Project

Redford Park Junction Improvement Scheme

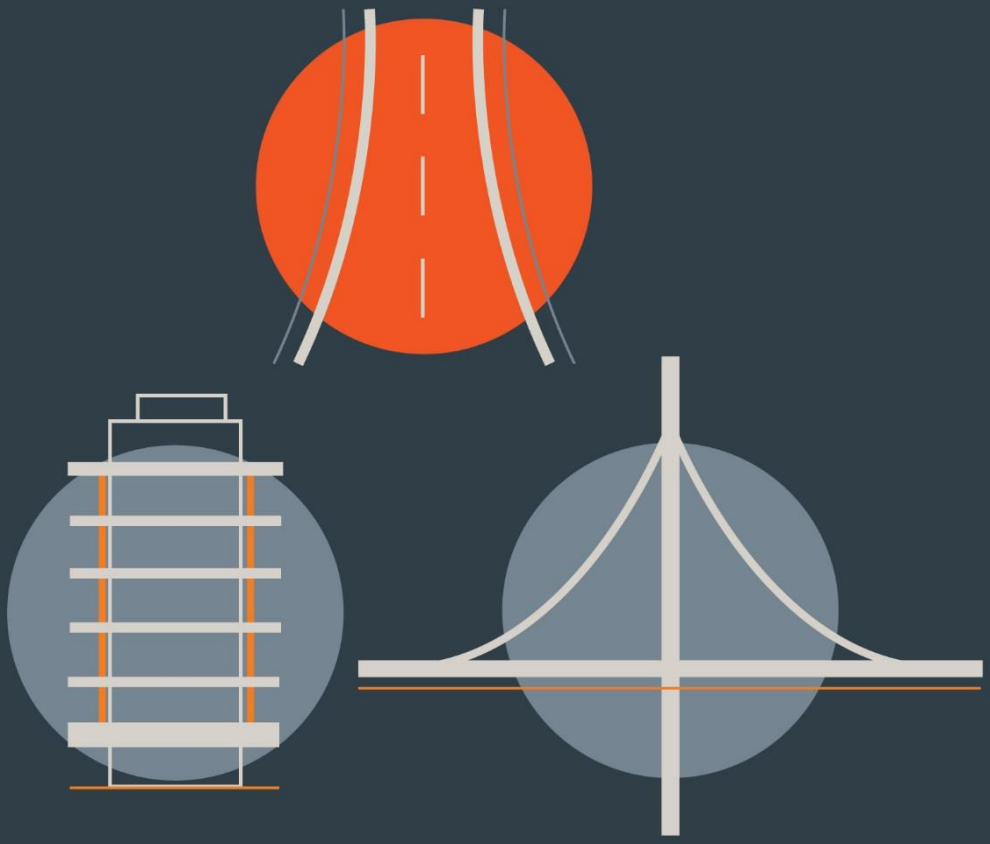
Report Title

Part 8 Design Report

Client

Wicklow County Council

TRANSPORTATION



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APPENDICES

1.0 INTRODUCTION

1.1 INTRODUCTION

1.1.1 DBFL have been commissioned by Wicklow County Council (WCC) to prepare a Part 8 Design Report for the design of the R761/Redford Park/Blacklion Manor Road Signalised Junction (Redford Park Junction) Improvement Scheme.

1.1.2 The overall scheme aims to deliver an upgrade to the existing signal-controlled Redford Park junction which is located within the Redford area of Greystones in County Wicklow. The upgrades will consist of improvements for pedestrians and cyclists with the upgrade of footpaths and inclusion of protected cycle track facilities, as well as an improvement to public transport through the upgrading of two existing bus stops in the immediate vicinity of the junction.

1.2 SITE LOCATION

1.2.1 The junction is located within the Redford area in Greystones, County Wicklow. A site location map, shown in Figure 1-1, outlines the location of the Redford Park junction.

Figure 1-1: Scheme Location (Source: Google Maps)

1.3 BACKGROUND TO SCHEME

1.3.1 The existing junction is located within an area of Greystones that experiences peaks in traffic flows, in particular, during morning and evening times. This is due to a number of factors, including the following which are also illustrated in Figure 1-2 below:

Local Schools: The junction is located in close proximity to three schools, the Greystones Educate Together National School, Temple Carrig School and Gaelscoil na gCloch Liath, all located along the Blacklion Manor Road. There are a number of car, pedestrian and cycle trips, therefore, accessing and egressing the schools for drop off and pick up times.

R761 Regional Road: The R761, which routes through the junction in a north to south direction, is the main Regional Road from Greystones into Bray Town and also provides an access road to the M11 Motorway. The R761, approximately 25km in length, routes from Rathnew in the outskirts of Wicklow, travelling northwards through Kilcoole and Greystones terminating in Bray Town at the junction to the M11. This route is busy at peak times with a typical AADT of between 11,000 – 12,000 Vehicles.

Local Amenities: The junction is located in close proximity to a number of amenities including local shops off Blacklion Manor Road that include a Lidl food store, a Circle K Garage off the R761 southern arm as well as a number of smaller retail shops. These amenities attract a number of vehicle movements throughout the day.

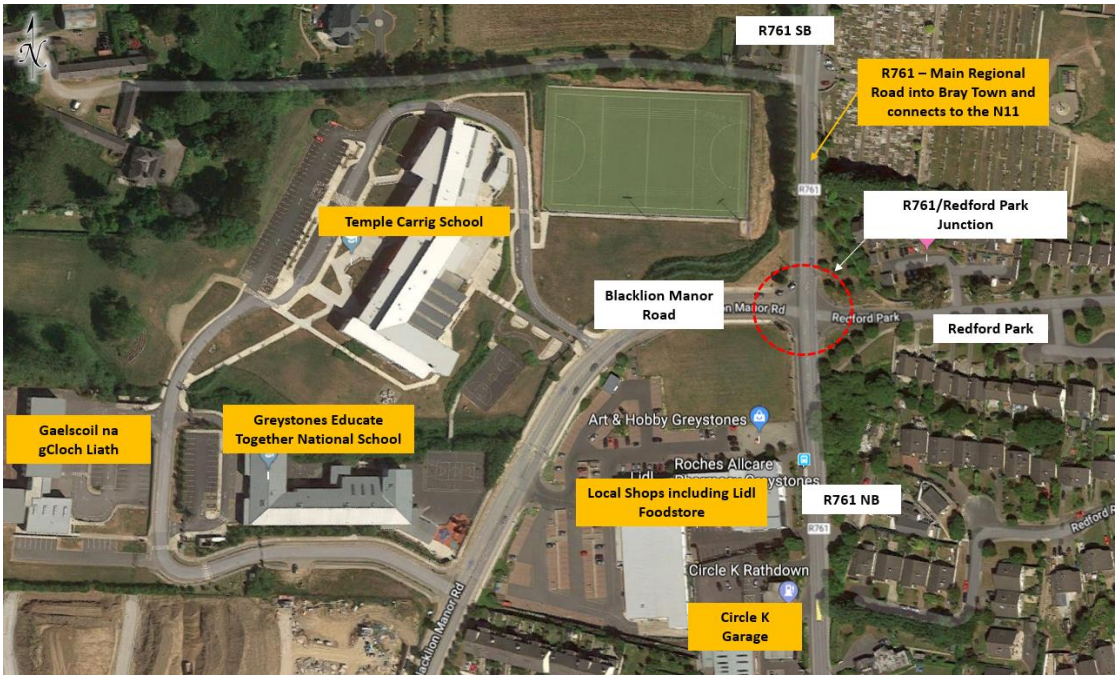


Figure 1-2: Key Trip Attractors (Source: Google Maps)

1.4 AIMS & OBJECTIVES

1.4.1 The main aim is to deliver a scheme for the Redford Park Junction that will improve pedestrian and cycle facilities through the junction as well as improve the junctions safety and operation for all users.

1.4.2 The main objectives for the scheme are therefore:

1. To provide improved pedestrian facilities along the scheme extents, including improved footpaths and pedestrian crossing facilities;
2. To provide high quality, safe and continuous cycle facilities through the scheme extents; and
3. To provide improvements for vehicular movements.

1.5 REPORT STRUCTURE

1.5.1 Following on from **Chapter 1** of this report, which details the Introduction and background to the scheme, **Chapter 2** outlines the relevant policy and guidance documents that justify the scheme on a national, regional and local basis.

1.5.2 **Chapter 3** details the Existing Conditions for the area including the existing roads, footpaths and cycle provision through the junction as well as existing amenities in the surrounding environment.

1.5.3 **Chapter 4** outlines the proposed scheme development for the Redford Park junction including proposed pedestrian, cyclist and public transport enhancements as well as required drainage and utilities works.

1.5.4 **Chapter 5** describes the Environmental Assessment undertaken and findings, including archaeological and built heritage constraints.

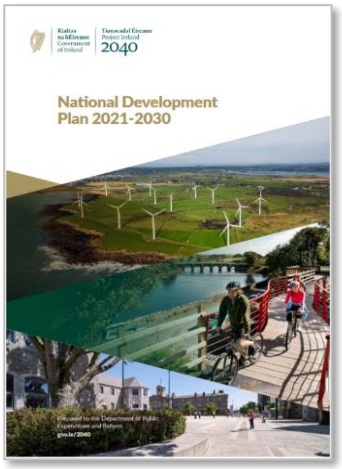
1.5.5 **Chapter 6** provides a Summary of the report as well as a Conclusion.

2.0 POLICY CONTEXT

2.1.1 It is important that a review of current Policy is undertaken and used to inform the development of the options considered for the Redford Park Junction Improvement Scheme. The following policy documents and design guidance have been reviewed as part of this scheme.

