

Cork County Council
**Togher Public Realm
Enhancement**
Technical Planning Report

REP/Togher Report

Issue 1 | 15 August 2018

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.




Job number 234335-29

Ove Arup & Partners Ireland Ltd

Arup
One Albert Quay
Cork
T12 X8N6
Ireland
www.arup.com

ARUP

Document Verification

Job title		Togher Public Realm Enhancement		Job number	
				234335-29	
Document title		Technical Planning Report		File reference	
				4-04-02	
Document ref		REP/Togher Report			
Revision	Date	Filename	234335-00_20180515_Togher Public Realm Enhancement_Technical Planning Report_I1.docx		
Issue 1	15 Aug 2018	Description	Issue 1		
			Prepared by	Checked by	Approved by
		Name	Declan Haugh Shane Fleming	Brian Burke	Emer Kennedy
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document



Contents

	Page
1 Introduction	1
2 Study Area Context	2
2.1 Local Environment	2
2.2 Existing junctions and links configurations	3
2.3 Current Issues	4
2.4 Public Transport	5
2.5 Pedestrian and Cyclist Facilities	5
2.6 Existing Traffic Movements	7
2.7 Road Safety	8
3 Scheme Proposals	9
3.1 Scheme objectives	9
3.2 Major scheme proposals	10
4 Emerging Overall Proposed Scheme	11
4.1 Togher Cross Junction Selection	12
4.2 Proposed Measures at Togher Cross Junction	19
4.3 Public Lighting Design	19
4.4 Landscaping Strategy	20
5 Summary and Conclusion	23

Appendices

Appendix A

Togher Public Realm Enhancement Landscape Concept

1 Introduction

This Engineering Report has been prepared for Cork County Council in support of the planning application for a proposed Public Realm Enhancement project along Togher Road, Cork. Arup has been appointed by Cork County Council to develop this scheme, including a carrying out a transport assessment and creating an urban design strategy. Cork County Council are availing of the opportunity to improve the existing streetscape and transport operation of the identified study area in conjunction with the Douglas Flood Relief Scheme.

The overall goal of the project is to produce a combined streetscape/transport design proposal in a manner that helps achieve the vision of Cork County Council and the following is a list of the Scheme objectives which guided the preliminary design of this scheme. Cork County Council's vision is that the design should create:

- Attractive, welcoming and increasingly accessible public spaces that serve as public gathering spaces and complement the diversity of surrounding land uses;
- Streetscape and public space design that fosters an active pedestrian environment and serves a diversity of uses;
- Functional streetscapes that preserve and highlight the quality of the area;
- Streetscape designs, including simplicity of associated materials that can easily be kept clean and maintained over time;
- Sustainable design methods and practices that reflect a commitment to principles of environmental stewardship;
- A plan that can be implemented cost-effectively and in phases, if necessary;
- A reduction of both vehicular speeds and congestion, particularly at Togher Cross Roundabout; and
- Consideration for the implementation of the objectives outlined for the route within the Cork Cycle Network Plan.

A critical element of this scheme is the upgrade of the existing Togher Cross junction. This report assesses the options considered in the selection of the recommended option for the upgrade of the Togher Cross junction. A number of options were considered and the preferred option was selected based on a number of criteria including the outputs from traffic models used to predict the anticipated operation of the junction, together with the objectives of the scheme listed above.

2 Study Area Context

2.1 Local Environment

The Togher area itself extends far beyond the red line boundary of the current works, with the residential and community areas of the village located either side of the N40. The interventions to be carried out as part of these works are however restricted by the extent of the Douglas Flood Relief Scheme, and are therefore focused on the section of Togher Road south of the N40. The works are however cognisant that the interventions must fit into the wider context and act as a catalyst to further enhance and connect the overall Togher area.

The area is generally car-dominated, with limited pedestrian facilities both along and across the various streets. The project brief's focus is clearly on improving the conditions for pedestrian movement through imaginative public realm design that considers the reallocation of space from vehicular traffic to pedestrian space. It is therefore an aspiration to transform the area from a road into the beginnings of a new, pedestrian focused, Togher Village, which may then inform interventions in the wider Togher area, both north of the N40 and beyond.

The immediate area has a number of important local facilities fronting onto Togher Road, including the Way of the Cross Church, O'Connell Court, Togher Girls National School and Boys National School (on adjacent sites), Togher Community Centre, L'Arche, Togher Youth Services, and number of retail units including Centra and Applegreen as well as local businesses. Many of these facilities serve the wider Togher area and therefore there is a large draw of residents to the area, further emphasising the need for improved pedestrian facilities in order to encourage active trips.

Togher Road is characterised by wide road cross section in parts, with sufficient room on both sides for informal on-street parking (parallel) and two-way traffic flow. Parking in some locations is buffered by build-outs which calm traffic flow and allow for pedestrian crossings to be provided.

The Way of the Cross Church has two separated areas of off-street parking within the church grounds. The southern of which is an uncontrolled parking area, and the northern has some uncontrolled parking but also acts as a linear set-down area for school users. The adjacent schools do not facilitate parking within their grounds for drop-off or collection; rather this is facilitated by the set-down in the church car park and on-street setting-down on Togher Road.

Along with acting as an attractor for the wider Togher area in terms of community uses, this portion of Togher Road also appears to facilitate a significant level of Heavy Goods Vehicles (HGVs).

There are a number of industrial units to the south east of the subject area, and based on the current road network it seems the most direct route for these HGVs to get from the N40 to these industrial units is via Sarsfield Road and then Togher Cross roundabout. This negatively affects the village environment that the Togher residents are looking to enhance.

