



Project  
CYCLE NETWORK PLAN  
FOR WATERFORD CITY AND ENVIRONS

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Volume 1 : Main Report

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### Waterford Sport Partnership

- Pauline Cunningham

### Waterford Institute of Technology

- Elaine Greenan
- Elaine Mullan

### Local National Schools

Principal, staff and pupils at the following schools;

- Gaelscoil PhortLairge
- Holy Family School
- Newtown Junior School
- Our Lady of Lourdes National School
- Our Lady of Good Council National School
- Presentation Girls National School
- ScoilLorcain Boys National School
- St Declans Boys National School
- St Stephens Boys National School
- St Marys Boys National School
- St Pauls Boys National School
- St Ursula's Girls National School
- Waterpark National School

### Local Secondary Schools

Principal and staff at the following national schools

- Abbey Community College
- De La Salle College
- Mount Sion CBS
- Newtown School
- Our Lady of Mercy
- Presentation Secondary School
- Waterpark College

### Key Local Business and Employers

- Bausch & Lomb Ireland
- Genzyme Ireland Ltd
- Shaws Department Store
- Teva Pharmaceuticals
- Waterford University Hospital

## FOREWARD

The requirements of the private motor car have been the principal focus and prioritisation of the planning and design for transportation requirements in Ireland over the last five to six decades. An unintentional yet adverse impact of this approach has been the creation of urban environments that suppress walking and cycling, in addition to public transport use, across all sectors of society.

Unfortunately much of Waterford's transport infrastructure has been designed and built on the assumptions that (a) almost everyone has access to car, and (b) the urban road network can accommodate the continued growth of private motorised traffic. It is now increasingly recognised that neither of the each assumptions are true. Accordingly existing conditions and associated travel practices are unsustainable.

The Environmental Protection Agency (EPA) reports that in 2009 this imbalanced approach has influenced the emergence of a transport sector that accounts for over 21% of Ireland's carbon emissions. This sector relies extensively on ever more expensive yet depleting oil reserves.

Experience reveals that switching from motorised transport to cleaner, healthier travel practices, particularly for shorter journeys, can make a significant contribution towards tackling these issues. Such a shift can provide significant benefits for both public health and the liveability of the numerous communities' across Waterford City and Environs. In addition, a modal shift resulting in the greater utilisation of sustainable active modes of travel, such as walking and cycling, has the potential to offer significant savings on health and environmental costs.

Best practice guidance demonstrates that there is enormous potential for changing people's travel behaviour. In the context of the following 2011 'Waterford City' travel characteristics, and the acknowledgement that cycling can provide a viable mode of travel for journeys up to between 4 km and 9 km (or even more); clearly the potential for increasing cycling levels across Waterford City and its environs is significant.

- **Travel to Work** : 46% travel 4km or less (72% 9km or less)
- **Travel to Primary School** : 81% travel 4km or less (97% 9km or less)
- **Travel to Secondary School** : 63% travel 4km or less (77% 9km or less)
- **Travel to College** : 74% travel 4km or less (94% 9km or less)

Influenced by the last two generations focus upon designing environments in response to the requirements of the private motor car, the number of people cycling in Ireland has decreased. Whilst this trend has been experienced in many countries, including Denmark and the Netherlands amongst others, Ireland has been slower to respond.

With only 2% of all journeys to work, school and college in Waterford City being undertaken by bicycle in 2011, cycling may be considered almost 'alien' to many members of the general population. Nevertheless, contrary to many beliefs, a cycling culture has previously been experienced within Ireland. As recently as 1986 over 8% of all journeys to work in Waterford City were undertaken by bicycle, whilst cycling accounted for approximately 19% and 28% of all journeys to / from secondary school and college respectively. Accordingly the promotion of cycling across Waterford and its environs seeks to reintroduce these previous practices.

Experience reveals that one of the key parameters influencing the uptake of cycling is to ensure that our streets and public spaces are suitable for people of all ages and all abilities. To achieve this transformation necessitates a multidisciplinary approach focusing upon the integration of high quality 'fit for purpose' infrastructure with complementary behaviour change measures. The findings of the consultation exercise undertaken as part of this study reinforce the important role that the provision of best practice cycling infrastructure has upon many stakeholders perspective of cycling in Waterford.

Building upon the ever increasing cycling 'revolution' being experienced across a number of areas in Ireland, the policy direction provided by *Smarter Travel: A Sustainable Transport Future* (2009) and the momentum generated following the publication of Ireland's first *National Cycle Policy Framework*, the *Waterford City and Environs Cycle Network Plan* has been commissioned to identify a network of integrated cycle links and nodes with the objective of facilitating the reintroduction of a local cycling culture. The Cycle Network Plan, incorporating dedicated urban, inter-urban and green route networks constitutes one of a number of coordinated initiatives to be implemented with the objective of achieving the following vision as outlined within the National Cycle Policy Framework.

*"The mission is to create a strong cycling culture in Ireland. The vision is that all cities, towns, villages and rural areas will be bicycle friendly. Cycling will be a normal way to get about, especially for short trips. Cycling contributes to improved quality of life and quality of the public realm, a stronger economy and business environment, and an enhanced environment. A culture of cycling will have developed in Ireland to the extent that 10% of all trips will be by bike by 2020."*

Extract from Page 6 of the National Cycle Policy Framework (2009-2020)

## VOLUME 1 :MAIN REPORT

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## CHAPTER 1

# Introduction

## 1.0 INTRODUCTION

### 1.1 OVERVIEW

DBFL Consulting Engineers have been commissioned by Waterford City Council to prepare a Cycle Network Plan for the area defined as Waterford City & Environs. The adopted study area, as graphically illustrated in drawing 132041/9101 (Volume 2) comprises areas until recently administered by the three Local Authorities listed below. Accordingly the Cycle Network Plan is to be consistent with each adjacent plan such that there is continuity of route networks across the traditional administrative boundaries.

- Waterford City Council,
- Waterford County Council and
- Kilkenny County Council

The Brief requires that the Cycle Network Plan shall identify and determine in a consistent, clear and logical manner the following cycle networks within the Waterford City Environs;

- The **Urban Cycle Network** at the Primary, Secondary and Feeder levels,
- The **Inter-urban Cycle Network** linking the relevant sections of the Urban Network and including the elements of the National Cycle Network,
- The **Green Route Network** being cycle routes developed predominately for tourist, recreational and leisure purposes.

The findings of the study and associated Cycle Network Plan recommendations are reported in the following three volumes which together constitute the Cycle Network Plan for Waterford City & Environs.

- **VOLUME 1 : MAIN REPORT.** This report provides a summary of the principal parameters that actively influence the adopted study areas development framework ranging from strategic national policy documentation down to local site specific local area plans. The existing 2013 cycle network is identified and an associated Quality of Service assessment reported. The methodology for planning the future cycle network is outlined with the resulting cycle infrastructure recommendations presented.
- **VOLUME 2 : DRAWINGS.** This volume contains the various drawings that accompany the main report thereby enabling convenient access to the

graphically presented supporting information. Five principal categories of drawings are included which present; (i) The Existing Cycle Facilities, (ii) The Quality of Service score assigned to these existing facilities, (iii) The identified key barriers to cycle mobility across the study area, (iv) The study areas principal land use characteristics, and (v) The recommended cycle network infrastructure proposals.

- **VOLUME 3 : SUPPLEMENTARY INFORMATION.** The third volume presents supplementary information collated by DBFL during the course of the study. In addition to quantifying existing baseline travel trends, background data in regard to the parameters influencing travel behaviour characteristics at National Schools, Secondary Schools, Waterford Institute of Technology and key local employer's is quantified.

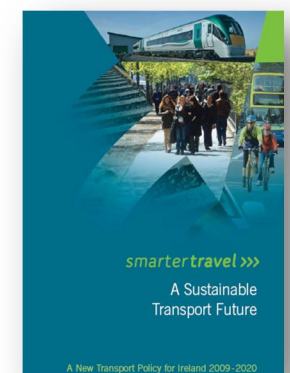
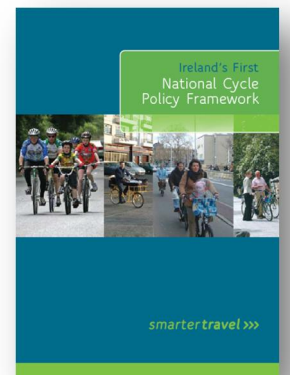
### 1.2 CONTEXT OF STUDY

Over the past two decades there has been a steep decline in cycling across Ireland. With the objective of addressing this recent trend the 'National Cycle Policy Framework, 2009-2020' (NCPF) was published by the Department of Transport in 2009. The framework outlines 19 specific objectives and 109 actions that have been identified with the aim of creating a strong cycling culture in Ireland with a specific aim of, 10% of all journeys being made by bicycle by the year 2020.

The NCPF publication is based on the Government's transport policy for Ireland '2009 - 2020 Smarter Travel - A Sustainable Transport Future'.

The NCPF publication states that a comprehensive range of initiatives including both hard and soft measures are required for a comprehensive approach to encouraging people to cycle. Hard measures are those which relate to planning and infrastructure or 'Engineering Measures' whereas soft measures relate to initiatives focusing upon 'Communication and Education' themed measures.

Stakeholder involvement is considered to be one of the principal criteria influencing the success of the NCPF as is appropriate funding, resources and legislation / enforcement.



The NCPF publication emphasizes that the needs of the cyclist should be considered and presented in all National, Regional, Local and sub-local plans.

### 1.3 BACKGROUND

#### 1.3.1 Sustainable Safety

The National Cycle Manual (NCM) provides guidance on 'integrating the bike in the design of urban areas'. It is recognised that cycling is a vulnerable mode of transport hence the NCM promotes the principles of 'Sustainable Safety'. It presents the five sustainable safety principles which include;



- **Functionality** – *'a design which is fit for purpose is safer'*
- **Homogeneity** – *'reducing the relative speed, mass and directional differences of different road users sharing the same space increases safety'*.
- **Legibility** – *'a road environment that all road users can read and understand is safer'*.
- **Forgiveness**– *'environments that contribute to benign outcomes of accidents are safer'*.
- **Self-Awareness**– *'where road users are aware of their own abilities and limitations to negotiate a road environment, the environment is safer'*.

#### 1.3.2 Cycle Network

A cycle network is simply a collection of connected cycle routes which aims to connect the main home, education, work, commercial and leisure origin / destination catchments. The NCM states that a well designed cycle network will include a hierarchy of corridors. It describes how an urban cycle network can have up to three levels including;

- **Primary Network**– These carry most of the cycle traffic and cross the urban area
- **Secondary Network**–These are links between principal cycle routes and local zones
- **Feeder** – These are cycle routes within local zones and / or connections from zones to the network levels above.

#### 1.3.3 Cycle Network Design

The NCM proposes a seven step process for the planning, budgeting and programming of a cycle network. These steps include;

- 1) Inventory of Existing Cycling Regime
- 2) Understanding Trip Demand and the Potential for Cycling Trips
- 3) Trip Assignment to the Network
- 4) Trip Forecast
- 5) Urban and Transport Planning
- 6) Prioritising Improvements
- 7) Programme, Consultation, Budgets

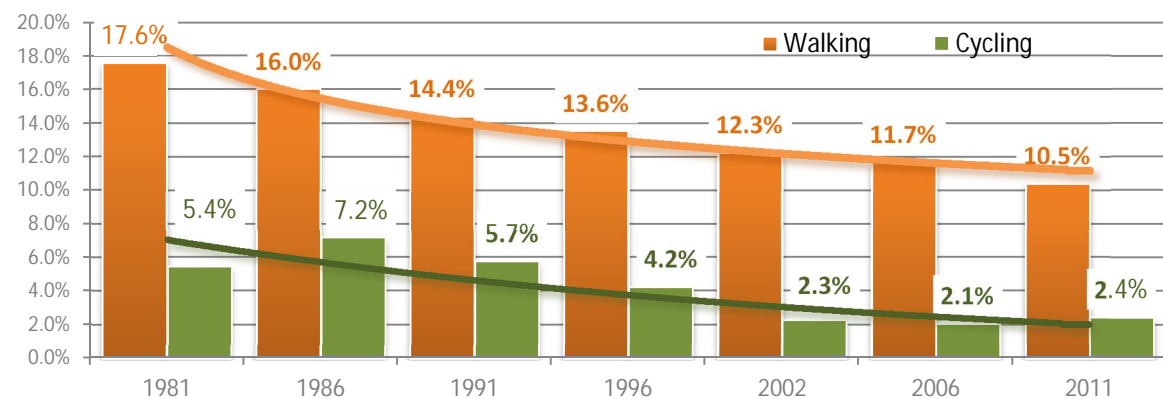
The project prerequisites for Waterford City and Environs Cycle Network Plan study require that DBFL address the first five of these NCM steps. In due course Waterford City Council in partnership with key stakeholders will address the actions associated with NCM steps 6 and 7.

#### 1.3.4 Travel Characteristics and Trends

An understanding of existing local cycle levels, how these current trends compare to previous levels and benchmarking local cycle characteristics against other comparable urban centres provides a valuable insight into local travel practices. An evaluation of such travel characteristics and their adoption as key performance indicators (KPI's) enables the performance and subsequent level of success of initiatives to be quantified over time.

A review of Census data demonstrates that the number of people walking and cycling in Ireland has been continuously declining since 1981. In reference to Graph 1.1 below it is established that walking to work in Ireland has declined from a modal share of 17.6% in 1981, to 10.5% in 2011, representing a decline of approximately 40%. Cycling unfortunately has recorded an even greater decline. In 1986 cycling recorded a modal share for travel to work journey purpose of 7.2% whilst in 2011 this had fallen to approximately 2.4%. This represents a decline of approximately two thirds over this 25 year period. This national trend in the decline of active travel is repeated throughout Ireland however evidence reveals that Dublin is beginning to reverse this decline with a recorded increase in the number of people cycling to work in 2011.