2.2 NATIONAL DEVELOPMENT PLAN (2021-2030)

2.2.1 As part of Project Ireland 2040 the National Development Plan sets out the Government's over-arching investment strategy and budget for the period 2021-2030. It is an ambitious plan that balances the significant demand for public investment across all sectors and regions of Ireland with a major focus on improving the delivery of infrastructure projects to ensure speed of delivery and value for money.



2.2.2 The NDP sets out a significant level of investment, almost €165 billion, which will underpin the NPF and drive its implementation over the next nine years. The scale of the Transport-related requirements under the revised NDP amounts to c. €35 billion in total over 2021- 2030.

2.2.3 The National Planning Framework (NPF) recognises the importance of significant investment in sustainable mobility (active travel and public transport) networks if the NPF population growth targets are to be achieved. Investing in high-quality sustainable mobility will improve citizens' quality of life, support our transition to a low-carbon society and enhance our economic competitiveness.

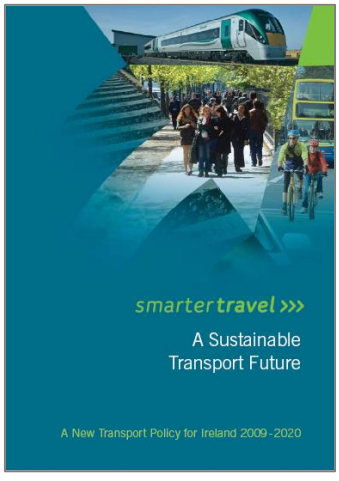
2.2.4 With regard to Ireland's greenhouse gas emissions, the transport sector has been determined as a key contributor to this and is responsible for 20%. The NDP sets out an entire National Strategic Objective that is dedicated to "Sustainable Mobility" and has a range of policies and measures to promote the achievement of sustainable mobility. The following definitions of Sustainable Mobility have been outlined in the NDP:

- Comfortable and affordable journeys to and from work, home, school, college, shops and leisure;
- Travelling by cleaner and greener transport; and
- A shift away from the private car to greater use of active travel (walking and cycling) and public transport.

2.2.5 The Government is firmly committed to encouraging the use of walking, cycling and other active travel methods, and this has been signalled by the recent increase in the active travel budget. Whole-of Government funding equivalent to 20% of the 2020 transport capital budget, or €360 million, has been committed annually for the period 2021-2025. In 2021, the NTA allocated just over €240 million to active travel infrastructure projects in Dublin, the Greater Dublin Area and regional cities.

2.2.6 This investment will help support the delivery of significant levels of new and improved walking and cycling infrastructure by 2025, as well as additional investment in Greenways. Successful delivery of planned projects and programmes should serve to encourage a shift in the population towards walking, cycling and scooting as transport modes as the decade progresses.

2.3 SMARTER TRAVEL: A SUSTAINALBE TRANSPORT FUTURE (2009–2020)



2.3.1 Smarter Travel - A Sustainable Transport Future, was published in February 2009, and represents a new transport policy for Ireland for the period 2009-2020. The policy recognises the vital importance of continued investment in transport to ensure an efficient economy and continued social development, but it also sets out the necessary steps to ensure that people choose more sustainable transport modes such as walking, cycling and public transport.

2.3.2 The policy is a direct response to the fact that continued growth in demand for road transport is not sustainable due to the resulting adverse impacts of increasing congestion levels, local air pollution, contribution to global

warming, and the additional negative impacts to health through promoting increasingly sedentary lifestyles.

2.3.3 The following five key goals form the basis of the Smarter Travel policy document:

- Improve quality of life and accessibility to transport for all and, in particular, for people with reduced mobility and those who may experience isolation due to lack of transport.
- Improve economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks.
- Minimise the negative impacts of transport on the local and global environment through reducing localised air pollutants and greenhouse gas emissions.
- Reduce overall travel demand and commuting distances travelled by the private car.
- Improve security of energy supply by reducing dependency on imported fossil fuels.

2.3.4 These aims will be achieved through 49 specific actions listed within the Smarter Travel Policy, which can be broadly grouped into 4 key areas:

- Actions to reduce distance travelled by private car and encourage smarter travel,
- Actions aimed at ensuring that alternatives to the private car are more widely available,
- Actions aimed at improving the fuel efficiency of motorised transport through improved fleet structure, energy efficient driving and alternative technologies, and
- Actions aimed at strengthening institutional arrangements.

2.3.5 The Smarter Travel policy also includes for a comprehensive range of supporting 'actions' including mode specific (e.g. walking, cycling and public transport etc.) and behaviour change initiatives which both encourage and provide for sustainable travel practices for all journeys.

2.4 CLIMATE ACTION PLAN (2021)

2.4.1 The Climate Action Plan 2021 sets out a major programme for change in response to reducing Ireland's greenhouse gas emissions. The proposals outlined in the Plan are aimed at achieving a net zero carbon energy system within Ireland and it is envisaged that these proposals will also have associated positive economic and societal benefits, including cleaner air, warmer homes and a more sustainable economy in the longer term.

2.4.2 Irelands transport system plays a critical role in realising the ambitious targets of the Climate Action Plan. Consequently, to make growth less transport intensive a number of key policies are identified, including the expansion of walking, cycling and public transport to promote modal shift. The measures to deliver on the transport related targets set out in the Climate Action Plan cover the following:

- Sustainability;
- System Efficiency and Demand Management;
- Fleet Electrification;
- Renewable and Alternative Transport Fuels for Freight;
- Use of Green Hydrogen and other Emerging Technologies.

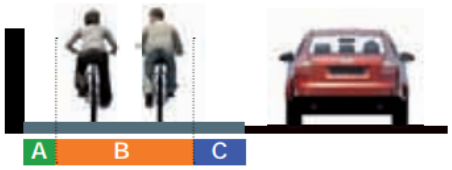
2.5 NATIONAL CYCLE MANUAL (2011)

2.5.1 The National Cycle Manual is a national guidance document that details the principles of sustainable safety that offers a safe traffic environment for all road users including cyclists. The manual provides guidance on integrating the bicycle into the design of urban areas. The manual sets out five principles of Sustainable Safety:

1. Functionality: The principle of functionality is that the design which is fit for purpose is safer. Urban streets, roads and spaces are always multi – functional.
2. Homogeneity: The principle of Homogeneity is that reducing the relative speed, mass and directional differences of different road users sharing the same space increases safety.
3. Legibility: The principle of Legibility is that a road environment that all road users can read and understand is safer. A legible design will be self-evident, self-explanatory and self-enforcing.
4. Forgivingness: The principle of Forgivingness (Passive Safety) is that environments that contribute to benign outcomes of accidents are safer.
5. Self-Awareness: The principle of Self-Awareness is that where road users are aware of their own abilities and limitations to negotiate a road environment, the environment is safer.

2.5.2 The width of a cycle facility as well as the type of facility proposed (Integrated or Segregated) are two key factors for providing adequate, safe facilities and a sub-standard cycle lane/track is never recommended.

2.5.3 The designed width of a cycle facility is comprised of the effective width as well as clearances that are required in different circumstances. The Width Calculator table provides details for determining the actual width required for cycle lanes and tracks. It comprises of three main factors, A, B and C, as well as an additional factor, D, which is only relevant in certain circumstances. The width calculator table is illustrated in Figure 2-1.



A Inside Edge		B Cycling Regime		C Outside Edge		D Additional Features	
Kerb	0.25m	Single File	0.75m	30kph, 3.0m wide lane	0.50m	Uphill	0.25m
						Sharp bends	0.25m
Channel Gully	0.25m	Single File + Overtaking, Partially using next lane	1.25m	50kph, 3.0m wide lane	0.75m	Cyclist stacking, Stopping and starting	0.50m
Wall, Fence or Crash Barrier	0.65m	Basic Two-Way	1.75m	Raised kerb, dropped Kerb or physical barrier	0.50m	Around primary schools, Interchanges, or for larger tourist bikes	0.25m
Poles or Bollards	0.50m	Single File + Overtaking, Partially using next lane	2.00m	Kerb to vegetation etc. (ie. cycleway)	0.25m	Taxi ranks, loading, line of parked cars	1.00m (min 0.8m)
		2 Abreast + overtaking (tracks and cycleways)	2.50m			Turning pocket cyclists	0.50m

Figure 2-1: Cycle width calculator – National Cycle Manual (Source: NCM)

2.5.4 In terms of the type of facility proposed, integrated or segregated, there are a number of factors considered for determining the type of facility most appropriate. Segregated facilities are recommended in the following circumstances:

- The traffic regime cannot be rendered suitable for integrated cycling;
- To preclude traffic from queuing or parking on the facility;
- To confer an advantage on cyclists.

2.5.5 A guidance graph is illustrated in Figure 2-2 that sets out relevant factors for determining the type of facility to provide.

