout and routes southwards to Carrigaline, connecting to the N28 at Carr's Hill.

The R609 routes through predominantly residential areas with numerous housing estates either side of the road towards the north. Further south from Douglas village, the southern sections of the R609 are adjacent to agricultural land to the west and amenity areas (Douglas Golf Club) northeast of the road.

The R609 is a three-lane carriageway to the north with two lanes in each direction and the third lane providing right and left turning movements into residential developments. The route reverts to a standard two-lane single carriageway road to the south. The R609 ranges from approximately 10 metres wide to the north to approximately 6 metres along the southern section of road. Footpaths are provided along one side of the road. The route has direct access to a number of residential properties and has no hard shoulder.

Both routes have numerous junctions with other local and regional routes. Refer to **Figure 14.1**.

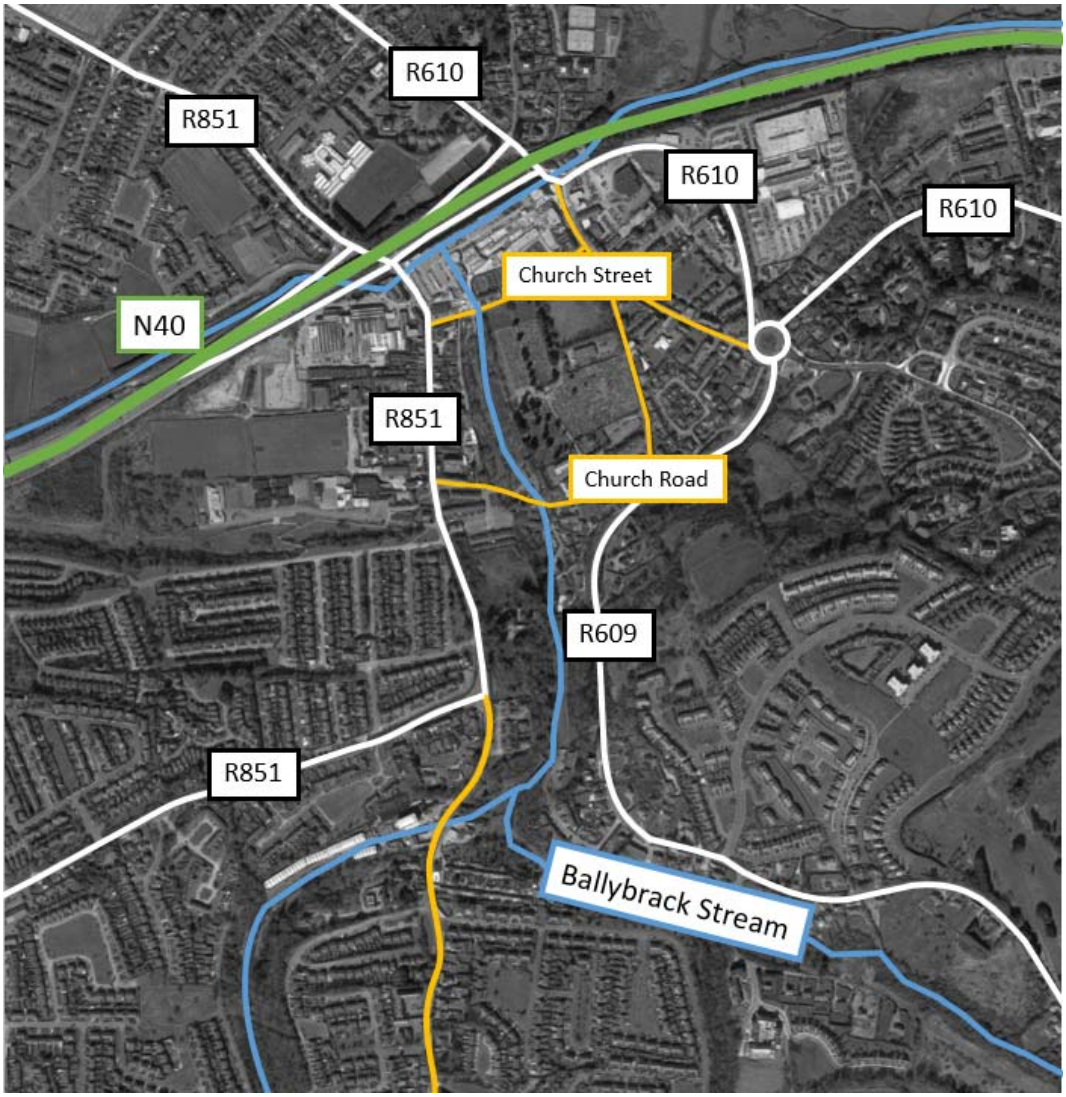

Figure 14.1: Existing Local Road Network (shown with access to/from N40 Cork SRR and the Ballybrack Stream Route for context)

14.3.1.2 Togher

The existing road network within the Togher study area comprises the N40 South Link Road and a number of regional and access roads, namely Togher Road and Sarsfield Road.

Togher Road links northwards to Cork city, and to the south with Fivemilebridge (via the R613) and the N71 (via Spur Hill). It is a standard two-lane single carriageway road with footpaths on either side of the road. The road is approximately 9 metres in width along its length.

The R849 Sarsfield Road links Togher Road to the Sarsfield Interchange at Junction 4 of the N40 SRR. It is a standard two-lane single carriageway road with footpaths on either side of the road with a grass verge dividing the carriageway and the footpath. The road is approximately 7.5 metres in width along its length. Refer to **Figure 14.2** below.

Figure 14.2: Existing Road Network and Tramore River Route

In the vicinity of the works, both routes are in predominantly urbanised areas, with numerous residential, industrial and commercial areas in the environs (in particular along the R849 Sarsfield Road), as well as a number of schools. Outside of the Togher area, Togher Road quickly transitions from a built-up environment to a largely undeveloped, greenfield environment.

14.4 Characteristics of the Proposed Scheme

As described previously in **Chapter 1 Introduction**, construction works for the proposed scheme will take place in four separate areas along the Tramore River and Ballybrack Stream in Douglas and Togher as follows:

Area 1: Ballybrack Stream through Douglas;

Area 2: Tramore River through St Patrick's Mills, Douglas;

Area 3: Grange Stream (tributary of Ballybrack Stream) through Donnybrook Commercial Centre; and

Area 4: Tramore River through Togher.

The majority of the proposed works under the Douglas Flood Relief Scheme (FRS) (including the Togher Culvert) consist of a number of measures which are summarised below:

- Construction of new flood defence walls and/or replacement of existing walls with new flood defence walls;
- Replacement of and/or extension of existing culverts;
- Removal of and/or replacement of bridges;
- Removal of existing trash screens and construction of new coarse screens;
- Local channel widening, deepening, realignment and regrading of river channel
- Construction of new earthen flood defence embankment;
- Provision of civil works such as road/footpath re-grading at a number of locations;
- Removal of vegetation and trees to facilitate construction works
- Protecting drainage outlets along the line of flood defence works with non-return flap valves;
- Once construction is completed, ongoing maintenance of the river channel, trash screens etc.

The proposed measures above are described in detail in **Chapter 3 Description of the Proposed Development.**

These proposed works are detailed in the scheme drawings in **Appendix 3.1**.

14.5 Evaluation of Impacts

The scheme, as described above and detailed in **Chapter 3 Description of the Proposed Development** is mainly concerned with works to and in the vicinity of the Ballybrack Stream and Tramore River, and therefore generally will not have any permanent impact on the road network post completion. The potential impacts of the scheme on the road network are as follows:

- Temporary impacts during construction due to the excavation of materials in order to facilitate construction, and the associated movements of excavation vehicles;
- Temporary impacts associated with the importing of construction materials to the works areas, and the relevant movements of delivery and construction vehicles and construction workforce;
- Temporary impact during construction due to the works elements that are on or adjacent to the existing road network, including culverts, bridges, and flood defence walls, etc., which may require full or partial road closures; and
- Residual impacts due to the removal of certain components of the existing transport infrastructure (and replacement with similar infrastructure).