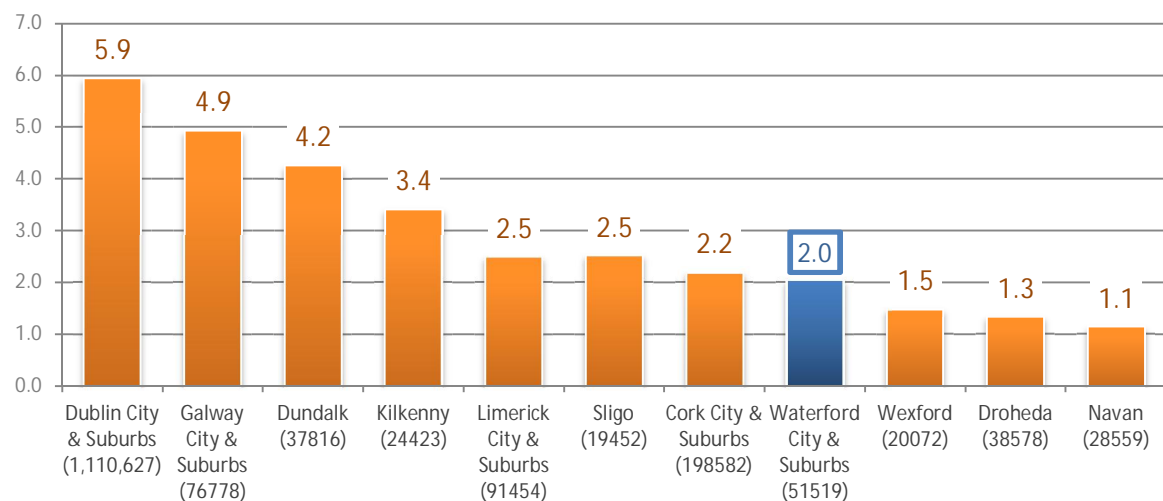




Graph 1.1 : Travel to Work in Ireland - Modal Share (Census Data)

A more details analysis of the 2011 recorded travel to work data reveals significant differences between different urban centres. As summarised in Graph 2.2 below, the utilisation of the bicycle for the journey to work within Waterford (2%) is below the modal share recorded in Sligo (2.5%), Kilkenny (3.4%) and Dundalk (4.2%). Each of these three urban centres have smaller population catchments compared to Waterford. Waterford also records the lowest cycle modal share compared to the outer four cities in the country.

The 2011 census data (journey to work) indicates that the bicycle modal share is 2.5 times higher in Galway and almost 3 times higher in Dublin. Similar performance results (cycle modal share) are recoded in Waterford for the journey to school and college as detailed further in Volume 3.

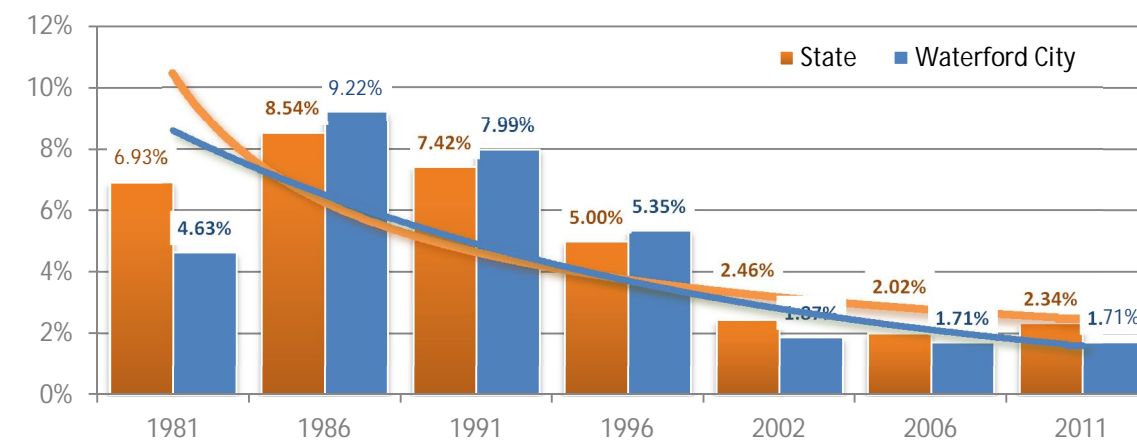


Graph 1.2 : Cycle to Work in Ireland by Urban Area (2011) - Modal Share (%)

Nevertheless, whilst Waterford returned disappointing modal share levels in the 2011 census, it has not always performed so poorly nor exhibited such unsustainable travel practices.

As detailed in Graph 1.3 below the accumulative total for the journeys to work, school and college clearly demonstrate that as recently as 1996 the use the bicycle in Waterford City exceeded the national average. Furthermore, recording a modal share of 7.99% and 9.22% in 1991 and 1986 respectively, Waterford clearly embraced the use of the bicycle.

Such high levels of cycling demonstrate that a strong cycling culture previously existed in Waterford City in recent times. Furthermore it is noted that the 1986 and 1991 cycle modal share levels in Waterford City are just shy of the National Cycle Frameworks 2020 national target of 10% (for all journeys). As a result, through the implementation of the encluse Cycle Network Plan recommendations in parallel with supplementary 'soft' initiatives there is a realistic and viable opportunity to reinstate a strong cycle culture in Waterford City and Environs to the benefit of all its resident's and the local economy.



Graph 1.3 : Cycle to Work, School, Collage - Modal Share (Census)

#### 1.4 STUDY METHODOLOGY

In response to the study's tender documentations specific prerequisites the first five steps (reference Figure 1.1 below) of the National Cycle Manual's (NCM) 'Seven Steps to Planning a Network' are applied however based on previous experience of similar schemes, these five stages have been sub divided further with the identification of 11 key tasks to be addressed by DBFL.

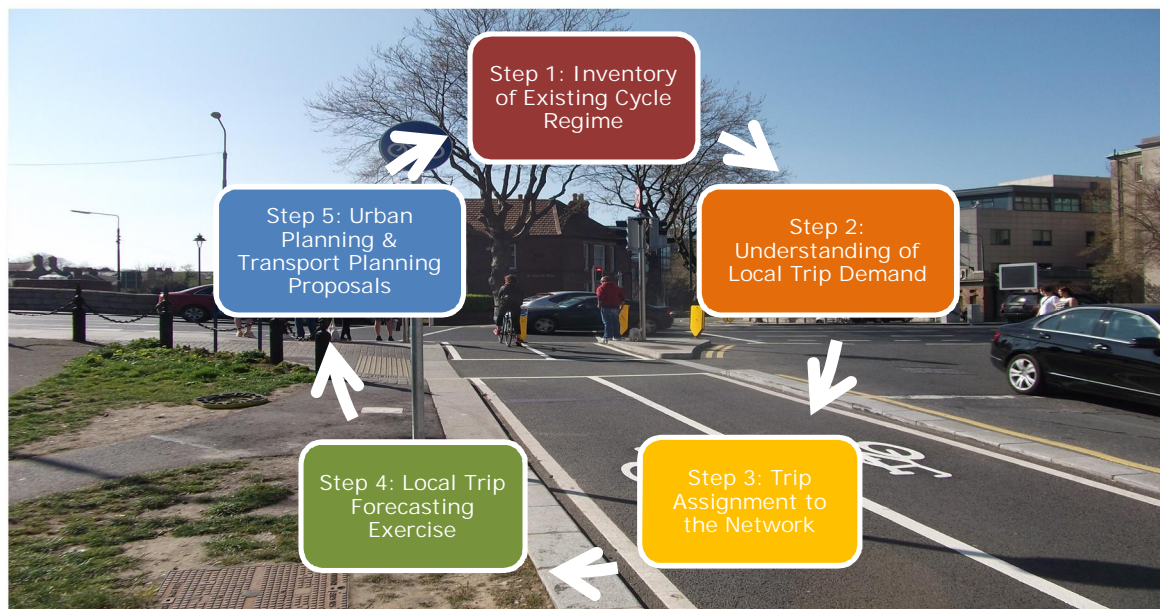


Figure 1.1: NCM 5 Steps to Planning a Network

These 5 NCM steps (or stages) and their relationship with DBFL's project tasks are presented in Table 1.1 below. The final two NCM steps comprising the 'prioritisation' of improvements and schemes (Step 6) and the 'programme, consultation, budgeting' of specific schemes (Step 7) will in due course be undertaken by Waterford City Council and in part will be influenced by the recommendations detailed within this report.

NCM Network Planning Steps	DBFL Project Task	DBFL Task Description
-	Tasks 1 & 2	Inception Meeting, Background Data Review
Step 1	Tasks 3a, 3b, 4	Route Infrastructure Audit, Mapping Exercise,
Elements of Steps 1, 2, 4	Tasks 5, 6	Establishment of Existing Cycle Network Proposals
Step 2	Task 7	Trip Demand Analysis
Step 3	Task 8	Trip Assignment to Network
Step 4	Task 9	Trip Forecast
Step 5	Task 10	Urban & Transport Strategy
-	Task 11	Compile & Issue Study Report

Table 1.1 : Project Tasks

## 1.5 DATA COLLECTION

### 1.5.1 Existing Cycle Facilities

Both Waterford City Council and Waterford County Council have over the last number of years instigated a programme of cycling focused initiatives with the objective of

encouraging and facilitating more people to cycle. One particular initiative of this programme has sought to enhance the local cycling environment through the provision of improved / new infrastructure with the objective of improving road safety levels, increasing the level of priority afforded to cyclists and providing convenient and attractive cycling routes and bicycle parking facilities. Within the Waterford City and Environs Cycle Network Plan (WCECNP) study area (reference drawing 9101 as included within the Volume 2) a number of the more recent cycle infrastructure initiatives include;

- R675 Waterford - Tramore Cycle Tracks,
- R680 Greenroute (Phase 1),
- R683 Richardstown Folly Cycle Lanes,
- R683 Dunmore Rd Greenroute,
- The Tramore Rd Greenway, and
- Kilbary Nature Park amongst others.



An audit of the WCECNP study areas existing cycle infrastructure has been undertaken using background information provided by Waterford City Council and Kilkenny County Council in addition to extensive site audits undertaken by DBFL. As detailed further in Chapter 2 the findings of the on-site audits have been digitised in the form of AutoCAD drawings as included within the accompanying Volume 2 report.

### 1.5.2 Future Cycle Facilities

1.5.3 In addition to the study areas existing on-site cycling facilities a number of other schemes have the potential to significantly influence the identification, planning, design and subsequent emergence of an integrated cycle network across Waterford City and Environs. These include committed cycle schemes, planned cycle schemes and other potential schemes which could provide additional benefits for cyclists.

#### Committed Schemes

1.5.4 These are schemes which have been awarded funding and / or planning but have yet to be physically implemented. The most notable committed schemes in regard to the WCECNP include;

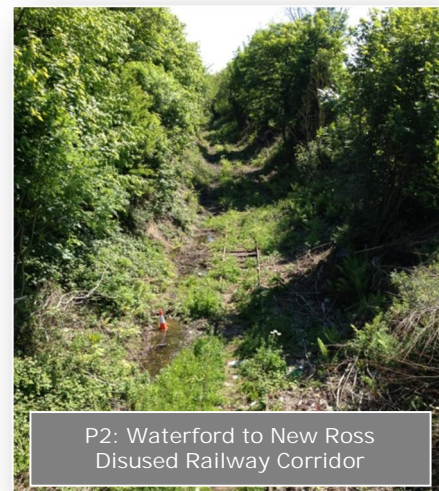
- Phase 2 of the R680 Greenroute,
- St Johns River Greenway,

- The Deise Greenway - Dungarvan to Kilmeaden & Kilmeaden to Bilberry sections
- Clonmel to Carrick-On-Suir Greenway, and
- R685 / R708 Tramore to Waterford Regional Airport Road Realignment Proposals (subject to a very slight redesign to provide greater priority for cyclists over the entire route).

#### Planned Schemes

1.5.5 A number of other schemes have the potential to form an integral element of the WCECNP however such 'planned' schemes as identified by the local planning authorities have yet to be progressed beyond their current policy objective status or feasibility studies. The most notable include;

- Cycle infrastructure aspirations of the current Waterford City Development Plan,
- Cycle infrastructure aspirations of the Ferrybank Local Area Plan (2009) and the subsequent Active Travel Strategy for Ferrybank (2012),
- New Ross to Ferrybank Greenway,
- New Ross to Saint Mullins Greenway.



#### Potential Future Schemes

1.5.6 Further to the cycle network opportunities identified as part of this WCECNP study a number of other potential schemes present opportunities that should be given serious consideration in terms of (a) the development and integration of a regional cycle network, (b) maximising the benefits, potential use and deliverability of routes and facilities that form the local WCECNP, and (c) facilitating a range of cycle tourism products / local routes which in addition to providing strategic access to the southeast retains such visitors in the local area for a longer duration and period of stay. Such opportunities include indicative cycle corridors and routes (and integration with) identified as part of the following studies;

- The River Barrow Corridor; Recreational, Tourism and Commercial product identification Study (2013),
- The National Cycle Network Scoping Study (2010),
- Failte Ireland Strategy for the Development of Irish Cycle Tourism (2007).

## 1.6 CONSULTATION

### 1.6.1 Consultation Exercise

Further to the consultation exercise undertaken with officers from Waterford City Council (Transportation and Planning Departments) and Kilkenny County Council the DBFL project team instigated contact with a number of other key stakeholders with the objective of obtaining their views in regard to the existing cycling environment across the WCECNP study area and opportunities regarding how WCECNP could address existing concerns with the objective of making cycling more attractive. Whilst more details of the consultation exercise are provided in both Section 4.1 and within the Volume 3 report the following paragraphs indicate the scale of the consultation undertaken.

### 1.6.2 Consultation with Primary Schools

A total of 21 national schools located within the WCECNP study area were contacted by DBFL. Following an introduction in regard to the objectives of the WCECNP, each school was requested to complete two separate questionnaires. From a management perspective the school principal or nominated staff member provided answers in regard to queries about the existing local cycling environment and issues encountered with encouraging pupils to cycle to school. In parallel a 'class' focused 'hand-up' survey was undertaken to establish pupils existing travel characteristics.

In total 67% of the schools returned completed questionnaires for DBFL to analyse. These 14 schools represented a total of 3,672 school children. The consultation exercise established that whilst a significant level of enthusiasm is clearly evident at each school, fears in regard to road safety issues and the absence of dedicated cycling infrastructure segregated from road traffic is a substantial barrier for both school children and their parents.

### 1.6.3 Consultation with Secondary Schools

Similar to the consultation exercise undertaken with the Primary Schools, a total of 9 Secondary Schools within the WCECNP study area were contacted by DBFL and requested to participate in the consultation exercise. The Secondary Schools were provided with a total of three different types of questionnaires. Whilst school

'management' and 'class' hand-up focused surveys were undertaken as per the approach utilised at the national schools, individual pupils were also provided with an additional 'infrastructure' preference questionnaire. The pupils were requested to identify their individual preferences for specific types of cycle route infrastructure particularly regarding the likelihood that each type would encourage them to cycle. A total of 7 Secondary Schools (78%) returned completed questionnaires to DBFL representing a total of 3,470 secondary school pupils from the WCECNP study area. An analysis of the returned secondary school data clearly demonstrates a clear preference for segregated cycle routes, with paved surfaces, away from motorised vehicles.