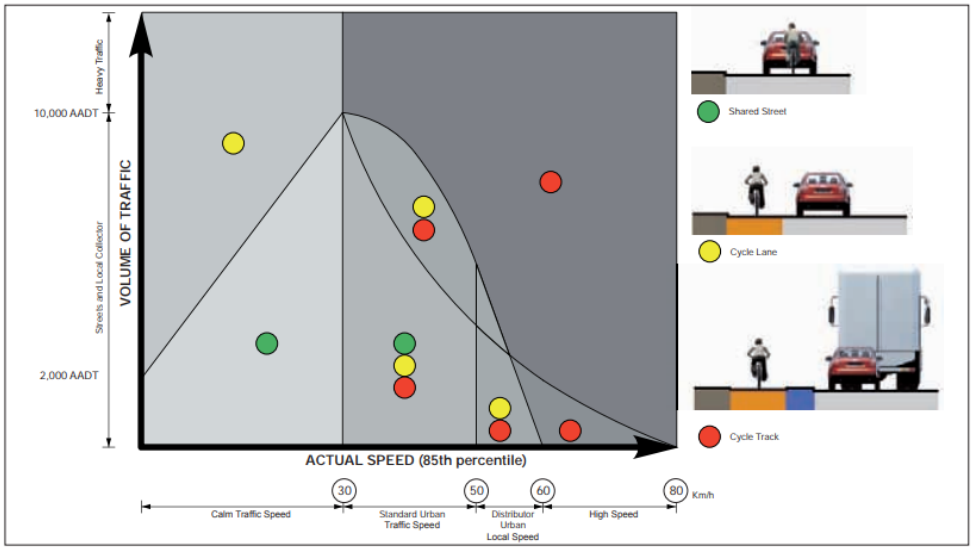
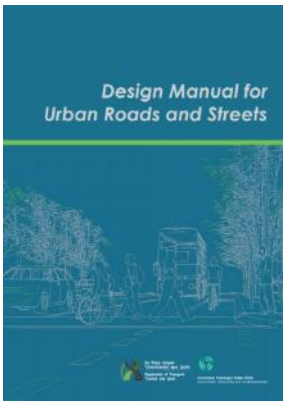


Figure 2-2: Guidance graph for determining type of cycle facility
(Source: NCM)

2.5.6 The graph determines the type of facility necessary, whether the facility is shared, cycle lane or cycle track, based on vehicle speed and AADT of the road.

2.6 DESIGN MANUAL FOR URBAN ROADS AND STREETS (2019)



2.6.1 The Design Manual for Urban Roads and Streets (DMURS) provides guidance relating to the design of urban roads and streets. It presents a series of principles, approaches and standards that are necessary to achieve balanced, best practice design outcomes with regard to street networks and individual streets.

2.6.2 The manual places a significant emphasis on car dominance in Ireland and the implications this has had regarding the pedestrian and cycle environment. The document encourages more sustainable travel patterns and safer streets by proposing a hierarchy for user priorities. This hierarchy places pedestrians at the top, indicating that walking is the most sustainable form of transport and that by prioritising pedestrians first, the number of short car journeys can be reduced and public transport made more accessible.

2.6.3 Second in the hierarchy are cyclists with public transport third in the hierarchy and private motor vehicles at the bottom. By placing private vehicles at the

bottom of the hierarchy, the document indicates that there should be a balance on street networks and cars should no longer take priority over the needs of other users.

2.6.4 The manual emphasises that narrow carriageways are one of the most effective design measures that calm traffic. Standard width of an arterial and link street is 3.25m, however, this may be reduced to 3m where lower design speeds are being applied. Desirable footpath widths are between 2m – 4m. The 2m width should be implemented to allow for low to moderate pedestrian activity. A 3m – 4m footpath should be implemented to allow for moderate to high pedestrian activity.

2.6.5 The focus of the manual is to create a place–based sustainable street network that balances the pedestrian and vehicle movements. The manual references the different types of street networks, including arterial streets, link streets, local streets, and highlights the importance of movement.

2.7 DRAFT PRELIMINARY DESIGN GUIDANCE BOOKLET FOR BUSCONNECTS CORE BUS CORRIDORS (2020)

2.7.1 The Draft Preliminary Design Guidance Booklet for BusConnects has recently been produced to assist with the design of typical corridor scenarios and layouts.

2.7.2 The purpose of the booklet is to complement, and not supersede, existing guidance documents relating to the design of urban streets, bus facilities, cycle facilities and public realm.

2.7.3 The aim of the design booklet is to provide guidance for the various design teams involved in the CBC Project and ensure a consistent design approach across the project. The document focuses on the engineering geometry and CBC operation, whilst acknowledging that the design evolution will result in the rationalisation of junction and link layouts, presenting opportunities to increase the public realm footprint and improve the placemaking offering of the CBC network.

2.7.4 The booklet also recognises that the CBC project is being planned and designed within the context of an existing city, with known constraints. The document provides guidance on the requirement for a more flexible

approach to the design of CBCs and utilising engineering judgement may be necessary in some locations due to these constraints. The optimum CBC cross section is shown in Figure 2-3.

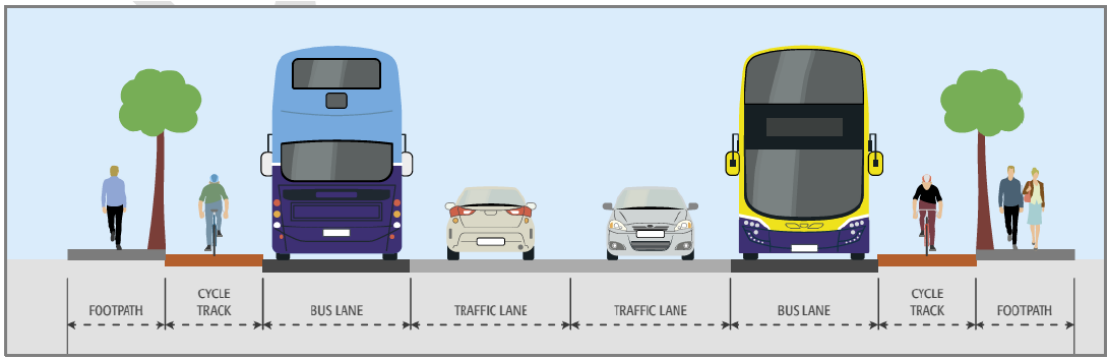


Figure 2-3: Optimum CBC Cross Section (Source: Preliminary Design Guidance Booklet)

2.7.5 With regards to junction design, the design guidance booklet states that the preferred layout for signalised junctions within the CBC project is the protected 'Dutch-style' junction, shown in Figure 2-4, which provides physical kerb buildouts to protect cyclists through the junction.

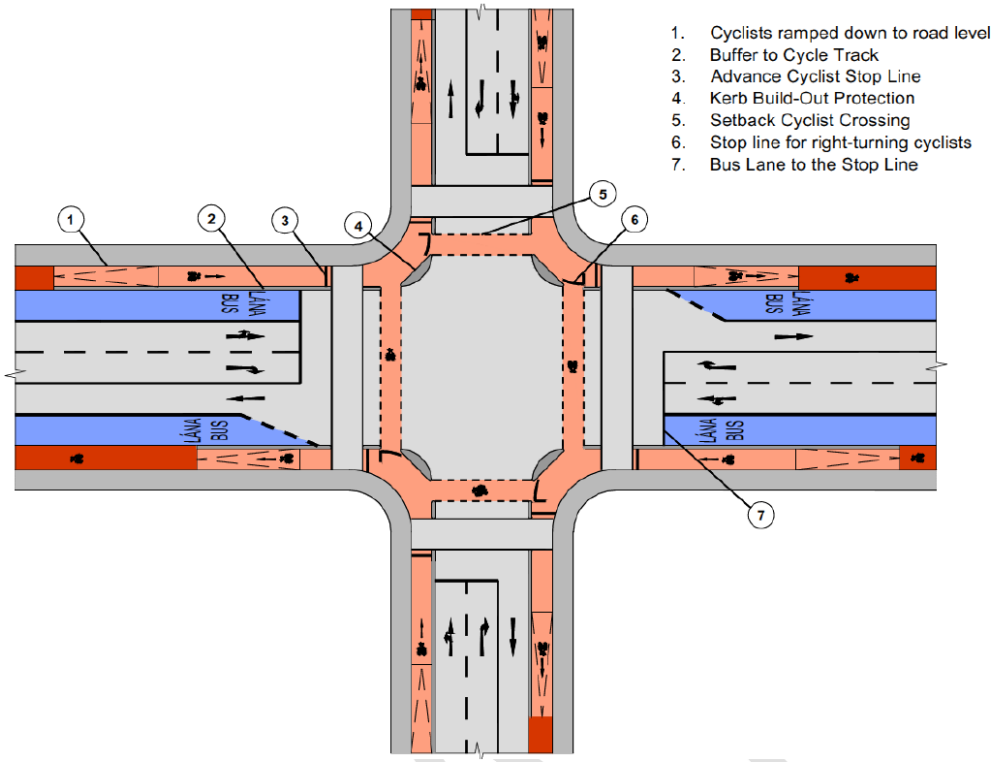


Figure 2-4: Dutch-Style Junction Design (Source: Preliminary Design Guidance Booklet)

2.7.6 With regard to bus stops, Island Bus Stops, such as that illustrated in Figure 2-5 are the preferred bus stop option to be used as standard on the CBC project where space constraints allow.