14.5.1 Construction Impacts

14.5.1.1 Potential Impacts of Construction Related Traffic

Subject to statutory consent, construction of the proposed scheme will commence mid-2018. A construction duration of approximately 18 months is envisaged with an estimated completion date of late 2019/early 2020. It is envisaged that all the works will be constructed under one contract and the works will be constructed in Douglas and Togher simultaneously. Specific activities (such as Lower Ravensdale Bridge and Church Road Bridge replacement) will be completed over a much shorter duration.

Construction of the proposed works in Douglas are estimated to take approximately 9-12 months overall, while proposed works in Togher are estimated to take approximately 12-15 months overall. Specific allowances may be made for interruptions to construction work (for example during specific moratoria at Christmas periods, seasonally-constrained works, etc., which would increase the working times to the maximum estimates). However, the shorter construction timeline estimates (9 months for Douglas and 12 months for Togher) have been used in this Chapter for assessment purposes, as these represent a worst-case scenario in terms of quantifying peak daily construction traffic movements. Refer to Table 4.1 of Chapter 4 for further details.

It is estimated that both works elements will be undertaken within the overall 18-month construction duration, with certain works elements ongoing simultaneously, resulting in an overlap between both work streams during construction, although the sites are not proximate. The overall works duration is expected to be a total of 18 months.

The construction phase of the proposed scheme will have a temporary impact on traffic volumes in the Douglas and Togher area and their environs. The proposals will not result in any residual changes to the existing traffic network once completed; however, temporary effects will result during the construction stage of the scheme.

These impacts will be primarily associated with restriction on access to certain portions of the existing road network due to ongoing works, and additional traffic flows on sections of the existing road network due to haulage of excavated material which is not reused on site, the delivery of materials to site and the movements of workforce traffic. Excavation and backfilling works will comprise the more trip-intensive portions of the schemes, while construction works themselves will be minor in comparison. For both schemes, excavation works will be undertaken initially, and excavation works will comprise the most intensive portion of the overall works.

Furthermore, works in Douglas have been sub-divided into a number of distinct areas (see **Section 14.4** above and **Figure 1.2a and Table 4.1** of **Chapter 4**). Works will not be occurring at all sub-areas in Douglas simultaneously; however for the purpose of this assessment it has been assumed that a number of works areas in Douglas are in operation at the same time.

The removal and delivery of material will typically be operated during standard working hours as set out in **Chapter 3**, which would generally be from 08:00-19:00 (Mon-Fri) and 09:00-16:00 (Saturday). However, this will be subject to approval and agreement with Cork County Council and An Garda Síochána.

Douglas

14.5.1.2 Excavation works

Construction-related traffic will be used for delivery of materials to site, removal of surplus excavated material from site and transport of employees and plant to/from site and throughout the site. The main materials to be delivered include concrete, clay, stone, pipes and culvert sections.

The estimated number of round trips (to/from site) for delivery of materials will vary depending on the element of the works under construction, but is estimated to be a total of 2,250 two-way trips (i.e. 1,125 vehicles) over the anticipated construction period of approximately 9 months, or an average of 10 two-way trips per day. During the most intensive excavation period, it is estimated that this will increase to a maximum of 96 two-way trips (or 48 vehicles) per day. During the peak hour, this will equate to a maximum of 18 two-way trips (or 9 vehicles).

14.5.1.3 Delivery of materials

Imported material for backfilling/reinstatement purposes and construction materials including concrete, etc. will comprise approximately 1,318 two-way trips (i.e. 659 vehicles) over the 9-month program, an average of 6 two-way trips per day.

During intensive works periods, it is anticipated that delivery of materials will total 46 two-way trips (i.e. 23 vehicles) per day. During the peak hour, this will equate to a maximum of 24 two-way trips (i.e. 12 vehicles).