### 1.6.5 Employer Consultation

At the project inception meeting DBFL were requested to identify and contact a number of key local businesses who could be approached with the objective of quantifying employee's constraints and issues in regard to commuter cycling. In addition to staff at Waterford City Council, a total of 9 local businesses / large employers were approached by DBFL. Five of these 9 large organisations availed of the opportunity to part-take in the consultation exercise. Excluding the responses received from the Waterford City Council staff, these 5 external organisations account for a total of 4,120 (one-way) commuter trips undertaken across the WCECNP study area.

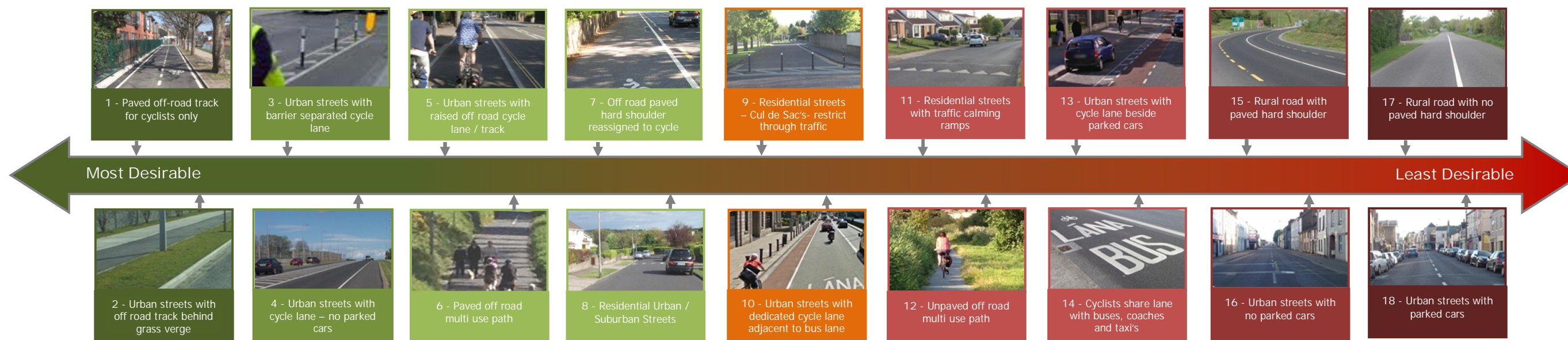


Figure 1.2 : Secondary School Pupils Cycling Infrastructure Preferences

### 1.6.4 Third Level Education Consultation

In response to the number of students and staff based at the Waterford Institute of Technology (WIT) and the five campus facilities dispersed across WCECNP study area, WIT were identified as one of the principal stakeholders whose demand profile and accessibility requirements should be actively considered throughout the course of this study. In addition to the valuable insight provided by WIT staff regarding existing and future travel demand characteristics, 50 students responded to the 'cycle infrastructure preference' questionnaire. The responses offer an insight into third level student's preferences regarding the type of cycle infrastructure that could, in parallel with other initiatives, encourage them to consider cycling for local trips. The analysis summarised in Volume 3, informed the cycle infrastructure decision process reported in Chapter 4.

### 1.7 FORMAT OF REPORT

- 1.7.1 Chapter 2 presents an overview of the existing cycle network facilities within the WCECNP study area. The results of existing networks "Quality of Service" assessment are also presented whilst the safety record of the local transportation network is quantified in terms of the number and type of incidents recorded involving cyclists.
- 1.7.2 The 5 NCM steps undertaken as part of the identification and planning of the future cycle network for the subject study area are outlined in Chapter 3.
- 1.7.3 Finally Chapter 4 provides a summary of the key components of the future cycle network and introduces a number of supplementary recommendations to complement the implementation of the WCECNP.



## CHAPTER 2

# Existing Cycle Route Network

## 2.0 EXISTING CYCLE ROUTE NETWORK

### 2.1 OVERVIEW

This chapter provides an overview of the existing cycle network within the WCECNP study area. In addition to background data provided by Waterford City Council and Kilkenny County Council the following material has been compiled based upon extensive site audits undertaken by DBFL.

### 2.2 EXISTING CYCLE FACILITIES IN WATERFORD CITY COUNCIL AREA

#### 2.2.1 Existing Cycle Network in Waterford City

The WCECNP study area currently benefits from a number of dedicated cycle facilities in response to a concerted effort by both Waterford City and County Councils to enhance local conditions for cycling over the last five years. Unfortunately this existing network could be best described as being ‘fragmented’ and doesn’t quite provide integrated seamless linkages between the major trip origins and destinations. Nevertheless the existing network elements form a good base for what can potentially become a comprehensive network thereby improving cycling conditions, road safety, and the general attractiveness of cycling within Waterford City and its environs.

The existing ‘patchwork’ cycle network within WCECNP study area is predominantly concentrated on the outskirts of the city centre. Due to the combination of narrow streetscapes and the significant demand for on-street car parking there is little opportunity to implement formal cycle facilities without introducing a compromise for other road users and local residents and businesses. Accordingly at present the cycling environment within the core city centre, with the exception of recently implemented ‘greenroute’ facilities operate as informal ‘shared’ links with cyclists required to use the same road carriageway as motorised vehicles. During peak periods of the day traffic congestion can result in slow traffic speeds which could potentially be conducive for cyclists however the historical narrow streetscapes, compounded by on-street parking in places, can restrict accessibility for cyclists seeking to travel along such corridors.



#### 2.2.2 Existing Dedicated Cycle Infrastructure in Waterford City

An audit of the cycling infrastructure confirms that the WCECNP study area currently comprises a variety of different types of cycling infrastructure as detailed in Drawings 9201 through to 9209 as included in Section 2 of the Volume 2 report. In reference to the different types of cycle route infrastructure facilities (Section 2 of Volume 3) the on-site audits established that the following 7 types of dedicated cycle infrastructure can currently be found across the WCECNP study area;

- **Type 1c** On-road mandatory cycle lanes (adjacent kerb edge),
- **Type 1d** On-road advisory cycle lanes (adjacent kerb edge),
- **Type 1h** On-road advisory cycle lanes beside parked cars,
- **Type 1j** Shared cycle / bus lanes,
- **Type 1n** Off-road cycle track behind grass verge,
- **Type 1p** Off-road cycle track behind verge or raised (footpath/cycle track at same level)
- **Type 4c** Paved off-road multiuse path (adjacent to road).

A full description of different cycling infrastructure types is presented in Section 2 of Volume 3. The majority (56%) of the existing cycle infrastructure making up Waterford City’s existing cycle network comprises on-road advisory cycle lanes (Type 1d). The quantum (or length) of the existing cycle network infrastructure elements is summarised in Table 2.1 below.

Route Category	On-Road Cycle Lanes (one-way)	Off-Road / Segregated Cycle Tracks	On-Road Shared Cycle/Bus Lanes	Greenways
Link Type	1c, 1d, 1h,	1n, 1p	1j	4c
Sub Total (km)	25.63	21.23	1.26	3.85
Total (km)	51.97			

Table 2.1: WCECNP Study Area - Existing Cycle Infrastructure Types and Lengths



### 2.2.3 Cycle Parking Provision

Presently there are approximately 80 dedicated on-street public bicycle parking spaces available in Waterford City Centre. These facilities, provided by Waterford City Council, are located in the general positions illustrated in Figure 2.1 below and Drawings 9201 through to 9209 as included in Section 2 of the Volume 2 report.



Figure 2.1: Existing City Centre Cycle Parking Spaces

Four generic types of cycle parking are currently provided. Whilst Type A and D both incorporate 'Sheffield Stands', type A also provides a degree of weather protection as illustrated in photograph P6 below. Similarly type B parking also incorporates weather protection however this type can prove a challenge for some due to the requirement to lift the bicycle into a vertical position. Furthermore with only the front wheel secured some cyclists do not favour this type of facility. Type C performs a dual function providing a facility to secure a bicycle to in addition to an important traffic management role. With one exception on the main campus (Sheffield stands with weather protection) the remaining bicycle parking facilities at each of the 5 WIT campuses use 'butterfly' stands within which a bicycle wheel can be supported. Such facilities unfortunately offer minimum benefits in terms of bicycle protection.



### 2.3 EXISTING FACILITIES IN WATERFORD COUNTY COUNCIL AREA

#### 2.3.1 Waterford to Tramore Corridor

The R674 Waterford to Tramore road corridor benefits from good quality on-road cycle tracks as provided along both sides of the road carriageway. Formed using the old hard shoulder and benefiting from a narrow road marking segregation treatment these facilities have proved very successful particularly for the leisure and cycle training users.



#### 2.3.2 Outer Ring Road Corridor

A shared pedestrian / cycle path is provided continuously along the length of the Outer Ring Road (Waterford City side of ORR corridor) between Williamstown Road Roundabout and the WIT West Campus Roundabout. Between Butlerstown Roundabout and the WIT West Campus Roundabout a shared pedestrian / cycle path is provided along both sides of the corridor however the width of the facility is notably narrower over this section. In addition shared pedestrian / cycle paths are provided from the WIT West Campus Roundabout on the ORR through the campus as far as the main buildings overlooking the River Suir.



#### 2.3.3 R680 Cork Road Corridor

During 2013 Waterford County Council implemented shared pedestrian / cycle paths along both sides of the R680 road corridor between Butlerstown Roundabout and the Holy Cross public house.

### 2.4 EXISTING FACILITIES IN KILKENNY COUNTY COUNCIL AREA

#### 2.4.1 Ferrybank Area Cycling Infrastructure

Ferrybank incorporates areas governed by both Waterford City Council and Kilkenny County Council. Aspirations to extend the R680 Greenroute concept along the length of

the Ferrybank dual carriageway between Rice Bridge and Rockshire Road have yet to be developed into firm proposals. As a result only the area under the jurisdiction of Kilkenny County Council currently benefits from dedicated cycle facilities which are only evident in a small number of isolated locations.

There is approximately a 200m section of cycle track located adjoining the R711 New Ross Road (southwest bound direction only) along the frontage of the Ferrybank Shopping Centre (P9). This off-road cycle track has been constructed at the same level as the adjoining footpath (differentiated by material treatment) and separated from the road carriageway by a narrow grass verge.



Segregated off-road cycle tracks (P10) are provided along both sides of the main access road to / from the Clover Meadows residential development. Unfortunately these off-road tracks terminate close to the New Ross Road roundabout and do not continue around this heavily trafficked R711 roundabout.



A narrow shared walk / cycle facility (P11) has also been provided on both sides of the Newrath Road / Sally Park dual carriageway over a distance of 1.8 km. However, with the exception of the sign indicating the presence of a cycle track (opposed to a shared walk / cycle facility) and the absence of any transition measures for cyclists the intended function of this facility is somewhat ambiguous.



#### 2.4.2 Belview Area Cycling Infrastructure

As part of the initial site development / road access improvements completed by the IDA for the Belview Science and Technology Park a 1.4km length of off-road cycle track has been provided. Differentiated by colour treatment / road markings and separated from the road carriageway by a grass verge this narrow two-way facility has been provided along one side of the road carriageway north/south through the 'Park' and eastwards as far as the N29 corridor.



## 2.5 QUALITY OF SERVICE ASSESSMENTS

### 2.5.1 Introduction

A Quality of Service (QOS) assessment has been undertaken in regard to the existing cycle network found within the WCECNP study area. QOS is a measure of the degree to which the needs of cyclists are met. The assessment has been carried out in accordance with the guidelines set out in the National Cycle Manual. The following sections describe how the five QOS criteria have been applied to the existing cycle network in order to obtain a QOS score. The five QOS assessment criteria include;

- Pavement Condition Index (PCI),
- Number of adjacent cyclists,
- Number of conflicts per 100m of route,
- Journey (Junction) time delay,
- HGV influence.

### 2.5.2 Pavement Condition Index (PCI)

PCI is a measure of the physical integrity of the cycle surface. This value has been derived based on a number of physical characteristics of the cycle surface including;

- Drop kerbs at access / egress to cycle lane / path,
- Utility covers creating uneven cycle surface,
- Cycle road markings,
- Cycle surface smoothness,
- Gully direction and construction, and
- Hedgeline obstructions.

A QOS level is associated with a range of PCI scores as shown in Table 2.2 below.

PCI Range	Description	QOS
86-100	Very Good	A+
66-85	Good	A
51-65	Fair	B
41-50	Poor	C
20-40	Very Poor	D

Table 2.2 : Pavement Condition Index QOS Values



### 2.5.3 Number of adjacent cyclists

This is the capacity for cycling two abreast and / or the ability for one cyclist to safely overtake another cyclist. The values for number of adjacent cyclists are based on the cycle lane / path width. Table 2.3 below presents the values incorporated into this assessment. In this table "1 + 1" represents the cycle lane can accommodate 1 cyclist with another overtaking.

Lane Width	No. of Adjacent Cyclists	QOS
2.5m	2 + 1	A+
2.0m	1 + 1	A
1.5m	1 + 1*	B
1.2-1.4m	1 + 0	C
< 1.2m	1 + 0	D

\* Partially using next lane when overtaking

Table 2.3: Number of Adjacent Cyclists QOS Values

### 2.5.4 Number of conflicts

This is a measure of the number of conflicts per 100m of the cycle route. The conflicts considered within this assessment are;

- Junctions
- Bus stops
- Pedestrian Crossings
- Groups of on-street parking / loading bays
- Entrances to apartment blocks and commercial / retail premises

Table 2.4 below presents the QOS level associated with the number of conflicts per 100m of cycle route.

No. of Conflicts / 100m	QOS
0-1	A+
0-1	A
1-3	B
4-10	C
>10	D

Table 2.4 : Number of Conflicts / 100m QOS Values

### 2.5.5 Junction Time Delay

This is a measure of the actual time delay at junctions as a percentage of the overall journey time. It is assumed that cyclists travel at an average speed of 15 km/h. Table 2.5 below presents the QOS level associated with the junction time delay.

Junction Time Delay	QOS
0-5%	A+
6-10%	A
11-25%	B
26-50%	C
>50%	D

Table 2.5 : Junction Time Delay QOS Values

### 2.5.6 HGV Influence

This is a measure of the number of HGV's and buses adjacent to cyclists as a percentage of total traffic during peak hours.

Junction Time Delay	QOS
0-1%	A+
0-1%	A
2-5%	B
6-10%	C
>10%	D

Table 2.6 : HGV Influence QOS Values

The quantum of HGV flows traveling across the study areas road network has been estimated using a range of Waterford City Council and DBFL sourced survey data.