2.2 Existing junctions and links configurations

The main junction within the study area is the junction of Togher Road/Lehenaghmore Road/Spur Hill, known as Togher Cross, which is a compact roundabout junction, with an additional 4th arm that accesses the adjacent Centra premises. This is a sub-standard roundabout junction, with varied provision of footpaths on some of the arms, and approaches that are acutely angled on entry to the junction. **Figure 1** below shows the existing junction layout.

In particular, the Lehenaghmore Road approach to the roundabout junction is at a skewed angle relative to the Spur Hill arm, with the effect of making it difficult to accommodate larger vehicles on the left turn from Lehenaghmore Road to Spur Hill.

Figure 1: Togher Road/Lehenaghmore Road/Spur Hill Roundabout Junction



Other junctions within the study area are primarily standard priority junctions between Togher Road and the adjacent side streets (Greenwood Estate, Robinscourt, Westside Estate).

There are also a number of direct accesses from Togher Road into the Way of the Cross Church, O'Connell Court, the Applegreen filling station, Togher Music School/Community Centre. The Way of the Cross Church, in particular, has four direct accesses from the Togher Road due to the one-way in / one-way out arrangement at each of the two parking areas.

Togher Road itself, between the roundabout junction to the south and the N40 overbridge to the north, is a standard two-lane road, with varying carriageway and footpath widths. Between the N40 overbridge and the Applegreen filling station, double yellow lines along the majority of the road length prohibit on-street parking, whereas to the south of the Applegreen filling station, on-street parking is permitted and facilitated via informal on-street parallel parking areas.

The carriageway width varies from approximately 7m to as much as 20m. Footpath widths along the route also vary widely, with a significant number of areas where the footpath widths are below the recommended minimum widths, and in places there are pinch points of less than 1m. For the mobility impaired it is recommended that pinch points such not be less than 1.2m at an absolute minimum. Approaching the roundabout junction on Lehenaghmore Road, the footpath on the right-hand side is extremely narrow in places, and there is no footpath on the left-hand side of the carriageway (there is also no footpath through the roundabout on this approach; i.e. the left-turn to Spur Hill from Lehenaghmore Road).

It is noted that no cycle facilities are currently provided within the study area.

2.3 Current Issues

There are a number of specific activities that occur within the study area that inconvenience all road users including public transport users, motorists, cyclists and pedestrians.

The current entry arms to the roundabout are flared on the Togher Road and Spur Hill approaches and in combination with an extremely small central island, results in fast speed of vehicles approaching and travelling through the roundabout as well as a requiring a larger carriageway width for pedestrians to cross. The alignment of the Spur Hill and Togher Road approaches can lead motorists to believe that they are continuing straight on and not entering a roundabout.

Congestion issues downstream of the roundabout on the Togher Road also cause issues of queuing through the roundabout during the morning peak period. On site observations suggest that this congestion primarily arises as a result of school activity, in particular drop-offs. Queuing of vehicles extends back through the roundabout and onto Lehenaghmore Road. This in turn blocks motorists on the Spur Hill approach, due to a lack of gaps in the queue and the requirement of vehicles on Spur Hill to yield to traffic entering the roundabout from Lehenaghmore.

There is a lack of adequate pedestrian facilities in the area and this poses a risk to pedestrian safety.

There is a lack of continuous facilities along the desire routes and narrow footpaths with pinch points are difficult to navigate by mobility impaired pedestrians. There is also a lack of dropped kerbs at the designated crossing points, as well as instances where there are dropped kerbs at one side of a crossing and none on the other, which in effect could leave a mobility impaired user stranded on the carriageway. This, in itself, is a serious safety issue.

There are a number of properties facing directly onto the carriageway and also onto the roundabout. This can present a hazard if there are motorists already on the roundabout or pedestrians navigating the footpath around the roundabout.

Parents dropping off their children in the morning peak period can cause severe traffic congestion that backs up as far as, and through the roundabout. Similar issues are also present at collection time but these are not as disruptive as the morning time due to lighter traffic in general in the area.

The carriageway on Togher Road is very wide in points and this encourages high speeds through the area and haphazard parking at the edges of the carriageway. In addition to the wide roadway, the corner radii at the junction with the side roads are quite large and encourage fast turning movements. This, in conjunction with the associated wider crossing distance, once again reduces pedestrian safety.

2.4 Public Transport

The 214 and 219 city bus services route along Togher Road and Spur Hill, passing through the existing roundabout and continuing along the R849 Sarsfield Road. There are a number of bus stops on Togher Road and Spur Hill to the north and south of the roundabout, with a mix of single-pole stops and bus shelters. There are currently bus stops provided on both sides of Spur Hill at the entrance to Sandown Crest, just to the south-west of the roundabout. The bus stop here on the northbound lane has been constructed as a bus lay-by, however the area provided is not sufficiently long for the bus to be able to pull in and out efficiently, leading to the bus movement being deterred by vehicular traffic. There are a further set of bus stops on both sides of the road provided on Togher Road at the Way of the Cross Church, to the north-east of the roundabout.

2.5 Pedestrian and Cyclist Facilities

2.5.1 Pedestrian Facilities

As has been described in Section 2.3, footpath provision and quality varies considerably along the route. There are sections with good quality footpaths (i.e. sufficiently wide, with dedicated crossing facilities) and there are poorer sections, with poor-quality crossing facilities, sub-standard widths and some localised pinch points.

There are also sections where there are little or no footpath facilities present, in particular on Lehenaghmore Road/Spur Hill approaches to the roundabout, and at the roundabout junction itself.