Delivery of concrete for construction purposes will comprise an average of 18 two-way trips per day (i.e. 9 vehicles), and during the peak hour it is estimated that 12 of these two-way trips (i.e. 6 vehicles) will deliver to the works sites.

14.5.1.4 Construction workforce

Construction staff numbers at Douglas are estimated at an average daily number of 14 personnel. However, at peak periods, this will increase to a maximum of 24 personnel. As outlined in **Chapter 3**, normal working hours will be in operation during the construction phase, which will be 08:00-19:00 on weekdays, and 09:00-16:00 on Saturdays.

It has been assumed that all 14 construction personnel arrive before 08:00, all 14 depart after 19:00, and 7 personnel leave and return during lunch. Therefore, the estimated number of two-way trips for construction personnel employed on site is approximately 42 per day over the construction period. During peak periods, this will increase to 72 two-way trips per day.

14.5.1.5 Total Excavation/Delivery trips

For the purpose of this assessment, the total trips per day for excavation, delivery of materials and for construction workforce movements have been combined. As set out above, excavation works will occur in Douglas prior to backfilling and construction works.

A contingency factor of 20% has been applied to the excavation and backfilling/delivery figures presented above to account for any additional or unforeseen trips that may occur periodically.

It is also noted that works in Douglas will be sub-divided into a number of smaller localised works areas, and works will not be undertaken at all of these sites simultaneously. However, the worst-case scenario assumed as part of this assessment is that a number of works areas in Douglas are ongoing simultaneously.

Table 14.1 gives a breakdown of the estimated construction workforce traffic.

Table 14.1: Average Construction Traffic Daily Breakdown

Description of trip	Total round trips (two-way) (for entire duration of works)	Average round trips per day* (two-way)	Maximum round trips per day (two-way)	Maximum round trips in peak hour (two-way)
Removal of Excavated Material	2,250	10	96	18
Delivery of Materials	1,318	6	64	36
Construction Workforce	8,190	42	72	24
Total (excluding 20% contingency)	11,758	58	232	78
Total	**12,472**	**62**	**264**	**89**

*Trips per Day calculated based on total works programme of 195 working days for works in Douglas)

*20% contingency applied to excavation/delivery figures only

Taking into account the large numbers of existing vehicles using the road network in and in the vicinity of the Douglas area, it is unlikely that traffic generated during the construction phase will have a significant impact on traffic flow locally.

It has been assumed that the N40 SRR east and west, the Rochestown Road and the South Douglas Road will be the main approach routes for traffic to and from the works sites in Douglas, whilst Grange Road and Carrigaline Road will also carry a minor amount of traffic to and from the works sites.

Traffic Surveys undertaken in Douglas as part of the development of the Douglas Land-Use Transportation Strategy (Douglas LUTS) in April 2012 identified AM

and PM peak hour two-way flows on certain sections of the road network, as shown in **Table 14.2**:

Table 14.2: Two-way traffic flows on road network (AM & PM Peaks)

Route	Two-way traffic flow (AM Peak)	Two-way traffic flow (PM Peak)	Percentage of Scheme Traffic added	Scheme Traffic added	Total Traffic (AM Peak)	Total Traffic (PM Peak)
South Douglas Road (includes N40 approach from West)	1,171	878	30%	27	1,198 (+2.3%)	905 (+3.1%)
Douglas Road (includes N40 approach from West)	1,730	1,669	20%	18	1,748 (+1%)	1,687 (+1.1%)
Rochestown Road (N40 approach from East)	1,205	1,485	35%	31	1,236 (+2.6%)	1,516 (+2.1%)
Grange Road	730	1,361	10%	9	739 (+1.2%)	1,370 (+0.7%)
Carrigaline Road	692	372	5%	4	696 (+0.6%)	376 (+1.1%)

Conclusion: Temporary Minor Impact

As can be seen in **Table 14.2** above, the construction-related traffic associated with the works in Douglas will impact on the local road networks to a minor extent. As outlined above, the average daily traffic associated with construction works is approximately 62 (two-way trips), increasing to a maximum of 264 daily two-way trips during the intensive work periods, which corresponds to a maximum peak hour estimate of 89 two-way trips (i.e. approximately 45 vehicles). These 89 trips have been applied to the local road network as per **Table 14.2** above, which shows that the impact on the local road network will be minimal.