### 2.5.7 Quality of Service Assessment of Existing Cycle Network

Adopting the above methodology and associated criteria DBFL undertook on-site audits of the existing cycling infrastructure in order to evaluate the most appropriate criteria score to apply as each section of the network. The average score for each route section (e.g. 100m) established the routes overall QoS assessment score.

The existing infrastructure recorded results ranging from a QoS score of D up to a B however QoS scores of B and C were found to be the most common result. The findings

of the analysis are detailed further in drawings 9301 to 9309 as included in Chapter 3 of Volume 2.

While the surface quality of the vast majority of cycle lanes / tracks has been in general found to be relatively good, the infrastructure is marked down at locations where;

- 'Advisory' opposed to 'Mandatory' cycle lanes have been provided,
- Where the lanes / tracks are considered narrow being less than 1.5m in width,
- Volume and speed of motorised traffic,
- The quantum of HGV traffic,
- Poorly specified and / or constructed road gully's / inspection chambers (P17),
- Absence of appropriate transition between cycle route sections (P16),
- Obstacles within the cycle route (15), and
- General maintenance issues.

Whilst the NCM recommends that for single file cycling, the lane width should be at minimum 1.75m wide, (as determined from the NCM width calculator assuming a 50kph zone and kerbed road edge), the majority of the existing cycle lanes / tracks in the study area were found to be 1.5m wide or less resulting in the lower QoS scores. The NCM also recommends that shared cycle / pedestrian facilities immediately adjacent to vehicular traffic should have a minimum combined width of 3m. As a result existing shared cycle / pedestrian facilities with a width less than 3m scored poorly despite having a good quality surface and minimum junction time delay. In general, off road facilities and the newest on-road mandatory cycle lanes achieved the highest QoS scores from the assessment.



## 2.6 RECORDED CYCLE COLLISION HISTORY

The collision statistics on the Road Safety Authority (RSA) website were reviewed in order to ascertain the safety record of the network within the WCECNP study area over the most recent six year period. This data includes information for the years 2005 through to 2012 and indicates basic information on all reported incidents.

It is noted that the RSA records detail only those occasions where the incident was officially recorded such as the Garda being present to formally record details of the incident.

### 2.6.1 Recorded Cycle Collision History in Waterford City

As graphically summarised in Figure 2.2 below only 4 incidents involving cyclists were recorded within Waterford City boundary between 2005 and 2012. The RSA graphic suggests that the majority of these incidents occurred on a Wednesday (3 no.) whilst the remaining incident occurred on a Friday. Three of these were classed as minor accidents while the fourth was classed as serious. Table 2.7 below provide the RSA details of the recorded bicycle incidents.

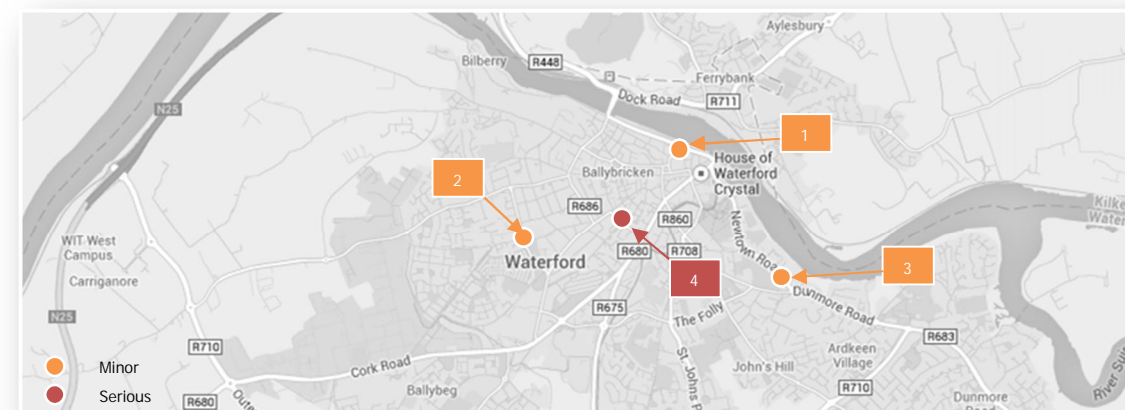


Figure 2.2 : Recorded Accidents Involving Cyclists since 2005

Ref	Year	Vehicle	Circumstances	Day	Time	Severity	Total Casualties
1	2006	Bicycle	Other	Wed	1900-2300	Minor	1
2	2007	Bicycle	Unknown	Wed	0700-1000	Minor	1
3	2011	Bicycle	Pedestrian	Fri	1600-1900	Minor	2
4	2008	Bicycle	Other	Wed	1000-1600	Serious	2

Table 2.7 : Cycle Incidents

## 2.6.2 Recorded Cycle Collision History in County Waterford

An analysis of the RSA collision data for the section of the WCECNP study area that extends into County Waterford confirms that there have been no recorded road traffic incidents involving cyclists between 2005 and 2012.

## 2.6.3 Recorded Cycle Collision History in County Kilkenny

Based on the RSA data there have been no recorded cycling incidents between 2005 and 2012 across the Ferrybank / Belview areas of Kilkenny County.

## 2.7 BARRIERS TO MOVEMENT

### 2.7.1 Types of Barriers

There are a number of reasons why people chose modes other than a bicycle for journeys in Waterford. International research indicates that the principal areas of concern and subsequent barriers to having more people cycling include amongst others;

- **Safety and Security Concerns** – The perceived or actual danger encountered whilst cycling and the security relating to storage of equipment.
- **Lack of Infrastructure and Support** – Insufficient provision of a perceived safe place to cycle and maintenance of cycle lanes / tracks, cycle parking and inter changes with other modes of travel, and
- **Inadequate Urban Design** – Lack of penetrability and connectivity for walking and cycling between urban areas due to the low level of importance afforded to such users in the planning and design of the existing (and potentially emerging) urban environment.
- **Environmental Challenges** – In addition to natural physical obstacles such as rivers, watercourses, and topographical barriers; climatical issues such as wet, cold and hot weather influence the perception of cycling by many individuals.

The findings of the consultation exercise undertaken by DBFL at local educational and employment centres reinforce the findings of the above best practice research with the perception of safety, the absence of appropriate dedicated cycling infrastructure, and journey distance, being identified as the main reasons why the respondents do not cycle to school, college or work in Waterford.

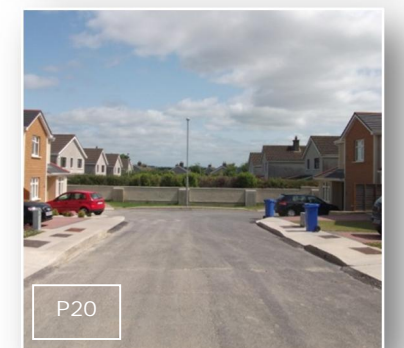
The development and subsequent implementation of the Waterford City and Environs Cycle Network Plan seeks to address many of the reported local 'barriers' to cycling. The

identification of the various components of the Cycle Network Plan seeks to remove or minimise the negative impact of these issues by addressing local natural physical barriers and urban planning barriers. In reference to drawing 1320041-9721 (Volume 2) such barriers to movement, particularly for pedestrians and cyclists, can be categorised as follows;

- Natural physical 'linear' barriers e.g. watercourses or embankments / cliffs.
- Natural physical 'area wide' barriers e.g. Kilbarry Bog pNHA.
- Existing planning induced barriers e.g. segregated developments.
- Potential future planning induced barriers e.g. absence of connectivity.
- Transport Infrastructure 'linear' barriers e.g. railway & strategic road corridors.
- Area 'land holding' barriers e.g. golf courses, large commercial plots etc.

The ability to reintroduce a cycling culture in Waterford is very much dependent upon the removal or at least the minimisation of these various barriers. This will necessitate the implementation of appropriate permeable walk / cycle connections through, around or over these existing constraints to movement. This is not an easy or straight forward task with a number of potential hurdles to be overcome.

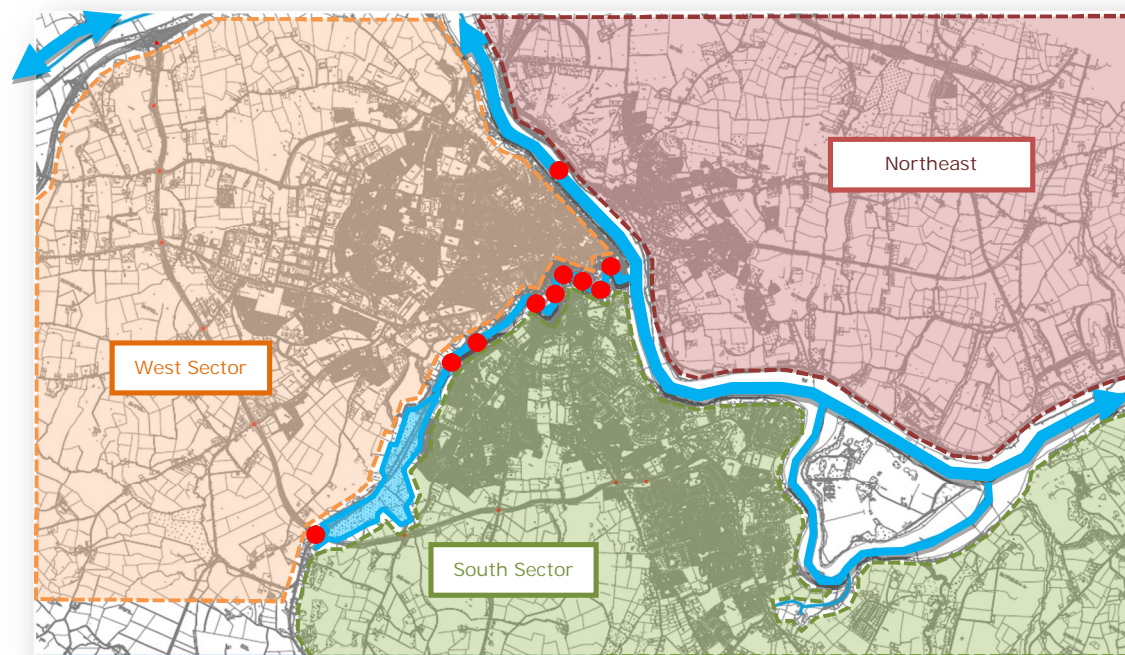
Through the application of a multidisciplinary focused approach an appropriately balanced yet 'sensitive' design can deliver a viable solution. The complexity of some of the above barriers may impact upon the solutions financial cost and / or require a longer implementation period. Nevertheless, in many instances, the elimination of the existing barrier to movement is very much worthy of consideration due to (a) the long term nature of benefits provided, (b) the range of potential economic, health and safety



benefits delivered, and (c) its more than likely to be in the public's interest to provide the new walk / cycle connection.

### 2.7.2 Natural Physical Barriers

Connectivity, and subsequently accessibility levels for walking and cycling, across the Waterford City and Environs study area is influenced by a number of natural physical barriers. The study area can be divided into three distinct sectors as defined by the River Suir and St Johns River (including Kilbary Bog pNHA) as illustrated in Figure 2.3 below and drawing 1320041-9721 (Volume 2).



**Figure 2.3 Natural River Course Boundary's and Sector Connections**

Whilst the Waterford City Development Plan (Objective 6.2.2) includes a policy objective to provide a pedestrian bridge linking the north and south quays (in the general area of The Clock Tower) there is currently only a single cycling connection across the River Suir barrier. This connection facilitated by the Edmund Rice Bridge is both inconvenient and unattractive to many cyclists in addition to being relatively detached from the principal urban areas (existing and zoned) in the Northeast Sector.

The course of St Johns River combined with Kilbary Bog pNHA further divides the study area into two further sectors by creating a natural physical barrier between the West and South sectors. Whilst a total of 10 existing linkages (including four dedicated footbridges) are currently available to 'bridge' this natural barrier these connections are

generally concentrated within the city centre area. As an example, eight of these existing 'bridge' connections are located between Bath St and Scotch Quay with the result of providing the opportunity to afford good levels of accessibility for cyclists in this central area (should these existing connections be made more cycle friendly). Upstream, to the southwest of Wyse's Bridge however there are currently significant distances over which no permeability is provided between existing urban areas / development lands as located either side of St Johns River. The only existing viable connections between the West and South sectors to the southwest of Bath St (between Wyse Bridge and the Outer Ring Road) are the Inner Ring Road and the narrow pedestrian footbridge(s) connecting Tramore Rd with Ashley Ave. Over this 3.55 km length only a single existing cycle connection is available for cyclists to travel between West and South sectors. The absence of linkages over this notable length within the urban area represents a significant barrier to movement resulting in an urban environment with poor connectivity and subsequently low accessibility levels. This environment very much encourages travel by private motorised vehicles and contrary to best practice guidance actually suppresses the viability and subsequent use of active modes of travel such as walking and cycling.

Within each of the study areas three sectors a number of other topographical barriers are present. These additional natural barriers are summarised below, however the scale (extend, size, height or length) or potential to address them through long term urban spatial planning negates the severity of the barrier. Nevertheless to many potential cyclists they remain a potential issue.

- North Sector – topographical barrier formed by the vertical cliff face located along the northern boundary of Plunkett Railway Station. The gradient of the Rockshire Rd corridor.
- West Sector – The gradients of both Summerhill and Quarry Rd.
- South Sector – The gradient of John's Hill (R860), Upper Grange Rd and Richardson's Folly (R709) corridors which represent a challenge to most cyclists.

### 2.7.3 Urban Design and Traffic Management Barriers

The design of our road network and streets has very much been influenced by the requirement of the private motorcar over the last two generations. This has generated a significant impact upon how people interact and use our streets. The car is dominant

with subsequent segregation from pedestrians and cyclists arising from the single focus upon the 'movement' function of the street network and the associated traffic flow and capacity requirements of motorised vehicles.

It is now increasingly acknowledged that this conventional approach to the design of our streets and urban areas creates one dimensional streets which fail to respond to the multifunctional demands placed upon our urban streetscapes. Segregated urban design solutions only increase car dependency and reduce both pedestrian and cycle activity through the creation of disconnected communities.