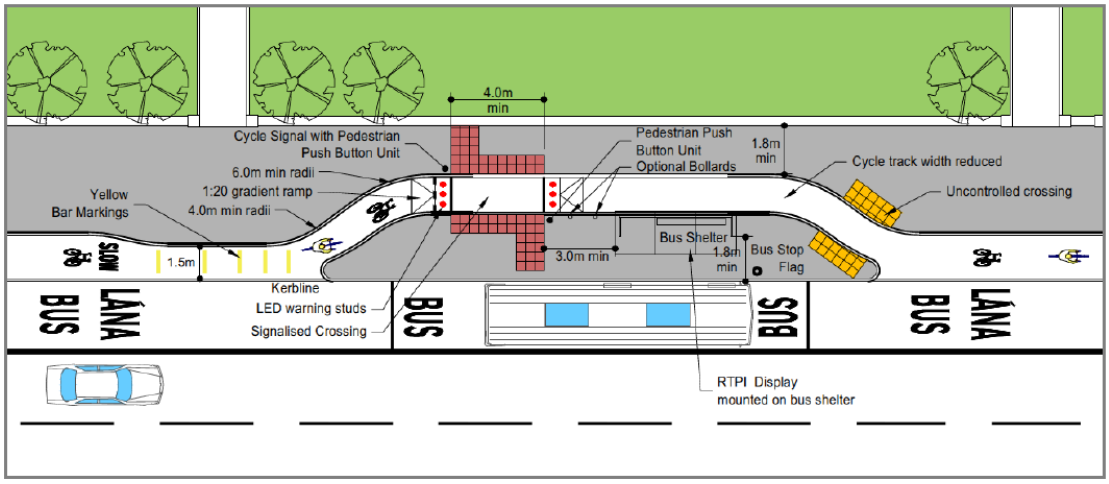
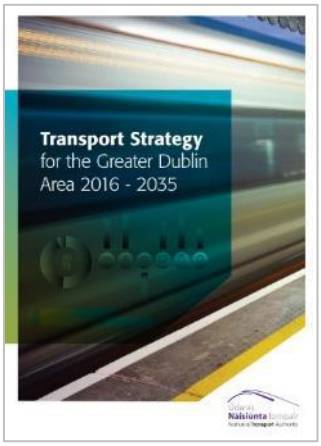


Figure 2-5: Island Bus Stop Arrangement (Source: Preliminary Design Guidance Booklet)

2.8 TRANSPORT STRATEGY FOR THE GREATER DUBLIN AREA (2016-2035)



2.8.1 The purpose of this strategy is '*to contribute to the economic, social and cultural progress of the Greater Dublin Area by providing for the efficient, effective and sustainable movement of people and goods.*'

2.8.2 This transport strategy provides a framework for the planning and delivery of transport infrastructure and services in the Greater Dublin Area (GDA).

2.8.3 There is an onus on the Authority to take full account of current prevailing policies and plans made at central government level, in transport, planning and in other sectors as well as other regional level plans. On review of these policies, the following key messages have emerged:

- Transport must be a key consideration in land use planning;
- In the short term, funding for large scale transport projects will be limited;
- Addressing urban congestion is a priority;
- The capacity of the strategic road network must be protected;

- A significant reduction in the share of trips undertaken by car is required, particularly in relation to short trips and commuter trips;
- An associated increase in walking, cycling and public transport is also required;
- A safe cycling network, with extensive coverage in metropolitan Dublin and in other towns, is needed to cater for the increased use of cycling that is already occurring and to reduce the dominance of the private car in meeting travel needs;
- The enhancement of the pedestrian environment, including measures to overcome severance and to increase permeability, is a priority.

2.8.4 In terms of cycle infrastructure, the GDA cycle network plan proposes to expand the urban cycle network to over 1,485km in length and will provide over 1,300km of new connections between towns in the rural areas of the GDA.

2.8.5 The need for a safe cycling network is recognised and it is intended that many of the key cycling route will be developed as segregated facilities, with cyclists separated from vehicular traffic through the use of kerb separators or by having the cycleway at a higher level than the road carriageway.

2.8.6 In terms of walking and issues raised relating to provision for pedestrians, it is intended to:

- Provide a safer, more comfortable and more convenient walking environment for those with mobility, visual and hearing impairments, and for those using buggies and prams;
- Enhance pedestrian movement along the strategic pedestrian routes by widening footpaths where appropriate, providing better surfacing and by removing unnecessary poles, signs, street cabinets, advertising and other street clutter;
- Revise road junction layouts, where appropriate, to provide dedicated pedestrian crossings, reduce pedestrian crossing distances, provide more direct pedestrian route and reduce the speed of turning traffic;

- Cooperate with other agencies in the enforcement of laws in relation to parking on footpaths;
- Ensure that permeability and accessibility of public transport stops and stations for local communities is maintained and enhanced.

2.9 DRAFT TRANSPORT STRATEGY FOR THE GREATER DUBLIN AREA 2022-2042

2.9.1 The Draft Greater Dublin Area Transport Strategy 2022-2042 has arisen from a review of the original 2016 strategy. The updated document *"sets out the framework for investment in transport infrastructure and services over the next twenty years".*

2.9.2 The overall aim of the Transport Strategy is *"To provide a sustainable, accessible and effective transport system for the Greater Dublin Area which meets the region's climate change requirements, serves the needs of urban and rural communities, and supports economic growth".*

2.9.3 Four primary objectives have been identified as part of the Draft Greater Dublin Area Transport Strategy 2022-2028. These are:

- **An Enhanced Natural and Built Environment -** To Create a better environment and meet our environmental obligations by transitioning to a clean, low emission transport system, reducing car dependency, and increasing walking, cycling and public transport use.
- **Connected Communities and a Better Quality of Life –** To enhance the health and quality of life of our society by improving connectivity between people and places, delivering safe and integrated transport options, and increasing opportunities for walking and cycling.
- **A Strong Sustainable Economy –** To support economic activity and growth by improving the opportunity for people to travel for

work or business where and when they need to, and facilitating the efficient movement of goods.

- **An Inclusive Transport System –** To deliver a high quality, equitable and accessible transport system, which caters for the needs of all members of society.

2.9.4 With regards to cycling, the Strategy acknowledges the growth in cycling in the Greater Dublin Area since the mid-2000s and the need to provide a coherent network of cycle facilities linking origins and destinations to cater for trips within communities. Measured for cycling outlined in the Strategy of particular relevance to this scheme include:

- **Measure CYC1 – GDA Cycle Network** It is the intention of the NTA and the local authorities to deliver a safe, comprehensive, attractive and legible cycle network in accordance with the updated Greater Dublin Area cycle Network.
- **Measure CYC2 – Cycle Infrastructure Design** It is the intention of the NTA to ensure that cycle infrastructure in the GDA provides an appropriate quality of service for all users, through the implementation of the design guidance contained in the latest version of the National Cycle Manual.

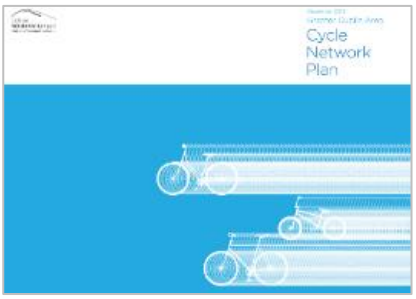
2.9.5 In terms of walking, the Strategy highlights the importance of good quality pedestrian facilities while recognising that walking forms some part of most journeys. Plans to provide a better walking environment include:

- Improving footpaths to ensure they are of sufficient width, adequately lit, serve both sides of the road in most urban areas, have good quality surfacing and are free of unnecessary clutter.
- Improving junctions to reduce the distance pedestrians have to cross and the number of times they must stop and wait during a crossing.
- Optimising crossing times for pedestrians at signalised junctions.
- Installing additional pedestrian crossing points where requirements are identified.
- Expanding and improving wayfinding systems.

2.9.6 The draft of the Transport Strategy is currently out for public consultation until 17th December 2021.

2.10 GDA CYCLE NETWORK PLAN (DECEMBER 2013)

2.10.1 The GDA Cycle Network Plan is a document, prepared on behalf of the National Transport Authority, that identifies and determines a consistent, clear and logical cycle network within the Greater Dublin Area.



2.10.2 The plan aims to ensure that cycling as a transport mode is supported, enhanced and exploited in order to achieve strategic objectives and reach national goals. The steps undertaken within the plan include the following:

1. Collate existing and planned network information;
2. Undertake quality of service review;
3. Identify gaps in existing network;
4. Cycle travel demand assessment;
5. Develop cycle network plan;
6. Target quality of service for routes;
7. Develop design concepts.

2.10.3 These seven steps proposed are in line with the National Cycle Manual methods for designing a Cycle Network.

2.10.4 The GDA Cycle Network map, shown in Figure 2-6, outlines the proposals for the Greystones area, which route through the Redford Park Junction. This shows that there is a proposed primary/secondary route (G1) along the R761 NB arm that extends back into Greystones Town. This route joins into the Inter-Urban route (W4) at the Redford Park junction that continues along the R761 SB arm into Bray. The Blacklion Manor Road and Redford Park are proposed as Feeder routes that connect the primary and secondary cycle network together.

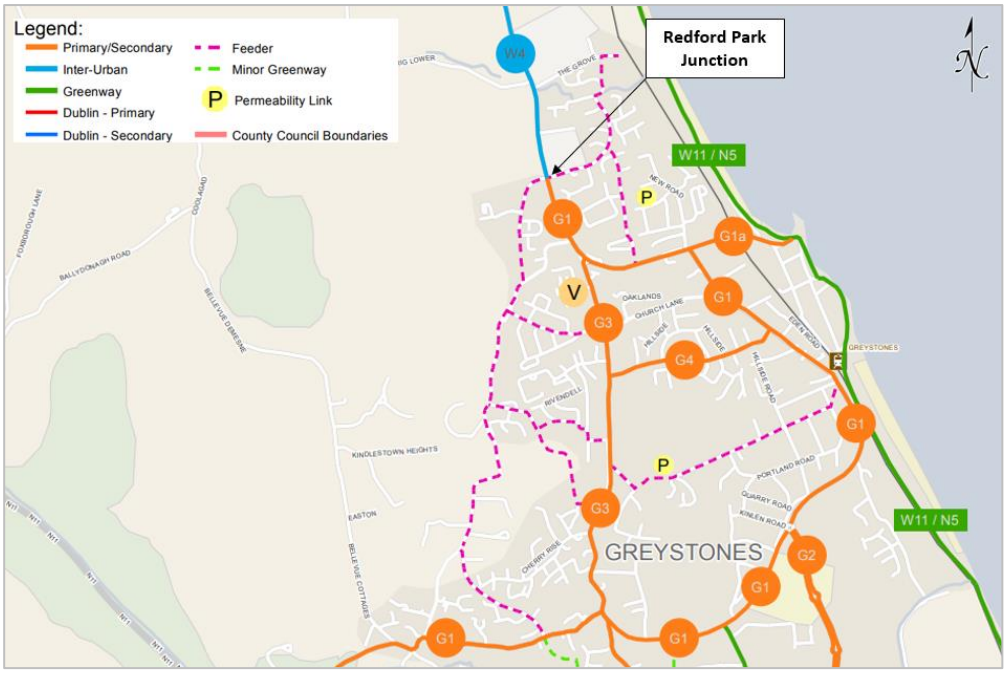
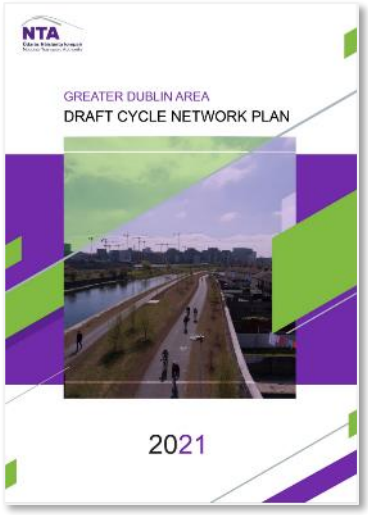


Figure 2-6: GDA Cycle Network Plan for Greystones
(Source: GDA Cycle Network Plan)

2.11 DRAFT GDA CYCLE NETWORK PLAN 2021

2.11.1 The Draft Greater Dublin Area Cycle Network Plan 2021 has arisen as an update to the original 2013 plan, with input from local authorities within the GDA.