As outlined above, it has been assumed that excavation and delivery works are ongoing simultaneously in Douglas; however in reality it is likely that excavation works will for the most part commence separately to backfilling works. Furthermore, construction personnel will arrive prior to 08:00 (commencement of the working day), and therefore will arrive outside of the typical morning peak period, and depart after 19:00, outside of the typical evening peak period. However, these traffic flows have also cumulatively been included on the local road network in the peak periods above in **Table 14.2**, for robustness.

It is not therefore anticipated that the construction traffic will significantly affect the flow of traffic through the Douglas area. The impact of construction traffic will therefore be minimal, will be short-term and there will be no residual impact beyond the construction stage.

Togher

14.5.1.6 Excavation works

The estimated number of round trips (to/from site) for delivery of materials will vary depending on the element of the works under construction, but is estimated to be a total of 2,148 two-way trips (i.e. 1,074 vehicles) over the anticipated construction period of approximately 12 months, or an average of 8 two-way trips per day. During the most intensive excavation period, it is estimated that this will increase to a maximum of 76 two-way trips (or 38 vehicles) per day. During the peak hour, this will equate to a maximum of 10 two-way trips (or 5 vehicles).

14.5.1.7 Delivery of materials

Imported material for backfilling/reinstatement purposes and construction materials including concrete, etc. will comprise approximately 1,720 two-way trips (i.e. 860 vehicles) over the 12-month program, an average of 6 two-way trips per day (i.e. 3 vehicles).

During intensive works periods, it is anticipated that delivery of materials (including culvert units, pavement reinstatement materials, etc.) will total 46 two-way trips (i.e. 23 vehicles) per day. During the peak hour, this will equate to a maximum of 20 two-way trips (i.e. 10 vehicles).

14.5.1.8 Construction workforce

Construction staff numbers at Togher are estimated at an average daily number of 12 personnel. However, at peak periods, this will increase to a maximum of 16. As outlined in **Chapter 3**, normal working hours will be in operation during the construction phase, which will be 08:00-19:00 on weekdays, and 09:00-16:00 on Saturdays.

It has been assumed that all 12 construction personnel arrive before 08:00, all 12 depart after 19:00, and that 6 leave and return during lunch. Therefore, the estimated number of round trips for construction personnel employed on site is approximately 36 round trips per day over the construction period during the most intensive period of works (during peak periods this will increase to a maximum value of 48).

14.5.1.9 Total Excavation/Delivery trips

For the purpose of this assessment, the total trips per day for excavation and for construction workforce movements have been combined. As with Douglas, excavation works will occur in Togher prior to backfilling and construction works. A contingency factor of 20% has been applied to the excavation and backfilling/delivery figures presented above to account for any additional or unforeseen trips that may occur periodically.

Table 14.3 gives a breakdown of the estimated construction workforce traffic.

Table 14.3: Average Construction Traffic Daily Breakdown

Description of trip	Total round trips (two-way) (for entire duration of works)	Average round trips per day* (two-way)	Maximum round trips per day (two-way)	Maximum round trips in peak hour (two-way)
Removal of Excavated Material	2,148	8	76	10
Delivery of Materials	1,720	6	46	20
Construction Workforce	9,360	36	48	16
Total (excluding 20% contingency)	13,228	50	170	46
Total	**14,001**	**53**	**194**	**52**

*Trips per Day calculated based on total works programme of 260 working days for works in Togher)

*20% contingency applied to excavation/delivery figures only

Taking into account the large numbers of existing vehicles using the road network in and in the vicinity of the Togher area, it is unlikely that traffic generated during the construction phase will have a significant impact on traffic flow locally.