This problem is highlighted in the Design Manual for Urban Roads and Streets (DMURS) through the use of the example reproduced in Figure 2.4. A typical residential area constructed in accordance with the principals of segregation results in restricted permeability for walking and cycling. As a result the two houses located back to back are actually up to 4.1km walking / cycling distance apart. Unfortunately there are many instances of this DMURS example across the WCECNP study area. Adversely impacting the level of permeability through and connectivity provided between communities' and residential areas comparable examples in Waterford include;

- Grange Heights – Summerville Avenue,
- Grange Heights – Grange Manor,
- Grange Manor – Summerville Avenue,
- Viewmount Park – Earls Court,
- Earls Court – Collins Avenue,
- Grantstown Village – Collins Avenue,
- Ursuline Court – Ursuline Crescent,
- Avondale – Beech Grove,
- Ashley Court – Hillview,
- Hillview – Carn Glas,
- Gracedieu Heights – Hillview,
- Carn Glas - Gracedieu Heights,

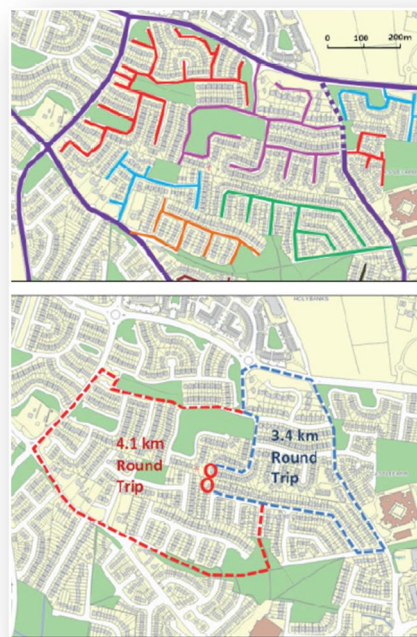


Figure 2.4 : Segregated Areas



- Fairfield Avenue – Lauradell Avenue,
- Cezanne Drive – Cleaboy Avenue,
- Ashbourne – Cezanne Drive,
- Ballinakill Avenue – Ballinakill Downs,
- Grantstown Park – Collins Avenue.



The scale of restrictions upon sustainable mobility between neighbouring residential areas is illustrated by the number of 'Existing Planning Induced Barriers' detailed in Drawing 9721 as included in section 4 (Volume 2). Nevertheless there are also local examples where permeable walk / cycle linkages between communities have been implemented. Such examples, a number of which are introduced below, demonstrate that it is clearly possible to provide such key sustainable connections between different areas for the benefit of the entire community.

- Grantstown Village - Holly Drive,
- Grange Manor – Ardkeen Village,
- Viewmount – Mount Pleasant,
- The Paddocks – Garranmore,
- Ashley Drive – Laurel Park,
- Lauradell Avenue – Gandon Drive,
- Gandon Drive – Cezanne Drive.



Whilst this segmented approach to urban design has left many communities isolated in terms of sustainable accessibility the approach to managing the subsequent rise in vehicular traffic has further compounded the problems encountered by active modes of travel. The conventional approach to traffic management has sought to maximise capacity for motorised traffic. This approach has resulted in a network of roads which are intimidating and unattractive for pedestrians and cyclists in addition to creating unnecessarily longer travel distances. Even within the city centre the conventional approach to traffic management, with on-street car parking and one-way streets creates challenging environments for cyclists which are perceived as being unsafe for cycling by many member of the general public. DMURS states that "*Government policies require a shift away from conventional design solutions towards those which prioritise sustainable modes of transport, safeguard vulnerable users and promote a sense of place. The approach required to achieve these outcomes will be principally based (on) the application of a more integrated model of street design, where real and perceived barriers to movement are removed...*" Whilst this guidance will actively shape new development, the biggest challenge will be to retrofit this policy to the existing urban environment.



## CHAPTER 3

# Future Cycle Network Planning

### 3.0 FUTURE CYCLE NETWORK PLANNING

#### 3.1 INTRODUCTION

3.1.1 In addition to the application of the principals of 'sustainable safety', as introduced previously in section 1.3.1, the specific needs of the cyclists will actively influence the planning of the WCECNP. The priority afforded to each of these needs will fluctuate between areas in response to land use characteristics. The NCM, in addition to international best practice, details the following five core requirements of a cyclist in regard to the planning and design of a cycle network and associated infrastructure;

- **Road Safety** – be safe and perceived as being safe, provide personal security, and limit conflict between cyclists with other road users.
- **Coherence** – Connect all potential origins and destinations, be continuous and recognisable, offer a consistent standard of protection, properly signposted, and include well located and specified bicycle parking facilities.
- **Directness** – be based upon travel desire lines, result in minimal detours or delays, provide a positive advantage in terms of directness and priority over motorised traffic.
- **Attractiveness** – be attractive and interesting, integrate with and complement the surrounding environment, contribute to good urban design, enhance personal security, and be well maintained.
- **Comfort** – be smooth, non-slip, well maintained, drained and free from debris; have sufficient width for the projected level of use; incorporate easy gradients; designed to avoid complicated manoeuvres; enable cyclists to maintain momentum; minimise impacts of noise, spray and headlight dazzle from motorised traffic.

3.1.2 In addition to the above cyclists needs, DBFL believe the 'adaptability' of the route and associated infrastructure should be considered from the outset. Where substantial increases in cycling numbers are projected, either as a result of a modal shift towards sustainable modes of travel, and / or future development increasing the number of trips being undertaken along a particular route corridor, consideration should also be given to the adaptability of infrastructure to accommodate increases in use thereby ensuring a deterioration in quality of service does not arise. Consideration of the 'adaptability' criteria can also ensure financial savings are delivered over the medium / long term.

3.1.3 A final consideration is the different level of significance that each type of cyclist applies to each of these core requirements. As illustrated in Figure 3.1 below, cyclists are drawn from the entire community and exhibit different abilities, journey characteristics and requirements. Furthermore the views of parents will influence if their children cycle.

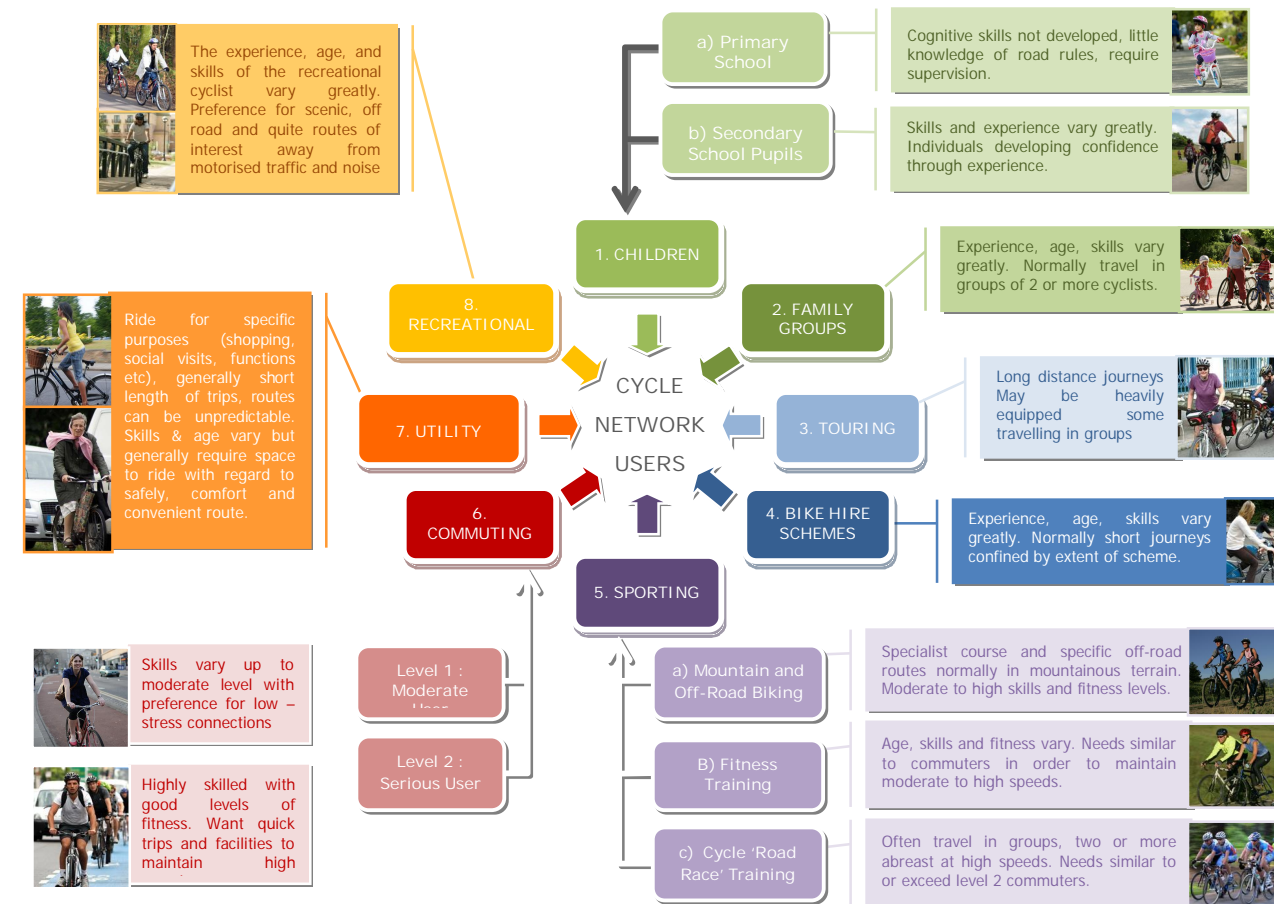
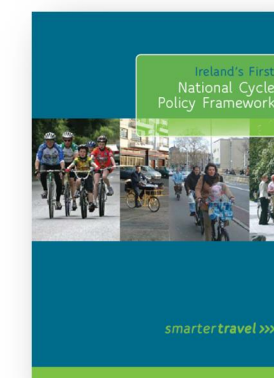


Figure 3.1 : Different Cycle Network Users and Associated Profiles

#### 3.2 STRATEGIC URBAN TRANSPORT PLANNING

##### 3.2.1 National Framework

Over the past two decades there has been a steep decline in cycling across Ireland. With the objective of addressing this recent trend the 'National Cycle Policy Framework, 2009-2020' (NCPF) was published by the Department of Transport in 2009. The framework outlines 19 specific objectives and 109 actions that have been identified with the aim of creating a strong cycling culture in Ireland with a specific aim of, 10% of all journeys being made by bicycle by the year 2020. The NCPF publication is based on the Government's transport



policy for Ireland '2009 – 2020 Smarter Travel - A Sustainable Transport Future'.

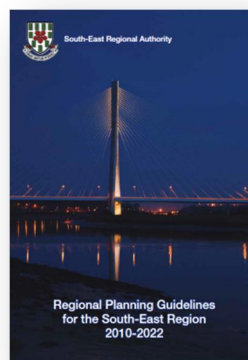
The NCPF publication states that a comprehensive range of initiatives including both hard and soft measures are required for a comprehensive approach to encouraging people to cycle. Hard measures are those which relate to planning and infrastructure or 'Engineering Measures' whereas soft measures relate to initiatives focusing upon 'Communication and Education' themed measures.



Stakeholder involvement is considered to be one of the criteria for the success of the NCPF as is appropriate funding, resources and legislation / enforcement. The NCPF publication emphasizes that the needs of the cyclist should be considered and presented in all National, Regional, Local and sub-local plans.

### 3.2.2 Regional Planning Guidelines (RPGs) for the South-East Region 2010-2022

The Regional Planning Guidelines for the south east region covers Waterford City and the following counties; Waterford, Carlow, Kilkenny, South Tipperary and Wexford. The RPGs 'provide a strategic planning framework for the South-East region with the objective of implementing the National Spatial Strategy at a regional level and achieving balanced regional development.' The RPGs have forecast a population increase for Waterford City & Environs from 56,500 in 2010 to 62,500 in 2022.



It has been identified that in order for the region to function more effectively and to contribute to the National target of cycling to reach 10% of all journeys made by 2020, the high levels of reliance on the private car needs to be reduced to allow a more sustainable transport future to be achieved.

In relation to walking and cycling the RPG policy PPO 5.8 has set the following objectives;-

- 'To support walking and cycling as the mode of first choice for journeys up to 7 kilometres'
- 'To promote and facilitate the sustainable development of cycling and walking facilities in the region'

- 'To promote the development of cycling by construction and improvement of cycle links within the region'

### 3.2.3 Local Development Plans

The local authority development plans of Waterford City Council, Waterford County Council and Kilkenny County Council which cover WCECNP study area all incorporate policy objectives which seek to encourage cycling.

#### *Waterford City Development Plan (2013-2019)*

The Waterford City Development Plan 2013-2019 sets the overall strategy for planning and sustainable development within the administrative area of Waterford City. To allow the realisation of sustainable development, objectives in relation to walking and cycling have been set and include:

*'To provide good connectivity to and within the City and to ensure ease of mobility/access from neighbourhoods to the City Centre, and between neighbourhoods.(POL. 1.1.6)'*

The Plan outlines delivery measures and mechanisms which will allow the policy objectives to be achieved:

*'The provision of improved facilities for cyclists through the development of a network of cycleways as reflected in the Transportation strategy, and the provision of secure cycle parking where permissions are being granted for commercial, residential or institutional developments in the city centre.'*

To encourage a modal shift from private car use to walking and cycling, the Plan identifies specific objectives;-

- 'To provide a citywide cycle network to link all areas of the city to each other via main routes. (OBJ 6.2.1)'
- 'To expand the network to connect the city centre to any proposed North Quay development with a foot/cycle bridge. (OBJ 6.2.2)'
- 'To provide additional dedicated bicycle parking racks as financial resources permit. (OBJ 6.2.3)'
- 'To provide cycle and walking networks between neighbourhood areas, further negating the need for car based journeys. (OBJ 6.2.4)'



To Plan makes reference to a review of the PLUTS which was adopted in 2004, concluding that due to the current economic circumstances, sustainable transport measures that were included within the PLUTS, although still viable, the delivery dates will not be realised by 2020.

*Waterford County Development Plan (2011-2017)*

Similar to the Waterford City Development Plan, the Waterford County Plan sets out the overall strategy for planning and sustainable within the County area. In its policy 'ECD 22' the County Plan has committed *'to continue to promote and facilitate the provision of high quality walking and cycling routes in Waterford.'*

Objective ECD 5 follows on to say the council will:

*'...facilitate as the opportunities arise, the sustainable development/enhancement of tourist trails and designated walking and cycling trails that do not cause landscape or environmental degradation throughout County Waterford. The Council shall also encourage the development of off-road cycling at appropriate locations.'*

*Ferrybank-Bellview Local Area Plan (2009)*

The Ferrybank-Bellview Local Area Plan (LAP) covers the area from Granagh to Bellview and from the River Suir to the line of the Waterford N25 By-pass and as such applies to lands included within the WCECNP study. The LAP outlines proposals for the creation of an 'Urban Village' at Ferrybank - Abbeylands and include:-

- The provision of a Green Route Corridor on the N25 through Ferrybank-Abbeylands which *"would add to the success of the proposed urban village in this area, prioritising the needs of pedestrians and cyclists, and those using public transport."*
- The development of a new Main Street as part of the above urban village concept would allow for the provision of traffic calming measures, bicycle parking, and cycle paths.