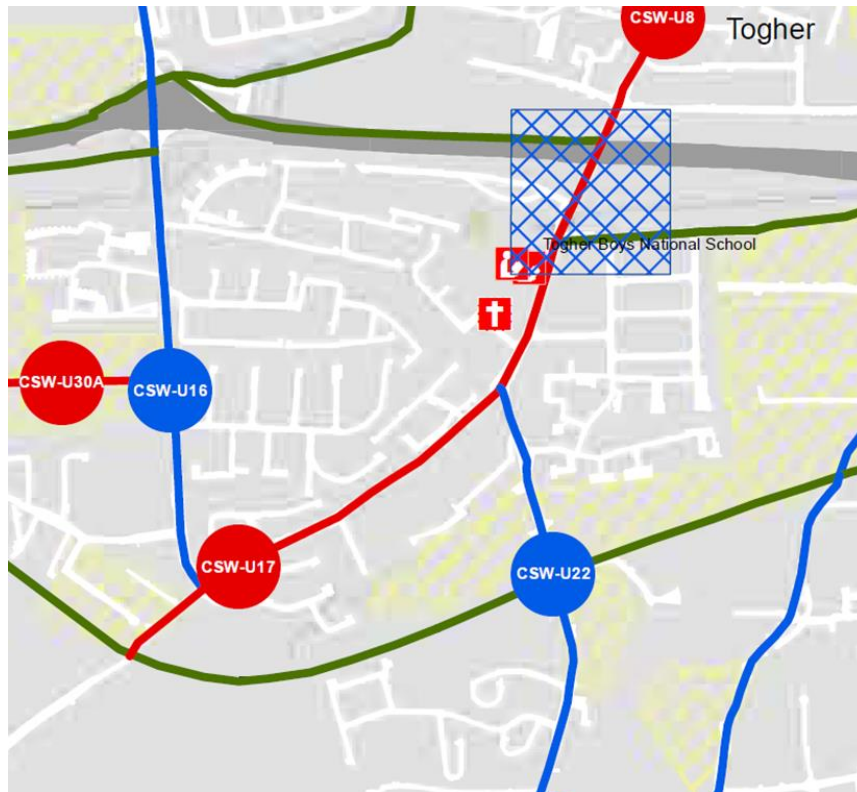
2.5.2 Cycle Facilities

No cycle facilities in the site vicinity at present on Togher Road. Approaching the N40 (opposite the junction to Westside Estate, there is a connection to the existing Togher-Tramore Road Greenway.

2.5.3 Cork Metropolitan Area Cycle Network Plan

The Cork Metropolitan Area Cycle Network Plan outlines proposals for a number of cycle network facilities in the study area, comprising elements of primary and secondary cycle network facilities along the Togher Road and Spur Hill, and the Togher Greenway to the south. Extracts from the Cycle Network Plan are outlined below and are presented in **Figure 2**.

- Route CSW-U8 – Togher Road (Clashduv Road to Greenwood Estate): this is proposed as a primary cycle route, with mandatory cycle lanes recommended in both directions, to be achieved by using the existing green verge along the western edge of this route;
- Route CSW-U17 – Togher Road (Disused Kinsale Railway Corridor to Greenwood Estate): this is proposed as a primary cycle route, with a mixture of shared pedestrian/cycle paths, and on-road mandatory cycle lanes. This is to be achieved by widening existing footpaths where necessary;
- Route CSW-U22 – Togher Road (Doughcloyne Road to Fernwood Crescent): this is proposed as a secondary route, with a mixture of dedicated cycle lanes where width allows, and mixed street on-road facilities elsewhere;
- Route CSW-GW2 – Togher Greenway: this is an existing segregated pedestrian and cycle path that is proposed to be upgraded in places to resurface and widen the path and ensure a high quality of service;
- Route CSW-GW5 – Disused Kinsale Rail Line: this currently does not facilitate any cycling along the route, and it is therefore proposed to provide a shared walking and cycling facility along the disused line, ultimately linking to Kinsale (subject to detailed planning and consultation with numerous landowners and stakeholders).