Traffic surveys for the road network in Togher in the vicinity of the works areas were not available for the purpose of this assessment; however the two-way traffic flows for the peak hour from **Table 14.3** above have been assumed to arrive and depart the Togher area from the local road network as follows:

Table 14.4: Estimated additional two-way traffic flows on road network (AM & PM Peaks)

Route	Percentage of Scheme Traffic added	Scheme Traffic added (two-way)
N40 (from East, via Sarsfield Interchange)	40%	21
N40 (from West, via Sarsfield Interchange)	40%	21
Wilton Road (from North)	10%	5
Togher Road (from North)	5%	3
Togher Road (from South)	5%	2

Conclusion: Temporary Minor Impact

It is not anticipated that the construction traffic will significantly affect the flow of traffic through the Togher area. Nevertheless, as with the proposed works at Douglas the construction-related traffic will impact on the local road networks to some extent. As outlined above, the average daily traffic associated with construction works is approximately 53 (two-way trips), increasing to a maximum of 194 daily two-way trips during the intensive work periods, which corresponds to a maximum peak hour estimate of 52 two-way trips (i.e. 26 vehicles).

As with Douglas, it has been assumed (as a worst-case scenario) that excavation and backfilling works will occur simultaneously, whereas these works are likely to occur independently of each other. Furthermore, as with the proposed works in Douglas, construction personnel will arrive and depart the works areas outside of the morning and evening peak periods (but have been included above for robustness). The impact of construction traffic will therefore be minimal, will be short-term and there will be no residual impact beyond the construction stage.

14.5.2 Sourcing of Materials and Transportation

As set out in **Chapter 4 Construction Activities,** in so far as is feasible, all construction materials will be sourced from local suppliers if these are available within the Cork area. The selection and specification of construction materials will be informed by local availability of these materials. Within the necessary constraints of performance, durability and cost, construction materials will be sourced from local suppliers and manufacturers, where possible. The co-ordination and logistics of construction traffic will be captured within the construction traffic management plan which will be agreed with CCC and An Garda Síochána.

14.5.3 Potential Impacts on Traffic and Transport Infrastructure

The proposed schemes have the potential to impact on the transport infrastructure in the area, most significantly during the construction phase. This impact is likely to occur as a result of the following works;

- Removal and Replacement of Lower Ravensdale Bridge;
- Togher Road – reinstatement of the culvert along Togher Road;
- Church Road – replacement of the culvert and extension of the existing tabletop ramp; and
- Removal of ICA pedestrian bridge and Church Road cycle track bridge.

In all of the above instances, the transport network elements removed are to be replaced at the same locations, or replaced at an adjacent, similar location. For example, Lower Ravensdale Bridge is to be replaced with a new bridge at the same location, whereas the ICA pedestrian bridge and Church Road cycle track bridge are to be relocated slightly further west, adjacent to the proposed flood defence wall. The proposed new bridge to replace Lower Ravensdale Bridge will be in place prior to removal of the existing bridge, thereby ensuring that access is retained to local properties.

Conclusion: No significant residual impact

14.5.4 Potential Impacts due to Construction Requirement Works (e.g. Road Closures)

It is likely that traffic management measures will be required during the construction phase of the works at the following locations:

- Lehenaghmore Industrial Estate;
- Lehenaghmore Road;
- Togher Road;
- West Douglas Street;
- Church Road;
- Lower Ravensdale;
- Donnybrook Hill; and
- Donnybrook Industrial Estate;

Typically, it is envisaged that traffic measures such as a stop-go system, temporary one-way traffic systems or similar will be considered for implementation to allow the trenches for the culverts and utility diversions to be constructed and at the same time to manage traffic.

It is envisaged that where possible, traffic flows will be restricted via lane closures only, so as to maintain access on specific routes. Where full closures are required, it is envisaged that these will be short-term in duration, and alternative access routes will be provided. In specific areas, such as Donnybrook Industrial Estate, alternative temporary accesses are to be provided for the works duration, following which full access will be restored.

Where full road closures are required, the works will be programmed so as to minimise the duration of closure, and alternative traffic routes will be clearly signed to drivers. For example, temporary closures on Togher Road to accommodate the culvert crossing the main road will require traffic to divert via Pouladuff Road (from the south) or via Tramore Road (from the north), etc. All road closures will be subject to agreement of traffic management and diversion routes, etc. with Cork County Council, Cork City Council and An Garda Síochána.