The LAP further outlines the route for the N25 Greenroute corridor to extend from Belmont to Ballinaneesagh via Ferrybank, the Quay, Parnell St. and the Cork Road. In addition, specific policies and objectives are included:-

- *'T9 Increase the provision of cycle paths in the plan area, particularly through the open space links.'*
- *'T11 Provide bicycle stands in the urban village and at all neighbourhood centres.'*
- *'OS3 Develop a system of linear parks with walkways and cycle paths with significant tree planting and public seating...'*

3.2.4 Other Strategic Studies and Cycle Programmes

*EuroVelo Europe Cycle Route Network*

The EuroVelo Cycle Network is made up of 14 long distance cycle routes as illustrated in Figure 3.2 below. Two of these long distance routes are located within Ireland (Route 1 and 2) with EuroVelo Routes 2 traveling the entire length of County Waterford.

- **EuroVelo Route 1** : runs from Nordkap, Norway to Sagres, Portugal via Bergen, Glasgow, Larne to Rosslare (along the north, west and south coast's), Nantes, Pamplona, Salamanca and Faro.
- **EuroVelo Route 2** : runs from Moscow through to Galway via Warsaw, Berlin, London and Dublin.

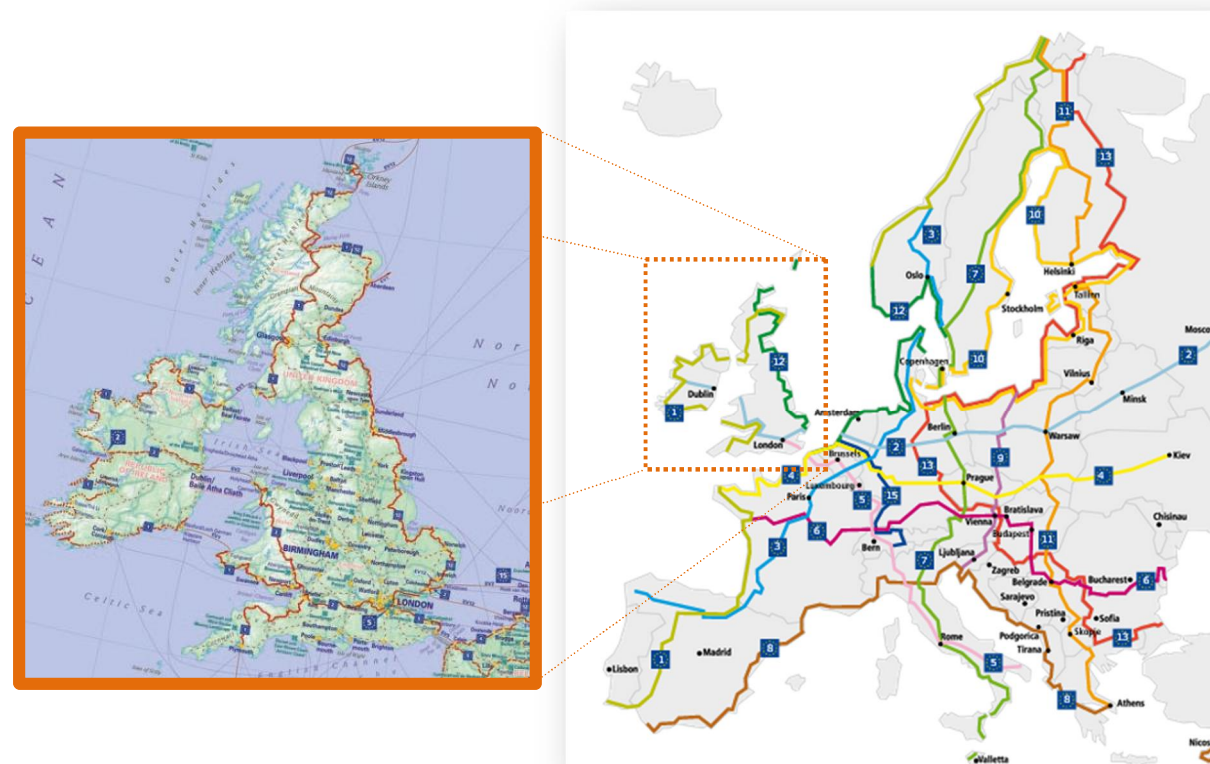


Figure 3.2 :EuroVelo Europe Cycle Route Network (Source: EuroVelo.com)

### National Cycle Network

The National Cycle Network Scoping Study (2010) identifies a total of 13 number long distance cycle routes throughout Ireland. As summarised below two of the identified cycle routes pass through the WCENCP study area;

- The NCN Route Corridor 3 is a 286km route from Wexford to Tralee and forms part of the Irish segment of the EuroVelo Route 1. It runs from Dungarvan eastwards along the coast via Tramore and Passage East to Wexford Town.
- The NCN Route Corridor 4 is a 52km route from Waterford to Clonmel. The Waterford to Carrick-On-Suir section is indicatively considered as an on-road section along quiet country roads via Fiddown and Kilmeadean. The Carrick-On-Suir to Clonmel is a proposed Greenway which is presently at preliminary design stage.



Figure 3.3 : National Cycle Network

### Strategy for the Development of Irish Cycle Tourism

Fáilte Ireland report that whilst cycle tourism declined by approximately 35% between 2000 and 2006, as recently as 2011 approximately 173,000 overseas visitors engaged in cycling while in Ireland spending approximately €200m. In 2007 Fáilte Ireland commissioned a study which delivered national and regional strategies for the development of Irish Cycle Tourism. The study was commissioned in order to "determine how best to renew the popularity of cycling in Ireland, how to encourage visitors to come to cycle in Ireland, and how cycle tourism can generate visitor spend."

The study identified a specific strategy for the south east region incorporating Cork, Wexford and Waterford counties which stated that "this region is a best-kept secret for cycle tourism. There is a substantial network of quite roads, a fantastic coastline, magnificent rivers and a backdrop of mountains for the more adventurous to

access..... There is, herein, an opportunity for the South East of Ireland to be presented as an accessible and very desirable region for cycle tourism."

The South East Strategy proposes a number of Gateways and potential HUB towns. Waterford Airport is categorised as a gateway, whilst Dungarvan is classified as a Hub Category 1, and Waterford City identified as a potential Hub Category 2.

The Fáilte Ireland network exhibits many synergies with the subsequent National Cycle Network Scoping Study, with a 'hub route' from Waterford to Clonmel via Kilmeadean being proposed, as is the 'long distance route' between Wexford and Kerry via the Waterford coastline. Nevertheless the identification of a number of shorter day-ride loops in combination with the 'longer' routes provides a regional network of potential cycle linkages between the identified hubs and places of interest which cater for the experienced cyclists, for casual users and Greenways for families.

In 2013 market research by Fáilte Ireland in regard to visitor's perceptions of what constituted an ideal cycling destination revealed a strong domestic and overseas market for cycling in Ireland. Criteria such as overall experience with interesting places to visit along routes, beautiful and varied scenery where all attributed to making a good cycling destination. The results of what makes a good cycling trail are summarised in Figure 3.5.

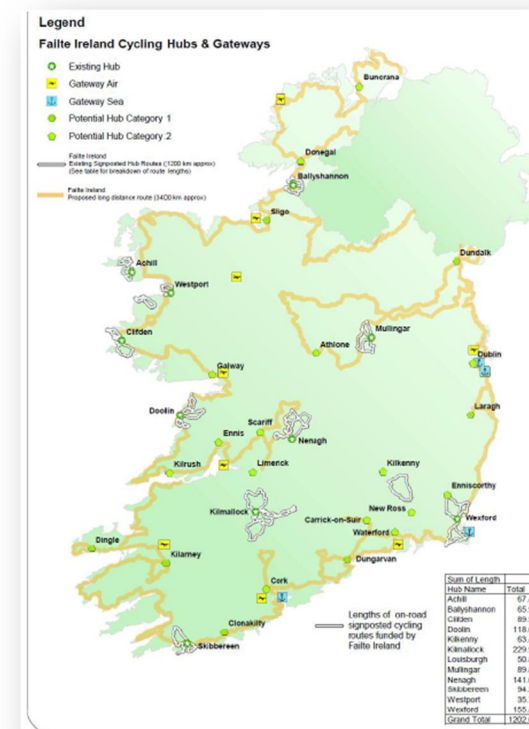


Figure 3.4 : Fáilte Ireland Cycle Network

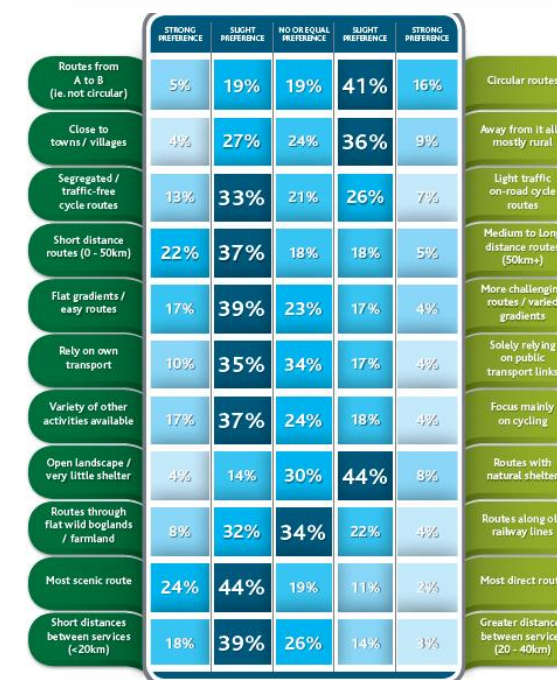


Figure 3.5 : Fáilte Ireland Research - Good Cycling Trail Attributes

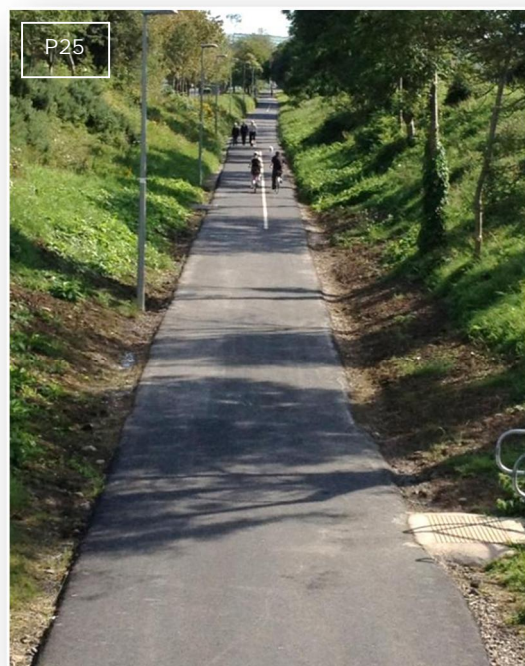
### 3.2.5 Regional and Local Cycle Studies

#### *Waterford to New Ross Greenway*

In 2013 the Kilkenny Leadership Partnership commissioned the Waterford to New Ross Greenway Preliminary Design Report. The study sought to investigate the potential of implementing a walking and cycling greenway either in isolation or in parallel with a narrow gauge railway over the 22km route of the disused Waterford to Rosslare railway line. The study concluded that there is available space for only one of these facilities with the greenway being the most viable. The report concludes the Greenway would provide a useful inter-urban commuter cycle facility between Waterford City and New Ross, an important local commuter link for this two urban areas as well as an attractive leisure and tourism amenity. Furthermore the opportunity to link to other Greenway schemes to the north (Red Bridge Greenway) and south (Deise Greenway) significantly enhances the cycling product in the southeast with the potential for nearly 70km of integrated Greenway facility representing a major attraction for tourists, recreational users and commuters.

#### *Waterford to Dungarvan Greenway (Deise Greenway)*

The Deise Greenway, a shared walk and cycling route, is proposed to run between Waterford City (Bilberry) and Dungarvan along the corridor of the disused Kilmeaden – Dungarvan railway line and adjacent to the Waterford & Suir Valley narrow gauge railway between Kilmeadean and Bilberry (Waterford City).



The proposed route as shown in Figure 3.6 is to be delivered in four principal stages. Waterford County Council has been very proactive over a number of years in delivering the Deise Greenway. The initial section between Dungarvan and Ballyrandle (with a cycle link to Clonea) is already constructed (P25) with Part 8 planning and funding secured in early 2014 for the next 6 phases (Stage 2) between Ballyrandle and Killmeaden. This part of the works also includes a spur to connect with Clonea.

Funding has also been secured to advance the Stage 3 and Stage 4 sections which will extend the scheme from Kilmeaden to Bilberry (Waterford). These last two stages include works to connect to the Deise Greenway, via the WIT West Campus at Carrignore, with the existing shared walk / cycle facility as currently provided adjacent to the R710 Waterford Outer Ring Road corridor.