Figure 2: Cork Metropolitan Area Cycle Network Plan – Togher Environs

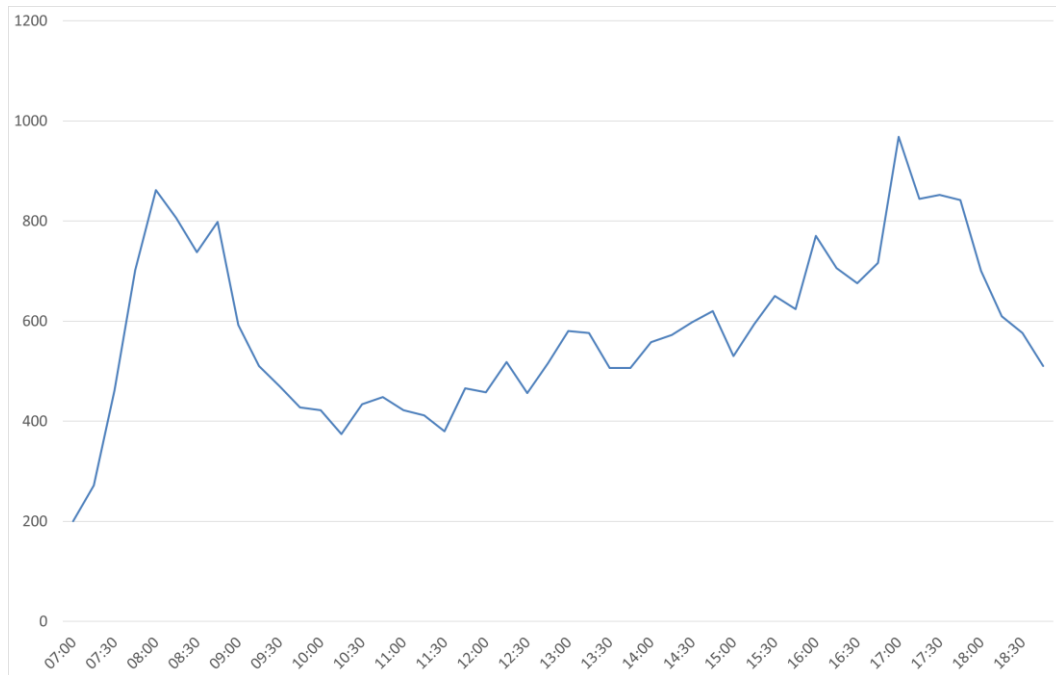
2.6 Existing Traffic Movements

Traffic surveys were carried out at a number of junctions in the study area by Idaso Ltd. on Tuesday April 17th 2018. The junction count locations included the Togher Road/Spur Hill Roundabout junction, the southern and northern Togher Road/Greenwood Estate junctions and the two entrances to the Way of the Cross Church on Togher Road. The surveys were carried out over a 12-hour period, from 07:00-19:00.

The survey results show that the three main arms of the roundabout junction are reasonably balanced, with 12-hour traffic flows on the four arms as shown below in **Table 1**. The fourth arm, the access to a local shop, is very lightly trafficked over the 12-hour day. The flows below are for the 12-hour survey period (7am-7pm), and also for an estimated Annual Average Daily Traffic (AADT) for each arm (based on the Transport Infrastructure Ireland guidelines for expanding short-term traffic counts).

Table 1: Vehicle Movements at Togher Roundabout

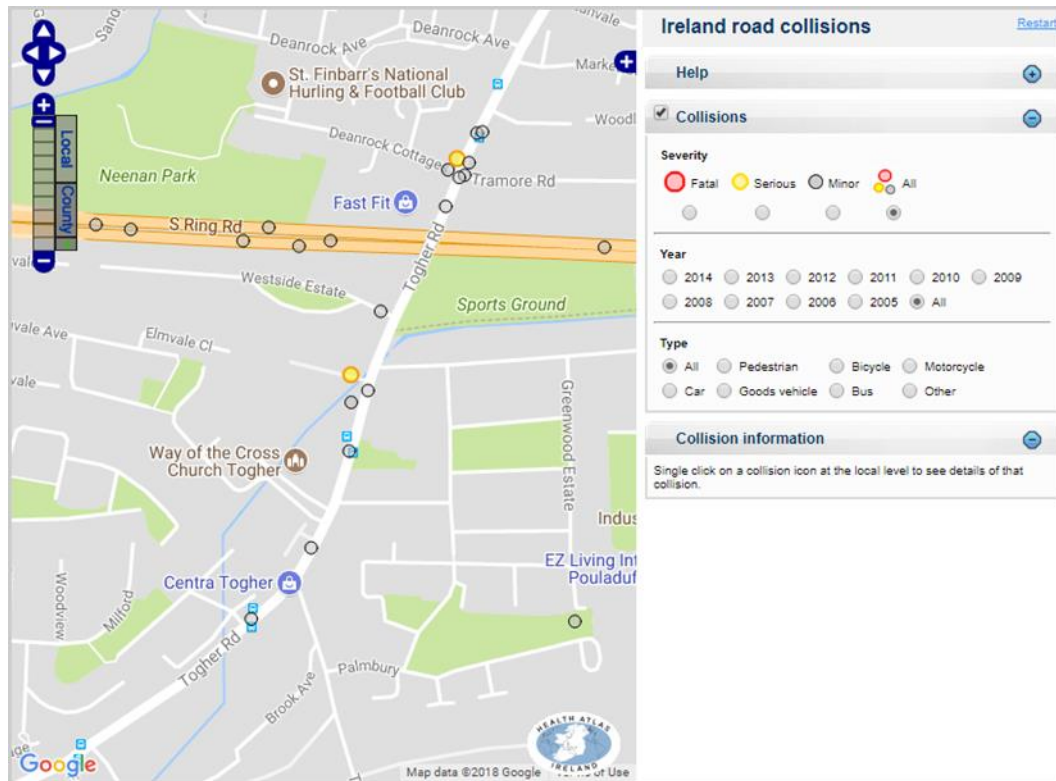
Arm Name	12-Hour Flow (veh)	AADT Estimate
Togher Road (northern arm)	10,504	11,900
Lehenaghmore Road	6,680	7,569
Spur Hill	8,931	10,120
Centra Access	1,715	1,943

Figure 3: Vehicle Throughput at Togher Roundabout

It can be seen in **Figure 3** above that the vehicle throughput at the junction over the 12-hour survey period shows a shorter morning peak period and a more widely-dispersed evening peak period and represents a relatively typical tidal arterial route.

2.7 Road Safety

A review of the available road safety collision record history on www.rsa.ie (from the years 2005-2014) demonstrates the collision history, with some incidents recorded along the Togher Road. **Figure 4** below shows the collision history including associated incident locations.

Figure 4: RSA.ie collision history on Togher Road

It can be seen above that the number of incidents recorded along the Togher Road from 2005-2014 is somewhat low. However, there are also a number of incidents recorded over this time period that are recorded as involving conflict between pedestrians and vehicles. Although there are no significant clusters that would warrant a further detailed investigation, these incidents may indicate that the functionality of the route is not providing sufficient priority to pedestrians.