It is expected that the majority of the intensive works on the public road will be programmed to be carried out in the summer months to avoid school traffic, etc. such as outside the primary school on the Togher Road. In Ravensdale it is likely that access will be restricted to a number of residential properties while the Lower Ravensdale Bridge is demolished. Vehicular access will be restricted for the duration of the works while pedestrian access will be maintained via alternative routes. Alternative provisions will be made to accommodate displaced residential parking demands for the duration of the works.

In other specific locations, such as Lehenaghmore Industrial Estate, it is envisaged that there will be some temporary reduction in available parking space to accommodate the proposed works areas; however as with the other elements, these will be reinstated upon completion.

Conclusion: Temporary Significant Impacts

14.5.5 Operational Impacts

Upon completion of the works, there are likely to be minor ongoing operational elements associated with regular channel maintenance. Channel maintenance will be required on an infrequent basis, at a number of locations throughout the scheme. These works will be minor, with minimal requirements for maintenance vehicles and staff, and will have a negligible impact.

14.5.6 Potential Cumulative Impacts

Subject to statutory consent, construction of the proposed scheme will commence mid-2018. A construction duration of approximately 18 months is envisaged with an estimated completion date of late 2019/early 2020. There are a number of local minor schemes proposed in the vicinity of the works areas, and a number of major infrastructure schemes planned in the wider Cork county region.

Locally, there are improvement works proposed for Lehenaghmore Road, and on Matthew Hill. The Matthew Hill pedestrian enhancement scheme involves a program of works along Matthew Hill, and localised works at a number of specific locations. The majority of the works involve carriageway improvements to provide wider pedestrian footpaths, additional public transport infrastructure including bus stops and shelters, and traffic calming works. The scheme has been sub-divided into a number of works packages, and has received Part VIII planning permission. Subject to funding, sub-elements will be tendered out for construction in 2017 and 2018. The majority of the works are envisaged to be implemented without any significant road closures, although temporary lane restrictions and associated traffic management will be provided where necessary.

Major infrastructure proposals in the wider county area include the Dunkettle Interchange Upgrade scheme and the N28 upgrade scheme. The Dunkettle Interchange upgrade scheme will involve the upgrade of the existing interchange to fully free-flowing status. Although the scheme currently has planning permission, and is part of the current capital expenditure programme, there is currently no construction timeframe for this scheme. It is likely that the scheme may commence construction in mid-to-late 2018, although there is no current confirmed works start date.

The N28 upgrade scheme involves the improvement of the N28 Cork-Ringaskiddy Route from the Bloomfield Interchange along the N40 Cork South Ring Road network, through to Ringaskiddy. The N28 will be upgraded to motorway standard as a result. The scheme will facilitate access to the Port of Cork terminal in Ringaskiddy and will remove strategic traffic flow from the existing N28 and the urban settlements currently served by the N28 route. The scheme is part of the current Capital Investment Program and is currently progressing through the detailed design process, ahead of a submission for planning permission in late 2017 – the scheme therefore does not have planning approval.

It is not therefore envisaged that the Dunkettle Interchange Upgrade or the N28 Upgrade schemes will impact upon the Douglas FRS works, as the N28

construction timeline is not expected to be coincidental with the Douglas FRS works, and the Dunkettle Interchange is not sufficiently close to the Douglas and Togher works sites for there to be a significant interaction between both. Furthermore, it is expected that traffic flows at the Dunkettle Interchange will be required to be maintained as part of the construction contract associated with the scheme.

14.6 Mitigation Measures

14.6.1 Mitigation Measures for Construction-Related Traffic

All construction works will be subject to industry-standard traffic management measures, including the preparation of a Construction Traffic Management Plan which will be undertaken in consultation with Cork County Council and An Garda Síochána, and which will be prepared and agreed in advance of any works commencing, and will include the sourcing of construction materials, agreement of appropriate haul routes, etc. These traffic management measures will be designed in accordance with the '*Guidance for the Control and Management of Traffic at Roadworks – Second Edition*'.