2.11.2 While the original 2013 GDA Cycle Network Plan focuses on identifying the routes required to provide an adequate network for cyclists, the updated 2021 plan seeks to enhance and strengthen local accessibility and permeability.

2.11.3 As part of the updated Plan, four manageable goals have been identified to create and improved and inclusive cycle network. These goals are as follows:

- Increase participation;
- Improve safety and accessibility;
- Improve connectivity;
- Create a navigable and coherent network.

2.11.4 The GDA Cycle Network map, shown in Figure 2-7, outlines the proposals for Greystones, including the proposed scheme junction.

2.11.5 Both the Blacklion Manor Road and R761 propose a Secondary Cycle Route along its length. The Draft plan only outlines the Strategic Network, therefore, the local Redford Park arm is not included within this plan at this level.

Figure 2-7: Draft 2021 GDA Cycle Network Plan for Greystones (Source: Draft GDA Cycle Network Plan 2021)

2.12 WICKLOW COUNTY COUNCIL DEVELOPMENT PLAN (2016 – 2022)

2.12.1 The vision for County Wicklow is to be a cohesive community of people enjoying distinct but interrelated urban and rural environments. With regard to transportation, the vision is to integrate lane use planning with transportation planning with the aims of reducing the distance that people need to travel to works, shops, schools and places of recreation and social interaction, facilitating the sustainable transportation of goods and the delivery of improved public transport.

2.12.2 The provision of walking and cycling routes within and connecting towns and villages to each other forms an essential part of a linked-up transport system, involving a variety of transport modes, where public transport can be availed of.

2.12.3 The objective for walking and cycling within the development plan are:

TR9 – To improve existing or provide new foot and cycleways on existing public roads, as funding allows.

TR10 – to require all new regional and local roads to include foot and cycleways, except in cases where shared road space is provided.

TR11 – To facilitate the development of foot and cycleways off road in order to achieve the most direct route to the principal destination while ensuring that personal safety, particularly at night-time, is of the utmost priority.

TR12 – To encourage the provision of secure covered bicycle-parking facilities at strategic locations such as town centres, neighbourhood centres, community facilities and transport nodes.

TR13 – To facilitate the development of cycling and walking amenity routes throughout the County.

3.0 EXISTING CONDITIONS

3.1 INTRODUCTION

3.1.1 This section of the report discusses the existing conditions of the road network surrounding the proposed Redford Park Junction Improvement Scheme including the traffic, pedestrian and cycling environment.

3.2 EXISTING JUNCTION LAYOUT

Road Layout

3.2.1 The Redford Park junction is a 4-arm signal controlled junction. The road network surrounding the junction is illustrated in Figure 3-1 below.

Figure 3-1: R761 / Blacklion Manor Road / Redford Park Junction

3.2.2 The R761 is a Regional Road in County Wicklow that routes in a north–south direction from Rathnew, through Kilcoole and Greystones before terminating in Bray. At the Redford Park Junction, the R761 has a speed limit of 50kph with one lane in each direction on approach to the junction. At the junction, both the northern and southern arms are allocated with one long lane and one flare lane for right turning vehicles.

Figure 3-2: R761 Regional Road at the Redford Park Junction

3.2.3 The Blacklion Manor Road is a recently constructed distributor road in Greystones. The road runs over a short distance, approximately 800m, and connects Chapel Road to the Redford Park Junction. The road operates with the function to provide for new development in the north western side of Greystones.

3.2.4 The road typically takes the form of a single general traffic lane in both directions. At the junction, the road provides one long lane for straight and right turning traffic and one flare lane for left turning vehicles.

Figure 3-3: Blacklion Manor Road

3.2.5 The Redford Park road is a residential access road situated on the north eastern side of Greystones. The road is approximately 7m in width and has one lane in both directions at the junction.

Figure 3-4: Redford Park

Cycle Facilities

3.2.6 There are off road cycle tracks in place along the Blacklion Manor Road. These are located on both sides of the road. Bollards are located along this road in the vicinity of the schools in order to provide protection for cyclists from vehicles parking here.

3.2.7 The off road cycle facilities come on road on approach to the Redford Park junction with bollards provided on the southern side for additional protection measures.

3.2.8 It is noted that the cycle lane along the Blacklion Manor Road on approach to the junction is located in between the left and right turning traffic lanes, as illustrated in the image in Figure 3-5.

Figure 3-5: Cycle Facilities along Blacklion Manor Road

3.2.9 There are no cycle facilities currently on the R761 Regional Road or the Redford Park road.

Pedestrian Facilities

3.2.10 There are footpath facilities on all roads approaching the Redford Park Junction with signalised pedestrian crossings on all arms. Footpaths at the junction are narrow in places considering the high volume of pedestrian activity from the three schools along Blacklion Manor Road, as shown in Figure 3-6.

Figure 3-6: High Volume of Pedestrians at Redford Park Junction

3.3 TRAFFIC SURVEYS

3.3.1 Traffic count data was obtained from WCC for the junction. This data was taken directly from the traffic controller with traffic volumes taken for the 26th November 2019 which represented a mid-week period during school operating times.

3.3.2 Shown in Figure 3-7 below are the AM (08:00 – 09:00) and PM (16:00 – 17:00) peak hour traffic flows through the Redford Park junction.

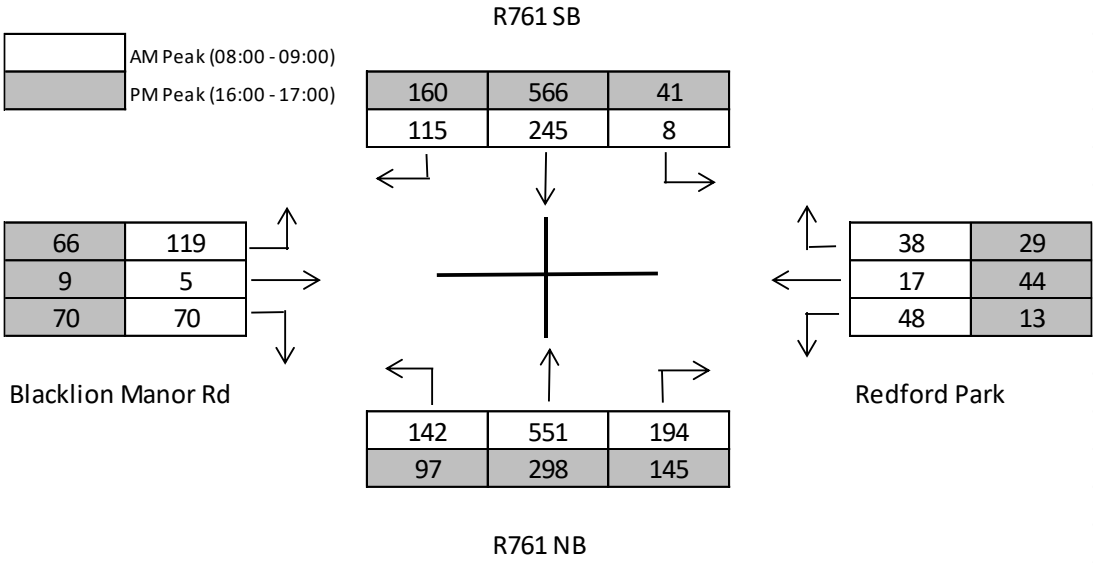


Figure 3-7: 2019 AM and PM Peak Traffic Flows for Redford Park Junction

3.3.3 Results for the AM peak hour show a high level of vehicular flow on the R761 NB arm with a total of 887 vehicles. Traffic flow for the R761 SB arm is lower in the AM peak as compared with the PM peak, showing a total vehicular flow of 368 in the AM peak and 767 in the PM peak.

3.3.4 The Blacklion Manor Road arm and the Redford Park arm show low traffic flows in both peak hours.

3.4 EXISTING TRAFFIC CAPACITY

3.4.1 A traffic model was developed for the Redford Park junction in order to determine the existing capacity at the junction. The TRL Software TRANSYT was used for the analysis. The junction was tested for the AM peak (08:00 – 09:00) and the PM peak (16:00 – 17:00). Results for the analysis for the AM peak hour and PM peak hour are outlined in Table 3-1 and Table 3-2 respectively.