3 Scheme Proposals

3.1 Scheme objectives

The overall goal of the project is to produce a combined streetscape/traffic design proposal in a manner that helps achieve the vision of Cork County Council and the following is the list of the Scheme objectives which guided the preliminary design. The design should create:

- Attractive, welcoming and increasingly accessible public spaces that serve as public gathering spaces and complement the diversity of surrounding land uses;
- Streetscape and public space design that fosters an active pedestrian environment and serves a diversity of uses;

- Functional streetscapes that preserve and highlight the quality of the area;
- Streetscape designs, including simplicity of associated materials that can easily be kept clean and maintained over time;
- Sustainable design methods and practices that reflect a commitment to principles of environmental stewardship;
- A plan that can be implemented cost-effectively and in phases, if necessary;
- A reduction of both vehicular speeds and congestion, particularly at Togher Cross Roundabout; and
- Consideration for the implementation of the objectives outlined for the route within the Cork Cycle Network Plan.

3.2 Major scheme proposals

Taking into consideration the main scheme objectives and criteria, it was deemed that the proposals for the study area should include:

- Applying a design speed of 30 km/hr to the study area to reflect the village nature of the area and take cognisance of the presence of two primary schools in the village;
- Improving pedestrian facilities by widening of footpaths throughout to a minimum width of 2m. Provide safe raised crossing points at each junction with Togher Road and at strategic crossing points along Togher Road, while in turn narrowing the roadway with a desirable width of 6m minimum;
- Addressing the congestion issues apparent along the route, both through design of the Togher Cross roundabout and addressing the informal on-street parking and setting down regime;
- The creation of a consistent and legible landscape strategy along the route;
- The formalisation of the soft mode connection between the existing greenway, the schools, and the route through to the residential areas to the west;
- Recognising that the roundabout layout is currently a barrier to movement in Togher and improvement of this junction.

In order to improve the layout of the Togher Cross junction, two options were considered. These two options were to either retain the junction as a roundabout type junction or to convert it to a signalised junction. In order to help determine which of these options would be preferable, two different roundabout layouts were modelled and two different junction configurations were modelled.

4 Emerging Overall Proposed Scheme

Based on the scheme proposals identified in Section 3.2, a number of scheme layout iterations were developed and an emerging preferred proposal for the study area was developed through the design process. The main features of the proposed scheme are listed below and are shown in drawings T0100-01-A, T0100-02-A and T0100-03-A which accompany this planning application:

- On the Lehenaghmore Road arm of the Togher Cross roundabout:
 - the existing footpaths alongside the residential units will be widened to a minimum width of 2m, removing the existing pinch point;
 - the current open drainage channel is to be filled in as part of the Douglas Flood Relief Scheme works, and this area will now be used to create a wide pedestrian space; and
 - the existing pedestrian crossing has been observed to be unsafe for pedestrians due to an apparent lack of legibility of the crossing, and therefore it is proposed to be formalised into a raised crossing affording further priority to pedestrians.
- On the Spur Hill arm of the Togher Cross roundabout:
 - the existing footpaths on both sides of the road will be widened to a minimum width of 2m;
 - the existing bus stop on the northbound lane will be reoriented to an inline bus stop; and
 - turning radii on the entrance to the Sandown Crest estate will be tightened to 3m in combination with widening of the footpaths.
- Along Togher Road:
 - consistently along the roadway the road width will be reduced to a minimum of 6m, footpaths will be widened to a minimum of 2m on the east side of the road, and on the west side of the road a 3.5m wide mixed facility will be created with a landscaped buffer along the road edge. The footpaths will be constructed with a high-quality concrete finish;
 - raised pedestrian crossings will be provided across each minor junction and at vehicular accesses for increased pedestrian safety;
 - raised pedestrian crossings will be provided at three key locations across Togher Road for increased pedestrian permeability and safety;
 - formal parking (including 1 no. designated space to match existing) will be provided on the east side of the road opposite O'Connell Court;
 - an off-street raised set-down area will be provided in front of the Church in conjunction with a raised table to cater for Church uses (e.g. funerals);
 - an off-street designated set-down area will be provided in front of Togher National Boys School to cater for school uses;

- the existing one-way in and out access/egress arrangements for the two zones of the Church car park are to be consolidated into two single access/egress points in order to reduce the number of conflict points between road users and to create a more legible access arrangement;
 - the current open channel adjacent to the existing signalised crossing is to be filled in as part of the Douglas Flood Relief Scheme works, and this area will now be used to create a new public space with associated street furniture and seating area;
 - a new 3.5m wide mixed facility will be provided connecting the existing Togher Greenway to the north to the existing shared route alongside the two schools, via the existing signalised pedestrian crossing; and
 - opportunities will be created throughout to enable a consistent and high-quality landscape strategy along the street.
- Landscaping to be provided along the scheme. The proposals in terms of hard and soft landscape features will be finalised in the detailed design phase, however for reference the document entitled ‘Togher Public Realm Enhancement Landscape Concept’ has been appended to this report which describes the current aspirations. These proposals were developed in order to inform the road design proposals and to complement the vision for the area.

4.1 Togher Cross Junction Selection

In order to address the identified issues relating to traffic operation, pedestrian priority and safety and cyclist provision, a number of options for the type of junction to be provided at Togher Cross were examined. This section addresses the junction type selection of the junction and the assessment of the options considered.

4 options were examined. One of these is the current or ‘do nothing’ scenario. There were three ‘do something’ options examined, included the signalisation of Togher Cross operating on a 3-stage basis, the signalisations of Togher Cross operating on a 5-stage basis and the upgrading of the existing roundabout to a ‘continental style’ roundabout.