Consequently, construction-related traffic flows will also be subject to any such traffic management plans, which may include restricted construction working hours, maintaining single-lane or two-way traffic flows and/or suitable diversion routes.

As outlined above, construction working hours will be 08:00-19:00 on weekdays, and 09:00-16:00 on Saturdays. Therefore, construction workforce traffic will arrive and depart at the working areas before the morning peak on the local road network, and after the evening peak.

The construction of the replacement local access bridge at Ravensdale will be carried out by a suitably qualified and experienced contractor who will be supervised to ensure that the works are carried out correctly. This will ensure that the bridge will be constructed safely and ensure the structural integrity of the structure. The length of the bridge replacement works will also be kept to a minimum to ensure disruption to residents will be minimised.

Excavation and reinstatement of the culvert trenches will be carried out in consultation with the Local Authority, and will also follow the Department of Transport, Tourism and Sport published document entitled '*Guidelines for Managing Openings in Public Roads'*. These works will be designed and supervised by a suitably qualified and experienced professional to ensure they are carried out correctly.

As with construction-related traffic, the localised traffic disruptions as a result of other proposed works throughout the scheme will be mitigated through the use of industry-standard traffic management measures. These traffic management measures should be designed in accordance with the '*Guidance for the Control and Management of Traffic at Roadworks – Second Edition'*. Where necessary, diversion routes will be developed for affected traffic due to road restrictions or closures.

14.6.2 Mitigation Measures for Traffic and Transport Infrastructure during Construction

The construction programme of the scheme will be phased in order to ensure that certain works are not underway simultaneously in proximity to each other where one works element impacts on the mitigation measures associated with an adjacent scheme.

The timings of potential road closures or restrictions will, where possible, be arranged so as to carry out the most intensive works elements at off-peak. Where possible, and subject to local considerations (including impacts on residents and businesses), 24-hour or night-time working will be included in construction phasing. Consultation will occur with local businesses and residents in advance of any works commencing.

Local access will be maintained throughout the works, by provision of new temporary accesses or by retention of existing accesses where possible.

The majority of the proposed works will be undertaken in phases so that partial traffic flow can be maintained at a minimum at all times and at all locations, wherever possible. Many works elements will be undertaken in multiple phases so as to allow for partial road closures so as to minimise the extent of any full road closures. Depending on the commencement date of the works, it may be possible to schedule the more disruptive elements during the summer months to coincide with school holidays.

Although the impact of temporary construction works are likely to be significant in localised areas, there are numerous diversion routes available within the study area due to the extensive local road network.

The road network will continue to function as it does at present once the works are completed, and there will be no permanent loss of access or loss of any elements of the existing road network.

14.6.3 Mitigation Measures during Operation

As outlined above, there are minimal operational requirements in terms of traffic flow. Channel maintenance will be an infrequent maintenance item, and will comprise negligible traffic flows. Therefore, there are no mitigation measures required for the operational phase of the scheme.

14.7 Residual Impacts

Taking into account the above mentioned mitigation measures, the residual impact of the proposed scheme on the transport infrastructure will be imperceptible.

As outlined above, there will be no permanent impact on the existing road network upon completion of the works. No loss of road operating capacity or loss of access will occur. The impacts of concern will be solely during the construction period, and will be proactively managed to minimise the level of disruption and to ensure that a sufficient standard of access is maintained throughout the scheme extents.

Conclusion: No Significant Residual Impact

14.8 References

Cork County Council (2012) Douglas Land-Use and Transportation Strategy – Baseline Transport Report, Section 6 – Existing Traffic Flows and Traffic Survey Results (MVA Consultancy).

Department of Transport, Tourism and Sport (2010) Guidance for the Control and Management of Traffic at Roadworks – Second Edition.

Department of Transport, Tourism and Sport (2015) Guidelines for Managing Openings in Public Roads.