Table 3-1: AM Base TRANSYT Results for the Redford Park Junction

AM Base Signalised Junction 2020 08:00 - 09:00						
Time Segment	**Arm**	**Traffic Stream**	**Degree of saturation (%)**	**Mean Delay per Veh (s)**	**Mean max queue (PCU)**	**Mean max queue (m)**
08:00-09:00	Redford Park	Straight, Left, Right	43	66.07	4.2	23
	Blacklion Manor Road	Left	22	42.09	3.63	20
		Straight, Right	22	53.78	2.66	15
	R761 NB	Straight, Left	76	33.26	27.88	153
		Right	26	13.74	2.04	11
	R761 SB	Straight, Left	27	27.3	7.43	41
		Right	15	17.52	2.54	14

Table 3-2: PM Base TRANSYT Results for the Redford Park Junction

PM Base Signalised Junction 2020 16:00 - 17:00						
Time Segment	**Arm**	**Traffic Stream**	**Degree of saturation (%)**	**Mean Delay per Veh (s)**	**Mean max queue (PCU)**	**Mean max queue (m)**
16:00-17:00	Redford Park	Straight, Left, Right	36	63.92	3.42	19
	Blacklion Manor Road	Left	12	40.54	2.01	11
		Straight, Right	23	54.02	2.8	15
	R761 NB	Straight, Left	43	27.8	12.67	70
		Right	19	15.76	2.02	11
	R761 SB	Straight, Left	66	35.92	22.55	124
		Right	21	17.81	3.03	17

3.4.2 Results show that during the AM peak hour, queuing is evident within the junction, in particular, on the R761 NB arm with a Degree of Saturation (DOS) of 76% and an average queue length of 27.8pcu which equates to 153m. It was noted on site during the AM peak hour that this arm does queue back. Results show that during the PM peak hour, the junction operates overall within capacity. Queueing is evident, however, on the R761 SB arm with a DOS of 66% and an average queue length of 22.5pcus which equates to 124m average queue length.

3.5 EXISTING PUBLIC TRANSPORT

3.5.1 Dublin Bus currently operates a bus route (84) through the Redford Park junction. This service routes between Newcastle and Blackrock, travelling through Kilcoole, Greystones and Bray. This service operates daily on an hourly basis.

3.5.2 Transport for Ireland operates a bus route (No.184) through the Redford Park junction along the R761 in a north to south direction. This service operates between Bray Train Station and Newtownmountkennedy, serving the Greystones Train Station and Delgany. This service operates daily and runs every 30 minutes approximately.

3.5.3 As part of the proposed Bus Connects scheme, there are a number of local and peak time services that are proposed to route from Greystones and along the R761 through the Redford Park junction, continuing to Bray and the City Centre. These services, as displayed in Figure 3-8, are the following:

- ***Route L1:*** This is a Local Route that loops between Greystones and Bray, routing through Newcastle in a clockwise direction.

- ***Route L2***: This is a Local Route that loops between Greystones and Bray, routing through Newcastle in an anticlockwise direction.
- ***Route X1 & X2:*** These are Peak Only/Express Routes. Route X1 routes through Kilcoole, Southern Cross and the City Centre. Route X2 route through Newcastle, Kilcoole, Southern Cross and the City Centre.

Figure 3-8: Bus Connects Proposals for Greystones

3.5.4 At present, there are two bus stops located on the R761 in close proximity to the junction which have been included as part of the upgrade of the Redford Park Junction.

3.5.5 The current layout of the bus stops result in a number of issues for pedestrians and cyclists. The bus stops are located on both sides of the R761 south of the Redford Park junction as shown below in Figure 3-9.

Figure 3-9: Location of Bus Stops included in Junction Design

3.5.6 As shown in Figure 3-9, the bus stops are located on both the outbound (travelling northbound along the R761) and the inbound (travelling southbound along the R761) sides of the R761. Figure 3-10 illustrates the existing layout of these bus stops.

Outbound Bus Stop (R761 NB arm)

Inbound Bus Stop (R761 NB arm)

Figure 3-10: Existing Layout for the Outbound and Inbound Bus Stops on the R761

3.5.7 As shown in Figure 3-10, the outbound bus stop currently operates as an 'In-Line' type of stop where buses stop within the traffic lane in order to pick up and disembark passengers. The inbound bus stop also operates as an 'In-Line' type of stop. This bus stop has recently been improved to provide temporary widening of the path area to accommodate the high volume of pedestrians waiting and walk along here.

3.5.8 It has been noted on site that there are a number of constraints and issues at these stops, these are the following:

- **Location of bus stops**: The bus stops are located very close to the Redford Park signalised junction. When a bus stops at these stops during peak hour periods, cars tend to block back for a short period while passengers board and alight from the bus.
- **Availability of Land**: Although land is available both sides of the road carriageway, this is restricted on the Outbound side by company buildings and on the Inbound side by a residential property.
- **Lack of cycle facilities**: There are no current cycle lane facilities that run along the R761 through the bus stops. It is a requirement in this scheme to accommodate improved facilities for pedestrians and cyclists, which includes cycle lane facilities along this section of the R761.

3.6 EXISTING HORIZONTAL & VERTICAL ALIGNMENT

3.6.1 The R761 runs in a southerly direction through the Redford Park junction and follows a straight downhill alignment from 36mAod to 32mAod. Redford Park approaches the junction from the east and follows a straight uphill alignment from 30.5mAod to 33mAod. Blacklion Manor Road approaches the junction from the west and curves from the south before meeting the junction at a straight downhill alignment from 34.6mAod to 33mAod.

3.7 SURFACE WATER DRAINAGE

3.7.1 All surface water run off within the Redford Park junction will discharge to an existing Wicklow County Council (WCC) 450mm diameter surface water sewer which discharges to an existing stream located to the south of the junction. There is also an existing 225/300mm surface water sewer located in Blacklion Manor Road which discharges to the 450mm surface water sewer in the Redford Park junction.

3.8 FOUL WATER DRAINAGE

3.8.1 Foul water drainage records from Irish Water received from Wicklow County Council show an existing 300mm uPVC foul sewer which runs from the south east corner of the Redford Park junction towards Redford Park to the east.

3.9 UTILITIES

3.9.1 Water supply records from Irish Water received from Wicklow County Council show an existing 6-inch uPVC watermain located in Redford Park to the east which connects to a 6-inch asbestos watermain located in the R761 and runs to the south. These records also show a 100mm uPVC watermain located on the opposite side of the R761 with runs all the way through the junction.

3.9.2 A number of utility companies records were reviewed in order to determine the existing utilities in the Redford Park Junction and within the immediate environs. The following records were determined:

- There is an existing Eir line in each one of the approaches to the Redford Park junction. There are 4nr Eir chambers located within the junction.
- Gas Networks Irelands records show an existing 125PE medium pressure distribution pipe located within each of the 4 approaches to the Redford Park junction.
- ESB records show an existing MV/LV underground cable located within Blacklion Manor Road, Redford Park and in the northern portion of the R761. These records also show LV overhead lines located in the northern portion of the R761. An existing ESB chamber is also located in the southwestern corner of the junction.
- Virgin Media records show ducting located in the south western corner of the junction and a Virgin Media chamber is located here also.

3.10 ROAD COLLISION STATISTICS

3.10.1 As part of this assessment, the Road Safety Authority (RSA) road collision database was reviewed in order to ascertain the safety record along the proposed scheme route.

3.10.2 The data reviewed on the website covers a 12-year period from 2005 – 2016 inclusive and indicates basic information on all reported incidents. It is noted

that information relating to reported collisions for the years 2017 to present are not yet available on the RSA database website.

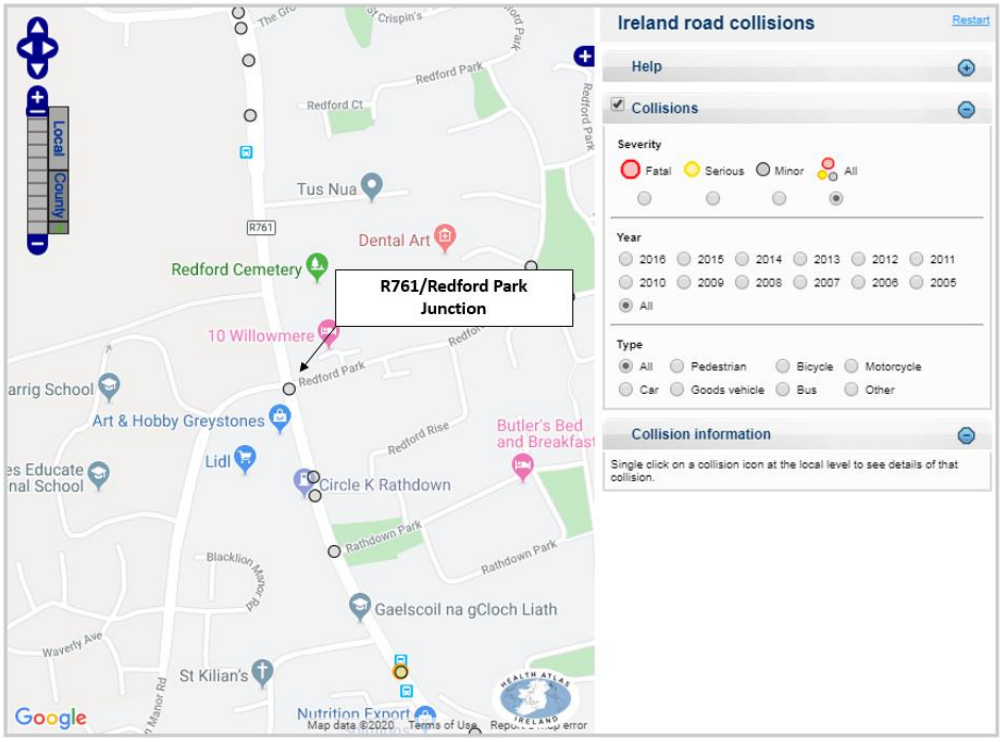


Figure 3-11: RSA Road Collision Database 2005 – 2016 (Source: RSA)

3.10.3 The graph in Figure 3-11 outlines that between the years of 2005 – 2016 there has been one collision recorded at the Redford Park junction. This collision, involving a rear end with a car, occurred in 2010 and was classed as minor in severity.