4.1.1 Traffic Assessment

As previously stated, traffic surveys were carried out at a number of junctions in the study area by Idaso Ltd. on Tuesday April 17th 2018. The junction count locations included the Togher Road/Spur Hill Roundabout junction, the southern and northern Togher Road/Greenwood Estate junctions and the two entrances to the Way of the Cross Church on Togher Road. The surveys were carried out over a 12-hour period, from 07:00-19:00.

This information was utilised in two different software packages to model the ‘do-nothing’ and ‘do-something’ scenarios. The software’s used were LinSig and Junctions 9.

LinSig: LinSig is a computer software package for the assessment and design of traffic signal junctions, either individually or as a network of junctions. The software package was developed by JCT Consultancy Ltd. and is used by traffic engineers to construct a model of a signalised junction or network, which can then be used to assess different designs and methods of operation. The outputs of the assessment are the Degree of Saturation (DoS), given as a ratio of flow to capacity, and a queue value for each junction arm.

The DoS value indicates the extent to which traffic flows on a junction arm approach capacity (a junction arm operating at capacity would have a DoS value of 100%). A signalised junction is generally said to be operating satisfactorily if all arms of the junction operate with DoS values below 90%. The queue value relates to the average of maximum queues (quoted in PCUs) on the junction arm.

Junction 9: the ARCADY module of Junctions 9 is a computer program for predicting capacities, queues and delays at roundabout. ARCADY was developed in the UK by the Transportation Research Laboratory (TRL).

The outputs of an ARCADY assessment are a Ratio of Flow to Capacity (RFC) and a queue value for each intersection arm. The RFC value indicates the extent to which traffic flows on an intersection arm approach capacity (an intersection arm operating at capacity would have an RFC value of 1.0). Typically, a roundabout is said to be operating satisfactorily if all arms of the intersection operate with RFC values below 0.85. The queue value relates to queue lengths (quotes in Passenger Car Units (PCUs)) on the intersection arm.

4.1.2 Current (do-nothing) Scenario

The current scenario is a 4-arm roundabout with flared entries. As previously described, this option does not provide pedestrian crossings and minimal deflection for vehicles passing through the junction from Togher Road and Spur Hill.

ARCADY was used to assess the junction capacity performance of the roundabout during both the AM and the PM peak traffic periods.

The results of the assessment of the do-nothing scenario can be seen in **Table 2** and

Table 3 below.

Table 2 Do-Nothing AM Peak

Approach Arm	RFC (%)	Queue (PCU)
Togher Road	12	0.1
Lehenaghmore	26	0.4
Spur Hill	16	0.2
Centra	12	0.0

Table 3 PM Current Roundabout

Approach Arm	RFC (%)	Queue (PCU)
Togher Road	17	0.2
Lehenaghmore	18	0.2
Spur Hill	15	0.2
Centra	4	0.0

4.1.3 Analysis of the Current Scenario

The results of the modelling of the junction suggest that the junction is operating significantly below capacity during both AM and PM peak periods. However, it must be noted that during peak periods, in particular the morning peak period, this junction is frequently congested. However observation suggests and the traffic modelling confirms that this congestion is as a result of downstream capacity issues on the Togher Road, primarily in the vicinity of the two schools as described in Section 2.3. In theory, if this junction were situated in a location with no adjacent restrictions, the model suggests that this junction would operate satisfactorily from a vehicular traffic perspective.

Notwithstanding the above, the layout of this roundabout could be significantly improved. The approach arms are flared and have poor visibility on approach to the roundabout. The width of the approach arms can cause difficulty for pedestrians when crossing due to the large carriageway width. Also, a lack of dropped kerbs also causes great difficulty for mobility impaired pedestrians.

4.1.4 Three-Stage Signalised Option

LinSig was used to assess the performance of a three-stage signalised junction during the current year for both the AM and PM peak periods. This junction layout would take the form of a crossroad arrangement and in this scenario all right turns would be opposed by the arms opposite and right turn movements would have to be undertaken by accepting gaps in oncoming traffic. Stage 1 comprised of green for Spur Hill and Togher Road simultaneously. Stage 2 comprised green for Lehenaghmore Road and the exit from Centra simultaneously. Stage 3 is a pedestrian stage with controlled pedestrian crossings on all arms.

The result can be seen in **Table 4** and **Table 5** below.

Table 4 AM Three Stage Signalised Option

Approach Arm	Deg Sat (%)	Mean Max Queue (veh)
Togher Road	16	5.1
Lehenaghmore	29	20.3
Spur Hill	23	16.1

Centra	4	1.3
--------	---	-----

Table 5 PM Three Stage Signalised Option

Approach Arm	Deg Sat (%)	Mean Max Queue (veh)
Togher Road	51.7	11
Lehenaghmore	15.3	15.3
Spur Hill	14.1	14.1
Centra	2.4	16.2

4.1.5 Analysis of the Three-Stage Signalised Option

The results of the modelling of this option suggest that the junction configuration would operate satisfactorily below capacity during both the AM and PM peak hours. This option would take up less road space than a roundabout, but it is shown to not operate as efficiently. It would result in queuing at most arms of the junction. It would provide a pedestrian phase to safely allow pedestrians to cross the carriageway. However, all right turning manoeuvres in this option are opposed and require accepting gaps in oncoming traffic. This could prove problematic for the right turn from Spur Hill to Togher Road. As the volume of traffic exiting from Centra is significantly less, vehicles from Spur Hill could incorrectly assume that their manoeuvre is unopposed, placing them in conflict with traffic exiting from Centra.