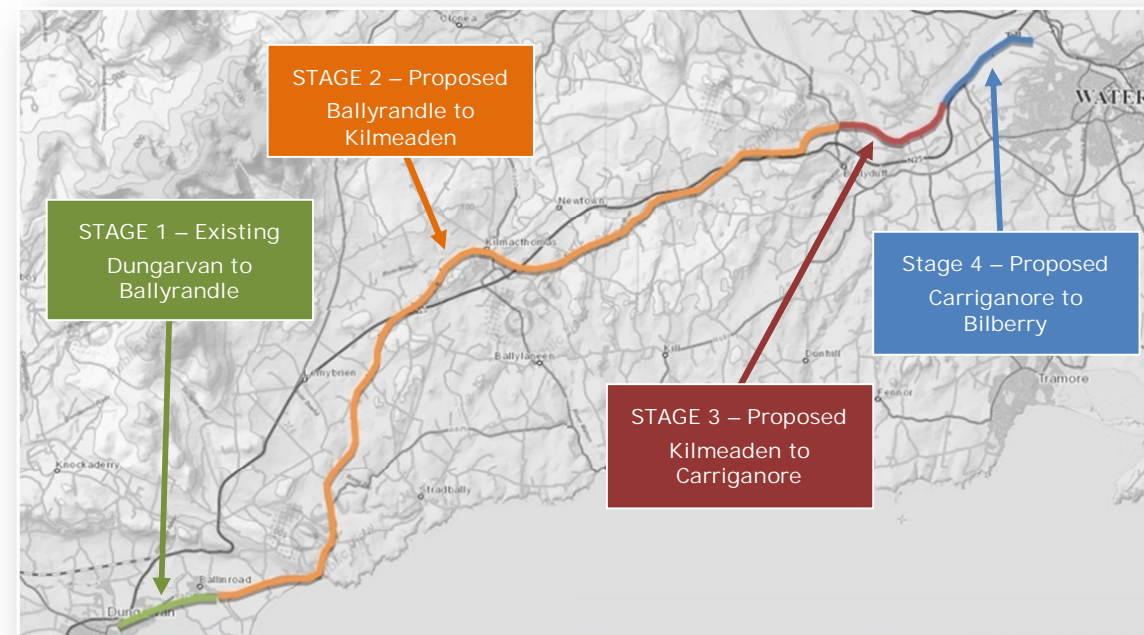
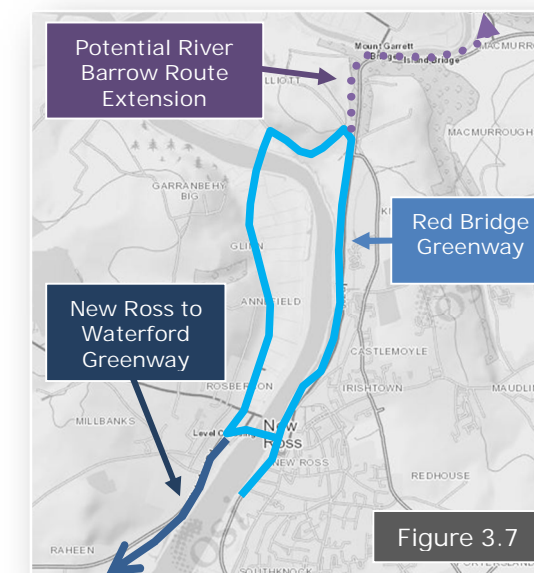


Figure 3.6 : Indicative Route and Implementation Stages of The Deise Greenway

#### *Red Bridge Greenway*

New Ross Town Council have commissioned a number of studies to determine the feasibility of implementing a shared walking and cycling 'Greenway' trail to the north of the town.

The proposal called the 'Red Bridge Walking and Cycling Trail' considered the development of a looped trail approximately 5km in length which would use reassigned sections of the existing road network in addition to sections of the disused railway line located to the north west of the Town including using the old railway bridge which crosses the River Barrow.



### River Barrow Corridor

The *Barrow Corridor Recreation, Tourism and Commercial Product Identification Study* (Barrow NTRCPI) focuses on identifying the recreation and tourism potential within the Barrow Navigation study area. In addition to the River Barrow the study incorporates 45.6km of the Grand Canal and a section of the Rive Nore. Accordingly the study area extends from Lowtown, in Co. Kildare to the Barrow Bridge at the Barrow Estuary. The study has a number of complementally objectives relevant to enhancing cycling in the South East Region including;

- To develop walking & cycling loops from each activity hub (including New Ross).
- Complete the Nore linear trail from Kilkenny to Inistioge and along the estuary where possible.

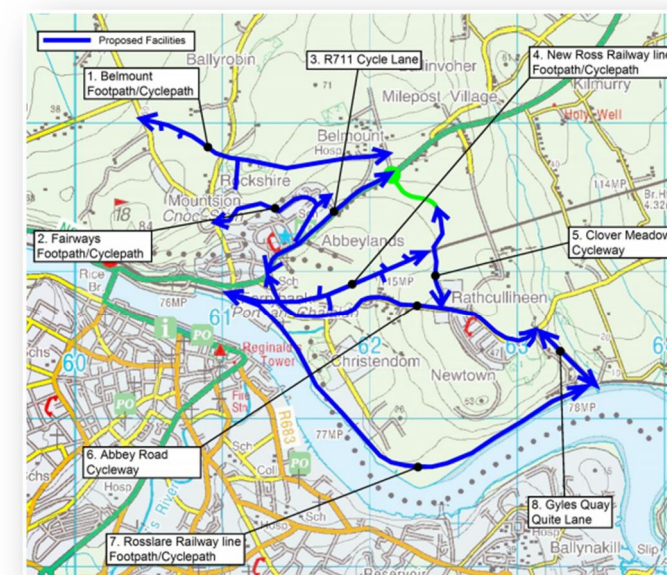


The recommendations of the study represent a 'partnership' vision between Waterways Ireland, Failte Ireland, the County Councils and the LEADER Groups along the length of the river and canal. The integration of the Barrow NTRCPI scheme with other waking and cycling scheme proposals emerging across the south east region, such as the New Ross and Red Bridge Greenways and the proposed Deise Greenway; presents significant opportunity's from both a regional cycling strategy and national network perspective. The delivery and appropriate integration of these different specific schemes would provide 'accumulative' benefits with the delivery of an attractive high quality, traffic free scenic cycle route from Dungravan in County Waterford to Dublin City Centre (via onward connection long the Grand Canal Greenway). This strategic link would complement the National Cycling Network.

### Active Travel Strategy for Ferrybank (2012)

This strategy proposes a range of new cycle / pedestrian measures with the aim of promoting active travel within the Ferrybank area. The strategy considers local internal trips across the area illustrated in Figure 3.10 below. As such it does not seek to identify cycling initiatives which would deliver an integrated network with linkages across the River Suir which represents a significant barrier to movement across the existing urban area.

The proposed measures have been developed based on the existing active travel usage, the locations of the major trip generators in the Ferrybank area and the potential for leisure trips. The identified proposals seek to deliver of range of facilities including cycle lanes, cycle tracks and greenways as summarised in Figure 3.10.



Kilkenny County Council confirmed that whilst a number of the identified initiatives may prove difficult to implement (e.g. Rosslare Railway Line) other proposals such as the initial sections of the New Ross Greenway remain a high priority. The authority are considering investigating the benefits of developing a more comprehensive and area wide active travel strategy which may result in alterations and / or additions to the measures proposed within the current strategy.



3.2.6 Other Local Studies

*Planning & Land Use Transportation Study (PLUTS)*

The Waterford PLUTS seeks to define the strategy for development within Waterford City and its Environs from 2002 up to the year 2020. The highlights of the PLUTS which seeks to accommodate a modal shift from private car use to more sustainable modes of travel include:

- *'A new City Centre Bridge for pedestrians and cyclists which will link the redeveloped North Quays with the existing City Centre'*
- *'Development of a high-quality bus-based public transport system in the City supported by Park and Ride facilities located north and south of the River.'*

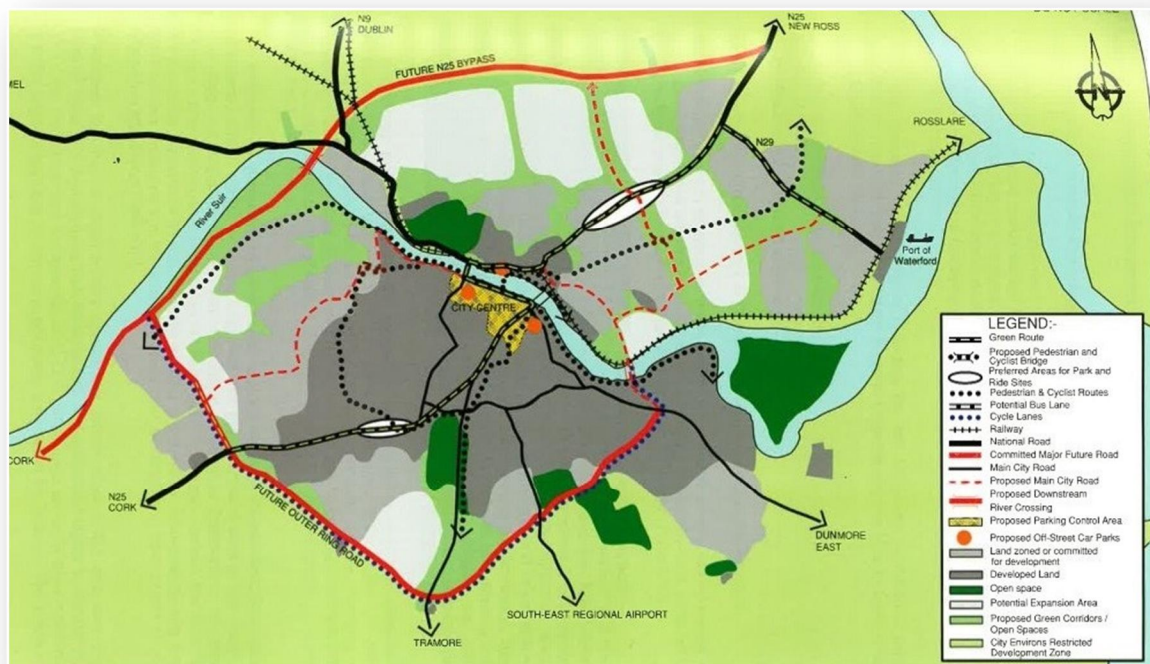


Figure 3.11 PLUTS Strategy

PLUTS has set goals in relation to sustainable land use and infrastructure which will *"Develop a (significantly improved) transportation network, which makes the most efficient use of the existing facilities and seeks to maximise the benefits of new infrastructure"*. In order to achieve this goal, the following policy objectives have been set:-

- *'16. To minimise routine commuting and reduce car dependency.'*

- *'17. To encourage a settlement pattern that encourages public transport, cycling and walking.'*

PLUTS makes reference to the provision of an *'orbital pedestrian and cycle route around the city'*. It is proposed for this route to link new and existing residential developments south of the River Suir to the City Centre. From the South Quays, the indicative route follows St Johns River to the southern suburbs, after which the route extends west towards Ticor North and Gracedieu and return to the South Quays via Grattan. PLUTS recommends the linking of this proposed orbital route to all major developments where possible whilst segregating the links from vehicular traffic.

PLUTS includes recommendations for the development of cycle networks between neighbourhood areas which include schools, local shopping centres and centres of existing and future employment. The planned pedestrian/cycle bridge connecting the North Quays with the City Centre represents a key link in the provision of these cycle networks. The Waterford City Development Plan (2013-2019) has subsequently concluded that the predicted transport demand and sustainable transport measures that were identified within the PLUTS will not be delivered by 2020.

In 2007 Waterford City Council commissioned a feasibility study which identified three potential pedestrian / cycle bridge formats which could be considered to deliver the corresponding PLUTS objective. The study's Option 2 design is presented in Figure 3.12.

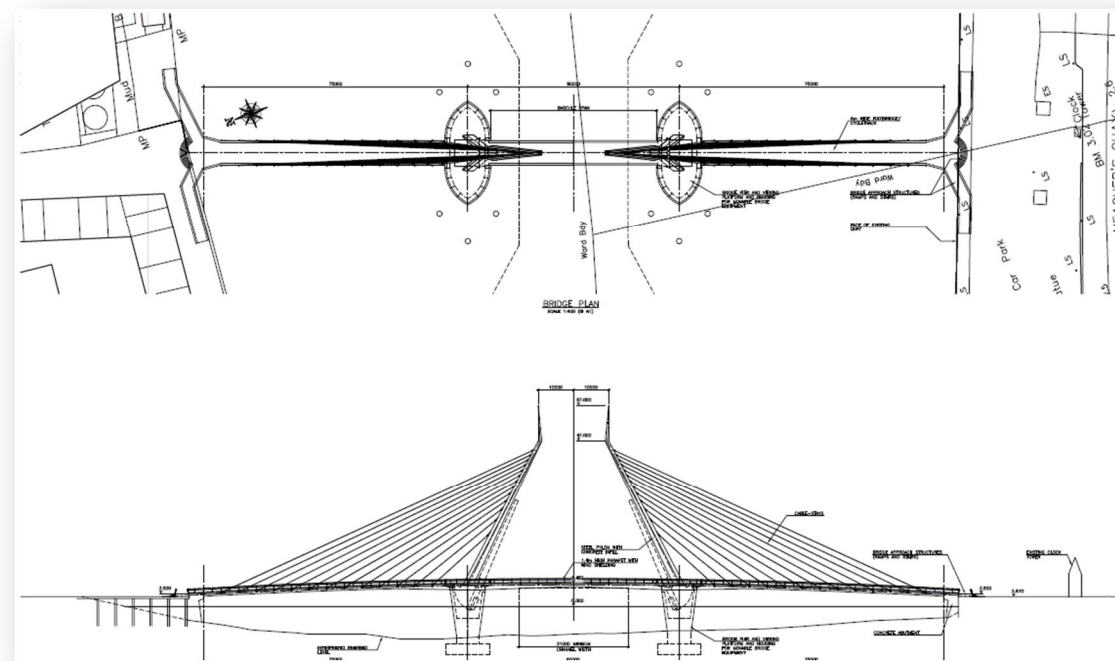


Figure 3.12 : Preliminary Bridge Design - Option 2 Concept

### 3.3 CYCLING TRIP DEMAND ANALYSIS

#### 3.3.1 Trip Type and Data Sources

The analysis for trip demand considers five principal journey types namely;

- a) The journey to / from national schools,
- b) The journey to / from secondary schools,
- c) The journey to / from college,
- d) Commuter trips associated with the journey to / from work, and
- e) Trips classified as 'other' which incorporates a range of different trip purposes including leisure trips amongst others.

In order to estimate of the trip demand within the WCECNP study area, data was obtained and analysed from the following two principal sources;

- Place of Work, School & College Census of Anonymised Records (POWSCAR) as collated from the 2011 Census, and
- 2009 National Travel Survey for 'Other' Trips.

This data identifies the 'existing' baseline (2011) trip demand. Based upon discussions with Waterford City Council officers this 2011 data has been adopted as representing comparable 2013 trip data due to the modest changes occurring across the study area in the interim two year period.