4.0 PROPOSED SCHEME DEVELOPMENT

4.1 INTRODUCTION

4.1.1 This section discusses the proposals for the scheme with regard to the improvements to the pedestrian and cycle network, the road network, as well as any requirements for utility and water services.

4.1.2 The overall proposals comprise an upgrade to the existing Redford Park junction in order to improve vehicular movement along the road as well as provide enhanced pedestrian and cycle facilities through the junction.

4.1.3 An Options Report, undertaken as part of this scheme design and provided in **Appendix C** of this report, detailed three design options for consideration at the Redford Park Junction, these were the following:

- Option 1: Continental Roundabout;
- Option 2: Improved Signalised Junction;
- Option 3: Cycle Protected Signalised Junction.

4.1.4 Following a detailed assessment that included a Multi-Criteria Analysis, the emerging preferred design option taken forward for Preliminary Design was Option 3; Cycle Protected Signalised Junction, as illustrated in Figure 4-1.

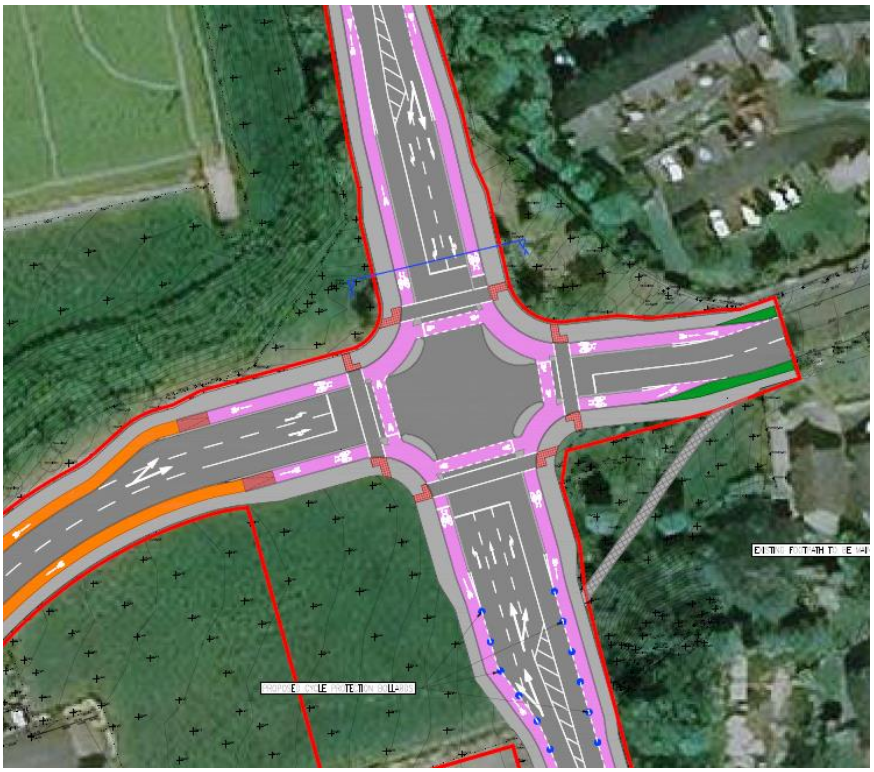


Figure 4-1: Overall Scheme Layout for Redford Park Junction

4.1.5 Detailed in the following sections are the design proposals for the Redford Park junction improvement scheme.

4.2 JUNCTION NETWORK PROPOSALS

4.2.1 The proposals for the Redford Park Junction comprise the upgrade of the existing signalised junction to incorporate proposals for pedestrian and cycle improvements through the junction.

4.2.2 This includes cycle lanes with kerb protection on the R761 and Blacklion Manor Road arm of the junction. Kerb protection along the cycle lane provides additional safety and protection measures for cyclists from vehicular traffic. Cycle lanes are proposed on the Redford Park arm on the approach to and departure of the junction only.

4.2.3 Protected islands are proposed at the corners of the junction. These islands have the purpose of protecting cyclists as they travel through the junction, in particular, in relation to possible conflict with left turning vehicles.

4.2.4 Upgraded footpaths and crossings are proposed at the junction for improved pedestrian movement. The footpaths have been increased to 3m width through the junction to cater for the high pedestrian demand resulting from three schools within close proximity to the junction.

4.2.5 It is noted that the concept for a Cycle Protected Signalised Junction is relatively new in Ireland. The National Transport Authority (NTA) have developed a signal and staging plan for Protected Signalised Junctions as part of the BusConnects Scheme. This staging plan will be adopted as part of this proposed junction and will be reviewed and updated as required as per NTA guidance. The staging plan proposed for the Redford Park junction is detailed within the Options Report provided in **Appendix C** of this report.

4.2.6 It is noted that an analysis assessment for the proposed cycle protected junction was undertaken as part of the Option Development of this scheme with the assessment and results provided within the Options Report appended to this report in **Appendix C**. Overall, the analysis showed that the junction performs similarly to the existing situation within the junction. Queueing does occur along the R761 arms during peak periods as in the existing scenario, however, the junction does operate within capacity for both the AM and PM peak hour.

4.3 PROPOSED HORIZONTAL & VERTICAL ALIGNMENT

4.3.1 All approaches to the junction are to be widened to accommodate new 2m wide cycle tracks on both sides of the road. Additionally, the southern approach will be widened to include an additional left turning flare lane from the R761 to Blacklion Manor Road.

4.4 PROPOSED ROAD LIGHTING

4.4.1 Public lighting is proposed on all sides of the junction and is to be located within the back of footpath.

4.5 TRAFFIC CALMING

4.5.1 Physical traffic calming measures are not proposed on approach or within the proposed junction arrangement. Traffic lanes on approach to the junction are proposed at 3m width which will have the effect of slowing vehicular traffic on approach to the junction. Pedestrian crossings are proposed on all arms of the junction. Protected islands will also increase the awareness of drivers for the presence of cyclists through the junction, in particular, left turning drivers.

4.6 PROPOSED DRAINAGE

Surface Water Drainage

4.6.1 Run-off collected from the updated junction will discharge to the existing 450mm WCC surface water sewer as is currently the case. Existing road gullies will be relocated with the existing spurs being utilised. Any new road gullies will connect to the existing 450mm diameter WCC surface water sewer.

4.7 PROPOSED UTILITIES

4.7.1 Existing utilities at the junction will be diverted to facilitate the proposed scheme.

4.8 PROPOSED BOUNDARY TREATMENT

4.8.1 The proposed junction will utilise the majority of space provided within the existing junction. The junction will impede slightly into the existing grass verges surrounding the junction. The boundary treatment surrounding the junction will remain unchanged as per the existing scenario.

4.8.2 The proposed bus stop improvements will not impact on the existing boundary treatments on either side of the R761.

4.8.3 A Stage 1 Road Safety Audit was undertaken for the junction and bus stop design proposals. This audit report is provided in Appendix D of this report.

5.0 ENVIRONMENTAL ASSESSMENT

5.1 APPROPRIATE ASSESSMENT SCREENING

5.1.1 Altemar Marine & Environmental Consultancy were commissioned to carry out a screening for Appropriate Assessment for this scheme. The full report is contained within **Appendix B** of this report with a summary outlined below.

5.1.2 The AA Screening report contains information required for Wicklow County Council to undertake a screening for Appropriate Assessment. It provides information on and assesses the potential for the proposed development to impact on the Natura 2000 network.

5.1.3 The AA Screening stage examines the likely significant effects of the project, either on its own, or in combination with other plans and projects, upon a Natura 2000 site and considers whether, on the basis of objective scientific evidence, it can be concluded, in view of best scientific knowledge and the conservation objectives of the relevant European sites, that there are not likely to be significant effects on any European site.

5.1.4 The report outlines that no Natura 2000 sites are within the zone of influence of this development. Having taken into consideration the effluent discharge from the proposed development works, the distance between the proposed development site to designated conservation sites, lack of direct hydrological pathway or biodiversity corridor link to conservation sites and mixing within the marine environment, it is concluded that this development would not give rise to any significant effects to designated sites. The construction and operation of the proposed project will not impact on the conservation objectives of features of interest of Natura 2000 sites.

5.1.5 The report presents a Stage 1 Appropriate Assessment Screening for the Proposed Development, outlining the information required for the competent authority to screen for appropriate assessment and to determine whether or not the proposed development, either alone or in combination with other plans and projects, in view of best scientific knowledge, is likely to have a significant effect on any European or Natura 2000 site.

5.1.6 On the basis of the content of the report, the competent authority is enabled to conduct a Stage 1 Screening for Appropriate Assessment and consider

whether, in view of best scientific knowledge and in view of the conservation objectives of the relevant European sites, the proposed development, individually or in combination with other plans or projects is likely to have a significant effect on any European site.

5.1.7 The report concludes that there is no possibility of significant impacts on Natura 2000 sites, features of interest or site specific conservation objectives. A Natura Impact Statement is not required. In carrying out this AA screening, mitigation measures have not been taken into account. Standard best practice construction measures which could have the effect of mitigating any effects on any European Sites have similarly not been taken into account.

5.2 EIAR REQUIREMENTS

5.2.1 Screening is the process of assessing the requirement of a project to be subject to an Environmental Impact Assessment Report (EIAR), based on the project type, scale and on the significance or environmental sensitivity of receiving environment.