4.1.6 Five-Stage Signalised Option

The second proposed option is to make change the roundabout to a five-stage signalised junction. In this scenario, each arm of the junction runs within its own stage, ensuring that all movements are unopposed. Stage 5 is a pedestrian only stage for all arms of the junction.

LinSig was used to assess the performance of the five-stage signalised junction for current year traffic volumes, for both the AM and the PM peak traffic periods.

The results can be seen in **Table 6** and **Table 7** below.

Table 6 AM Five-Stage Signalised Option

Approach Arm	Deg Sat (%)	Mean Max Queue (veh)
Togher Road	96.4	12.1
Lehenaghmore	98.3	33.1
Spur Hill	95.3	22.9
Centra	54.8	2.9

Table 7 PM Five-Stage Signalised Option

Approach Arm	Deg Sat (%)	Mean Max Queue (veh)
Togher Road	97.8	22.7
Lehenaghmore	98.0	26.1
Spur Hill	97.0	22.4
Centra	83.0	5.5

4.1.7 Analysis of the Five Stage Signalised Option

The results of the model suggest that this option would operate above the desirable maximum degree of saturation but just below capacity in both the AM and PM peak hours. These results suggest that the junction would not operate satisfactorily in the current year and any increase in traffic volumes would result in the junction operating over capacity. Similar to the three-stage signalised option, the layout of this option would take up less road space than a roundabout. It is demonstrated to not operate as efficiently however. This option would result in relatively long queues on approach to the junction and remove the capability of the junction to recover quickly from any persistent downstream saturation events. It would however have the ability to provide a pedestrian phase to safely allow pedestrians to cross the carriageway.

4.1.8 Continental Style Roundabout Option

The third proposed option is to keep the junction layout as a roundabout but to tighten the width of the approach arms and remove the entry flares to the roundabout. In this option, controlled zebra pedestrian crossings would be installed on the Togher Road, Spur Hill and Lehenaghmore Road arms of the junction, at or close to the entry points. An over-run area would be installed around the central island which would permit larger vehicles to utilise this space to complete manoeuvres, but discourage cars and light vehicles from doing so, therefore reducing speeds through the junction.

ARCADY was used to assess the performance of this roundabout option during both the AM and the PM peak traffic periods.

The results of the model can be seen in **Table 8** and **Table 9** below

Table 8 AM Continental Style Roundabout Option

Approach Arm	RFC (%)	Queue (PCU)
Togher Road	16	0.2
Lehenaghmore	29	0.4
Spur Hill	23	0.3
Centra	4	0.0

Table 9 PM Continental Style Roundabout Option

Approach Arm	RFC (%)	Queue (PCU)
Togher Road	22	0.3
Lehenaghmore	20	0.2
Spur Hill	20	0.3
Centra	7	0.1

4.1.9 Analysis of the Continental Style Roundabout Option

The modelling of this option suggests that the junction would operate well below capacity during both the AM and PM peak periods. Similar to the do-nothing scenario, this suggests that the capacity of the junction would not be the source of any capacity restrictions if it were to be altered. The approach arms to this roundabout in this proposal have been narrowed to reduce speed and increase visibility on approach. The narrowing of the approach arms will result in shorter crossing distances for pedestrian and improved the pedestrian's ability to navigate the junction. Narrower approach arms also allows more space to be allocated to pedestrians and to be used as footpaths.

4.1.10 Junction Assessment Conclusion

Having assessed the existing situation at the roundabout and modelling the various different proposed options, Option 3, the continental style roundabout, was deemed to be the preferred design for the Togher Cross junction.

Option 3, the continental style roundabout, was deemed to be the preferred option. This is similar in function to the roundabout that is already in Togher, with the exception of a few key features. The current flared approach arms are to be narrowed down to reduce the entry speed and provide a shorter crossing distance for pedestrians. The entry arms will be realigned to improve visibility of the roundabout and slow entry speed to the roundabout.

Option 3 is shown in the model to work well within capacity, with the RFC and queue lengths similar to the previous junction. This layout is able to adequately deal with the heavy traffic flows coming down Lehenaghmore and Spur Hill in conditions where downstream vehicular capacity is present.

This option is also a much safer option than the present roundabout. The realignment and narrowing of the entry arms will slow vehicles creating an enhanced pedestrian environment. The narrower carriageway also decreases the crossing distance which will also contribute to a safer environment for the pedestrian. The provision of controlled zebra crossings affords priority to pedestrians and removes the need for pedestrians to wait for gaps in the traffic or a pedestrian stage in the operation of traffic signals.

Although the proposal to signalise the junction would also benefit pedestrians and increase their ability to safely navigate the junction, it would result in longer queuing and delays. The continental style roundabout also benefits the pedestrian without the same negative impact on traffic flows.

4.2 Proposed Measures at Togher Cross Junction

- At the proposed Togher Cross continental style roundabout:
 - the roundabout geometry will be tightened to increase the deflection for vehicles traversing the roundabout and to create opportunities for larger pedestrian areas and landscaping in the vicinity, as well as reducing crossing widths for pedestrians crossing the arms. Due to the HGV traffic using the roundabout, an over-run area will be required in the central island;
 - in order to facilitate the HGV movements from the Lehenaghmore Road arm to the Spur Hill arm in a safe manner for all road users, it is proposed to purchase approximately 3.7m² of the existing property to the south of the roundabout (in addition to the land take proposed as part of the main Douglas Flood Relief Scheme), included the relocation and reconstruction of a 4.5m long section of the existing boundary wall. This will enable a 2m wide footpath be constructed around the corner as well as the provision of an over-run area for HGVs;
 - a raised pedestrian crossing will be provided at each arm, with a median island on the Togher Road arm to provide a resting place, if necessary, for vulnerable road users when crossing;
 - the existing access to Centra will be maintained as existing with a dropped kerb for vehicles to access;
 - existing local accesses to the residential and retail units on the east side of the roundabout will be maintained with dropped kerbs provided; and
 - soft landscaping will be provided both on the central island and at the roundabout edges as part of the landscaping strategy, and will be provided in such a manner so as not to affect visibility.

4.3 Public Lighting Design

4.3.1 Existing

Within the study area, Togher Road and the adjacent footpaths are illuminated by roadway lighting columns and luminaires on the east side of the roadway at approximately 40m intervals, with lighting poles also present on the west side at key locations and junctions. The existing roundabout area also has a significant offering of lighting columns.

It is noted that the luminaires appear to be modern LED fittings, and it has been noted during night time site visits that there appears to be an adequate coverage of the roadway from the existing public lighting.

4.3.2 Proposed Design

A proposed street lighting strategy shall be developed for the existing streets, footpaths and public spaces within the study area in line with the scheme proposals. As the scheme objectives aim to create attractive, welcoming and increasingly accessible public spaces, it is vital that these are well lit. Many of the areas that are intended to be public spaces are currently underused and therefore may not have adequate lighting cover, and therefore a bespoke strategy will be developed.

The lighting design shall cater for new lighting of the roadway if the existing provision is deemed insufficient for the proposed uses, in addition to lighting being provided to ensure a continuity of illumination along footpaths and within public areas.

The lighting design and installation shall be in accordance with the specific lighting and electrical items set out the following National Standards and guides:

- EN 13201: 2014 Road Lighting (all sections);
- Volume 1 - NRA Specification for Roadworks, Series 1300 & 1400;
- Volume 4 - NRA Road Construction Details, Series 1300 & 1400;
- IS EN 40 – Lighting Columns;
- Street Lighting Specification(s) provided by DLRCC;
- Institution of Lighting Professionals “GN01 Guidance Notes for Reduction of Obtrusive Light”; and
- Institution of Lighting Professionals “Code of Practice for the Design of Street Lighting”.

4.3.3 Design Details

A full lighting design will be completed as part of detailed design and agreed, as required, by Cork County Council.

Passively safe columns will be used where lighting columns will be located close to road verges. Columns shall be rooted type and shall be manufactured to European stand EN40– Lighting Columns. Light fittings will be in keeping with the existing provision.

Low level bollard lighting may be proposed along the footpaths or walking routes away from the main roadway. The use of such lighting will allow for light overspill and canopy illumination to be managed.

4.4 Landscaping Strategy

4.4.1 Existing

Within the study area along the section it is noted that there is 1 no. existing tree in the public realm.

There exists a number of planters within and in the vicinity of the Togher Cross Roundabout, as well as landscaped area at the egress of Robinscourt.

4.4.2 Proposed Design

A proposed landscaping strategy has been developed as part of the streetscape improvement works which has informed the scheme design drawings. The full ‘Togher Public Realm Enhancement Landscape Concept’ is included in Appendix A of this report.



Figure 5: Graphical representation of soft landscaping strategy

The general principles adopted were as follows, and as shown in **Figure 5**:

- Maintaining a focus on the existing character of the area with the continued use of local species such as the birch tree;
- Creation of a ‘gate’ into the Togher streetscape area through the provision of distinguishable trees at both the north and south end, signifying the arrival and leaving of the area;
- Mixed vegetation and landscaped sculpture within the Togher Cross roundabout building on the existing provision, with awareness of vehicular sightlines;
- Landmark trees provided at key locations where there are opportunities to gather in the public space; and
- Herbaceous ornamental planting and lower planting streets providing a green edge to the roadway in order to create a consistent and legible landscape strategy along the route.

A schematic of the proposed strategy extracted from the Togher Public Realm Enhancement Landscape Concept is shown in Figure 6 to illustrate the proposed design intention.



Figure 6: Extract from Togher Public Realm Enhancement Landscape Concept document

5 Summary and Conclusion

This technical planning report has been prepared in accordance with Part 8 of the Planning and Development Regulations, 2001 as amended. It sets out the existing situation in terms of traffic management, pedestrian and cycle facilities, as well as the local environment, at the Togher Cross Roundabout and along Togher Road.

Cork County Council are availing of the opportunity to improve the existing streetscape and transport operation of the identified study area in conjunction with the Douglas Flood Relief Scheme.

The overall goal of the project is to produce a combined streetscape/transport design proposal in a manner that helps achieve the vision of Cork County Council. In this sense, the Togher Public Realm Enhancement Scheme has been designed to provide attractive, welcoming, and increasingly accessible public spaces, as well as a reduction of both vehicular speeds and congestion through both hard and soft interventions.

The preliminary design for the scheme includes a general narrowing of road carriageway widths to achieve wider footpaths and a safer road environment for cyclists, improved crossing facilities for pedestrians, and a redesign of Togher Cross Roundabout to a continental style roundabout. The scheme therefore provides pedestrian and cycling facilities which the existing route is currently lacking.

Traffic modelling demonstrates that the proposed layout will work well within capacity, similar to the previous junction. This layout will be able to adequately deal with the heavy traffic flows coming down Lehenaghmore and Spur Hill, in conditions where downstream vehicular capacity is present.

Appendix A

Togher Public Realm Enhancement Landscape Concept

A1