5.2.2 The overriding consideration in determining whether a road scheme should be subject to an EIAR is the likelihood of significant environmental effects. Significant effects may arise by virtue of the type of road scheme, the scale or extent of the road scheme and the location of the road scheme in relation to sensitive environments.

5.2.3 In interpreting which projects are likely to have significant environmental effects, the EIAR Directive lists those projects for which the EIA is mandatory and those projects for which an EIAR may be required.

5.2.4 The legal requirements for EIA of a road development are defined in the Roads Act (1993) as amended by the Planning and Development Act (2000 – 2017) and regulations made under the Roads Acts & Planning Acts.

5.2.5 Table 5-1 provides an overview of the legislative requirements that determine whether a road scheme will require an EIA. With reference to the proposed Redford Park Junction Improvement Scheme, the Annex I and Annex II projects have been reviewed with the relevant roads projects outlined and assessed below.

Table 5-1: List of relevant Annex I & Annex II Projects requiring EIA

Annex I & II Projects	Comparative Assessment	EIA Required
Annex I (7)(b) – Construction of Motorways and Express Roads	The proposed scheme is not a motorway	No
Annex I (7)(c) – Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road or realigned and/or widened section of road would be 10 km or more in a continuous length.	Proposed Scheme does not propose the construction of a new road.	No
Annex II (10)(b) - Urban development projects, including the construction of shopping centres and car parks	Proposed scheme does not propose any construction of large scale car parks or shopping centres	No

5.2.6 With reference to Table 5-1, the proposed scheme is sub threshold in all cases and therefore does not require a mandatory EIAR with reference to the Roads Act and also Schedules 5 & 7 of the Planning & Development Regulations (2001 – 2017).

5.3 ARCHAEOLOGICAL & BUILT HERITAGE CONSTRAINTS

5.3.1 A desktop study was undertaken with reference to the Archaeological and Built Heritage environment surrounding the proposed scheme extents. The purpose of this was to evaluate any potential impact of the proposed scheme on the archaeological and architectural heritage within the area and to propose mitigation measures to avoid or reduce any adverse impacts if necessary. Figure 5-1 below illustrates the location of both the National Inventory of Architectural Heritage (NIAH) sites and the National Monuments Service sites in relation to the Redford Park junction.

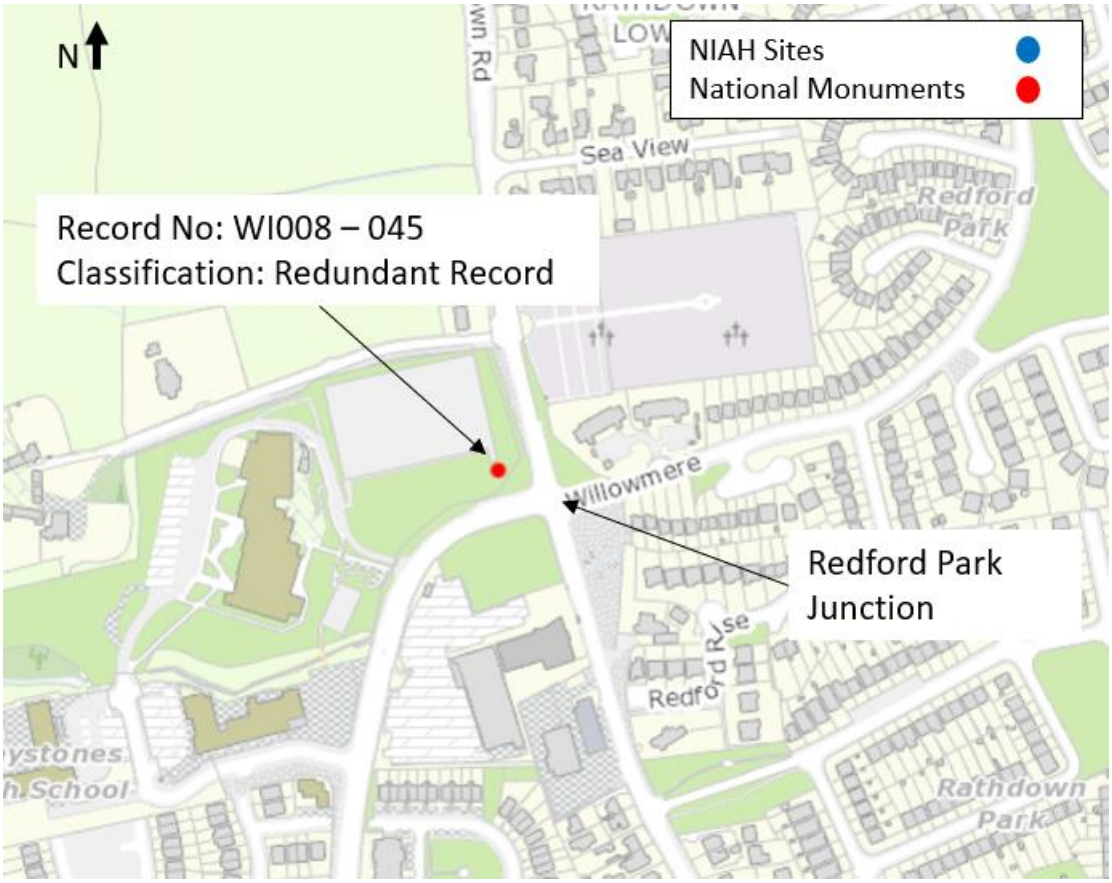


Figure 5-1: Location of NIAH and National Monuments within proximity to the Redford Park Junction

5.3.2 Figure 5-1 outlines that there are no NIAH sites in proximity to the Redford Park junction. There is one National Monument site located close to the junction, however, from the records, this is classed as a 'Redundant Record'. This monument is described as a possible enclosure noted in 2003, however, archaeological testing of the area in 2005 did not produce anything of archaeological significance.

5.3.3 Based on the desktop study of the area, it is not envisaged that the proposed junction improvement scheme will directly impact on any archaeological or architectural site of national importance.

6.0 SUMMARY

6.1 SUMMARY OF REPORT

6.1.1 DBFL were commissioned by Wicklow County Council (WCC) to prepare a Part 8 Design Report for the R761/Redford Park/Blacklion Manor Road Junction (Redford Park Junction) improvement scheme.

6.1.2 The overall scheme aims to deliver an upgrade to the existing signal-controlled Redford Park junction which is located within the Redford area of Greystones in County Wicklow. The upgrades will consist of improvements for pedestrians and cyclists with the upgrade of footpaths and inclusion of protected cycle track facilities through the junction, as well as an improvement to public transport through the upgrading of two existing bus stops in the immediate vicinity of the junction.

6.1.3 A number of policy documents were reviewed as part of this scheme in order to provide guidance and inform the overall scheme design. Documents reviewed include the National Cycle Manual (NCM), Design Manual for Urban Roads and Streets (DMURS), the Draft Preliminary Design Guidance for BusConnects Core Bus Corridors as well as the Wicklow County Council Development Plan. These guidance documents outline the requirement for schemes to provide improved safe environments for vulnerable road users, in particular, for pedestrians and cyclists.

6.1.4 The existing layout of the junction includes a 4 arm signal controlled junction. Traffic volumes are moderate to high through the junction, in particular during peak hour times. There are a number of amenities surrounding the junction including schools and retail centres. There are footpaths and pedestrian crossings located on all arms of the junction. There are currently no cycle facilities through the junction or along the R761. There are cycle facilities on the Blacklion Manor Road arm of the junction.

6.1.5 There is a 450mm diameter surface water sewer that discharges to an existing stream in close proximity to the Redford Park junction. There is also a 300mm uPVC foul sewer that runs in close proximity to the junction. Other utilities surrounding the junction include Eir, ESB and Virgin Media.

6.1.6 The RSA collision database outlines that between the period of 2005 – 2016, there has been one collision at the junction, this occurred in 2010 and was minor in nature.

6.1.7 In terms of the proposed junction design, a detailed options assessment and report was undertaken (shown in **Appendix C** of this report) in order to determine the preferred junction improvement layout for the Redford Park junction. An MCA was undertaken for three potential options with the Cycle Protected Junction emerging as the preferred option.

6.1.8 The cycle protected junction will provide protected kerbs and islands within the junction to provide improved safety for cyclists travelling through the junction. Pedestrian facilities will also be upgraded with 3m footpaths through the junction.

6.1.9 The bus stops, located to the south of the junction along the R761, will be upgraded to include cycle tracks behind the bus stops on both sides of the road. These upgraded bus stops align with the current NTA design guidance.

6.1.10 In terms of proposed surface water, run-off collected from the updated junction will discharge to the existing 450mm WCC surface water sewer as is currently the case. Existing road gullies will be relocated with the existing spurs being utilised. Any new road gullies will connect to the existing 450mm diameter WCC surface water sewer.

6.1.11 Altemar Marine & Environmental Consultancy were commissioned to carry out a screening for Appropriate Assessment for this scheme. The full report is contained within **Appendix B** of this report. The report concluded that there is no possibility of significant impacts on Natura 2000 sites, features of interest or site specific conservation objectives. A Natura Impact Statement is not required.

6.1.12 An EIA screening assessment was undertaken in order to determine whether the scheme was subject to a mandatory EIAR. The scheme is seen to be sub-threshold and therefore does not require a mandatory EIAR.

6.1.13 A desktop study was undertaken with reference to the Archaeological and Built Heritage environment surrounding the proposed scheme extents. Based on the desktop study of the area, it is not envisaged that the proposed

junction improvement scheme will directly impact on any archaeological or architectural site of national importance.

APPENDICES

APPENDIX A- PART 8 DRAWINGS

APPENDIX B- AA SCREENING REPORT

APPENDIX C- REDFORD PARK OPTIONS REPORT

APPENDIX D- STAGE 1 ROAD SAFETY AUDIT REPORT