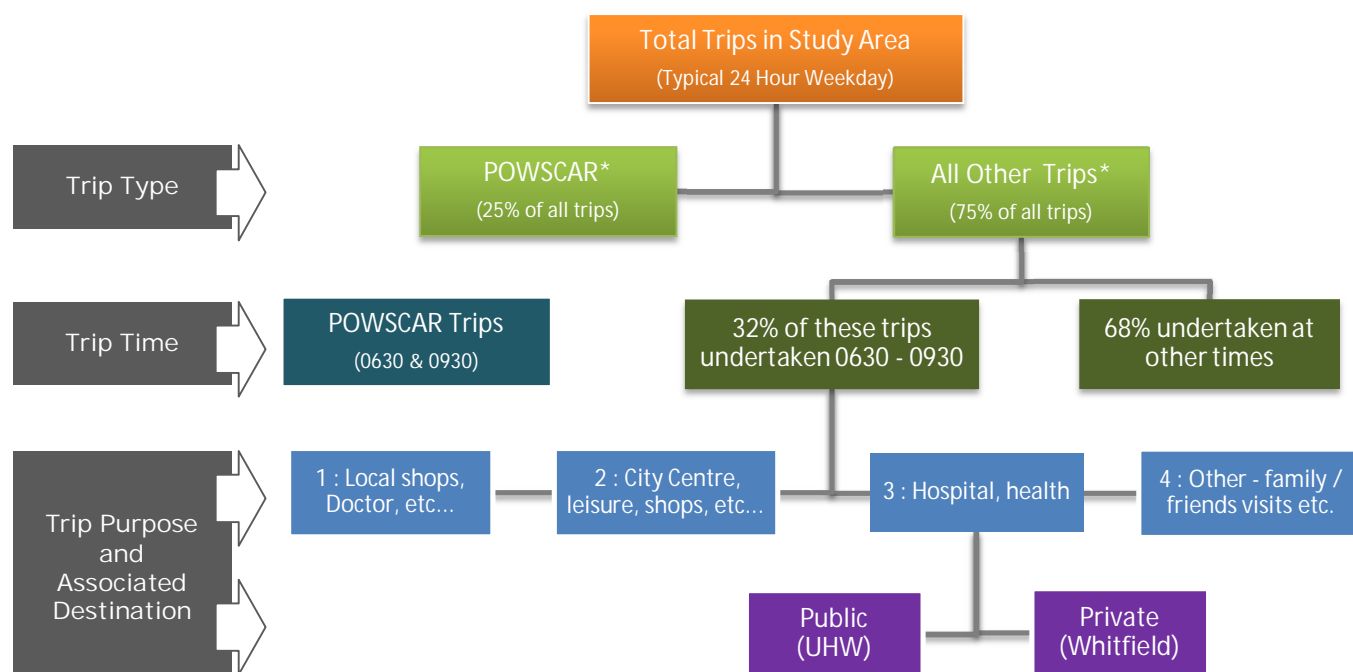


Figure 3.13 : Journey Purpose Trip Demand Data

An outline of the process for establishing the existing baseline trip data for the five principal trip types is summarised in Figure 3.13 below. In response to the typical weekday trip characteristics (time of the day journey started) recorded by the 2011 census and subsequently available from the Central Statistics Office (CSO), the analysis has focused upon the 3 hour morning period between 0630 and 0930. A similar approach has previously been adopted for the Greater Dublin Area Cycle Network Plan (December 2013) and is considered sufficiently robust for estimating future cycle demand flows. According the level of cycle demand predicted for the adopted 2023 design year focuses upon this same three hour period (0630 to 0930).

#### 3.3.2 Work, School and College Trips

In August 2012 the Census POWSCAR database was made available by the CSO. All journeys to work, school and college are recorded in the database based on their District Electoral Division (DED) for 2011. This information has been sourced and subsequently analysed to establish 'local' data pertaining to the WCECNP study area. DBFL have adopted a total of 48 different DED's which represent the WCECNP study area. Based on these 48 DED's, trip origin-destination data has been collated to provide information regarding (a) the mode of travel and (b) journey purposes for each journey undertaken between these 48 DED's. Accordingly journeys by bicycle between each of these DED's have been isolated within the adopted 3 hour assessment period (06:30-09:30). Figure 3.14 below illustrates the methodology employed during this complex exercise.

#### Methodology

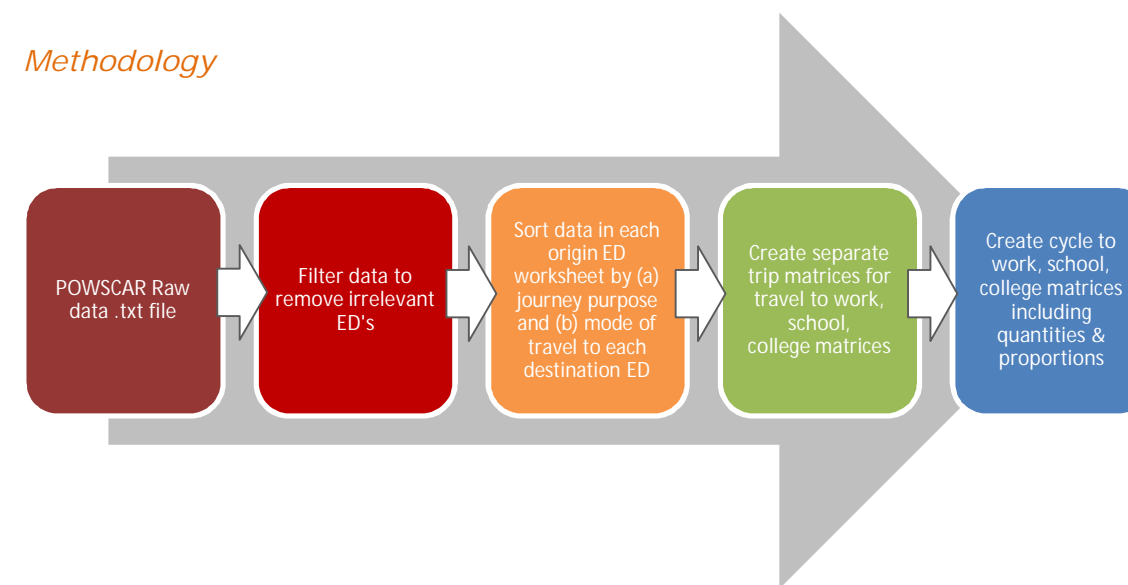


Figure 3.14: POWSCAR Trip Demand Analysis Procedure

Raw POWSCAR data was received from the Central Statistics Office containing information on commuting patterns of people at work, school and college within Ireland. This data was filtered to leave only the District Electoral Divisions (DED's) relevant to this study. This data was then analysed in order to extract the travel to work, school and college trends between the relevant ED's in terms of modal split and journey purpose. This process resulted in a comprehensive series of matrices including;

- Travel by all means of transport per each journey purpose,
- Travel by all means of transport by all journey purposes,
- Travel by bicycle per each journey purposes,
- Travel by bicycle by all journey purposes,
- Cycle mode share per each journey purpose, and
- Cycle mode share by all journey purposes.

### 3.3.3 'Other' Journey Purposes

Further to the POWSCAR data the 'Other' journey purposes include activities and associated trips associated with shopping (convenience and comparison retail destinations), health, leisure and visiting family or friends. Data for these trips is not recorded by the Census. In the absence of any other readily available information source for Waterford City & Environs, the trip quantities derived for these 'other' trips in this study have been based on the result of the National Travel Survey 2009. The National Travel Survey 2009 provides detailed information on the travel characteristics of a population of 7,221 adults and includes the following information;

- Number of journeys made,
- Reason for making each journey,
- Mode(s) of transport used,
- The time each journey commenced and ended,
- The duration of each journey and
- Distance travelled.

Based on this information, it has been estimated that 32% of all 'Other' cycle trips are undertaken between 0630 and 0930 peak period. The 'other' journey purposes category encompasses four trip purposes including;

- Local short journeys to Shops, Doctor etc...
- Journeys to City Centre, Leisure, Shopping etc...,
- Trips to Hospital & Health for appointments and visits, and
- Visiting family & friends.

### 3.3.4 Trip Assignment

The trip assignment process involves predicting the specific route that cyclists travelling between the defined DED's area are most likely to choose. The road network within the study area has been divided into corridors and each corridor has been further divided into logical sections to account for the principal trip demand variations (point of access or egress for specific residential areas, buildings / plots etc) along each corridor. In general, route choice was determined by the journey length between DED's origin and destination with the shortest distance being adopted as the key parameter influence which route is most likely to be taken. In addition potential route choice permutations have also been considered with the objective of reflecting other factors that may affect the specific route adopted by a cyclist (e.g. Steep gradients, busy roads, short cuts, personal security fears etc). As a result in many cases trips from DED to DED would be assigned to more than one potential route. Figure 3.15 below summarises the methodology employed to assign the 5 type times (work, school, etc) to the adopted network.

#### Methodology

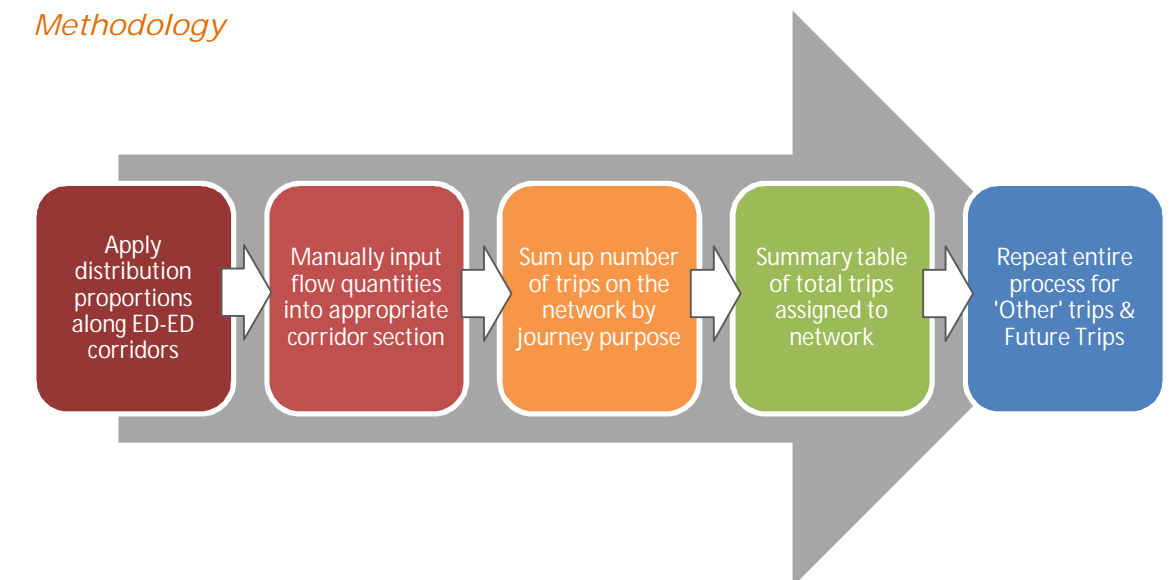


Figure 3.15 Trip Assignment Procedure

The procedure involved assigning the 'cycle' trip volumes determined during the analysis of the POWSCAR data to the various links that formed the adopted network. Flows were assigned to each corridor section along the route(s) between each origin-destination DED combination within the study area and were assigned for all five journey purposes. This resulted in the production of 192 trip assignment tables to cover the entire study area. The total trips on the road network from each DED were then calculated with the accumulative total (of the five trip purpose / type) presenting a

matrix incorporating all cycle flows traveling along the individual corridor sections for each journey purpose. The results of this 2013 based exercise are graphically presented in the following drawings as include within Chapter 5 of Volume 2.

- Drawing 9401 – Existing Cycle Demand Assignment; All Journey Purposes.
- Drawing 9402 - Existing Cycle Demand Assignment; Travel to Work.
- Drawing 9403 - Existing Cycle Demand Assignment; Travel to Primary School.
- Drawing 9404 - Existing Cycle Demand Assignment; Travel to Secondary School.
- Drawing 9405 - Existing Cycle Demand Assignment; Travel to College.
- Drawing 9406 - Existing Cycle Demand Assignment; 'Other' Journey Purposes.

### Cycle Traffic Cordon Counts

With the objective of investigating the accuracy of the trip assignment exercise DBFL undertook traffic counts in April 2013 at five different locations across Waterford City. The results of these counts are shown in Table 3.1 below thereby enabling a comparison to be made with the corresponding DBFL predicted flows (two-way). This exercise demonstrates that whilst a slight divergence is evident, the scale of which varies from link to link, a general relationship with an overall deviation of only 9.4% being established. In predicted DBFL cycle volumes (based upon 2011 Census data) are ever so slightly lower compared to the recorded 2013 flows with the largest divergence being noted on Rice Bridge and Merchants Quay.

Junction	Link	Observed	Predicted
Bridge St / Merchant Quay / Rice Bridge	Rice Bridge	35	26
	Merchants Quay	26	37
Summerhill / The Glen	The Glen	14	11
Passage Rd / Dunmore Rd	Dunmore Rd	33	28
Barrack St / Cannon St	Barrack St	13	12
Cork Rd / Tramore Rd	Cork Road	14	13

Table 3.1 : DBFL Two-Way Cycle Cordon Count (0630-0930)

### 3.3.5 Forecasting Future Cycle Demand

A ten year horizon year of 2023 has been adopted for the future cycle demand assessment. There are a number of factors that are expected to increase the quantities of cyclists over the next 10 years including;

- the potential future development across the study area (increase in population)

- an increase in cycling mode share due to a transfer from other modes of travel.



P27 : Dutch Example of a Segregated Two-way Cycle Track in an Urban Environment

### Future Development

Following a meeting with Waterford City Council's planning officers, an estimate of the potential zoned residential development lands most likely to be in place by the 2023 future horizon year has been made based upon the land use zoning objectives of the Waterford City Development Plan (2013-2019). In reference to Drawing 9604 (Volume 2) a total of 40 plots have been identified. Applying the appropriate density parameter to each of these plots it was possible to make an estimate of the number of dwellings (and subsequent future 2023 population) that could be accommodated within the study area. A similar approach has been adopted for the residential zoned development lands (26 number plots) located in Ferrybank, however it has been assumed that a maximum of 90% of these zoned lands could be developed by 2023.

It is inheritably more difficult to predict the specific location where 'new' employment opportunities may take place across the WCECNP study area by 2023. Acknowledging the zoned lands in drawing 9605 (Volume 2) it has been assumed that additional employment opportunities up to 2023 will be focused within existing areas and associated facilities. As a result it has been possible to apply the census 2011 recorded journey to work origin-destination characteristics to the new residential developments (or neighbouring DED data in appropriate cases).

In terms of both trip generation and trip assignment it has been assumed that neither the redevelopment of the North Quays area nor the PLUTS objective for the new pedestrian / cycle bridge across the River Suir will be implemented by 2023. Furthermore based upon discussions with WIT representatives student numbers in 2023 are not predicted to increase above the existing 2013 levels.



The aggregated trip demand data as assigned to the adopted network for each of the five journey purpose provides the predicted accumulative demand and associated cycling trips along each subsection of the local network.

### Cycling Mode Share

The baseline 2013 cycling trip demand levels and associated network assignment exercises are based upon the modal share characteristics evident during 2011 and as quantified by the Census undertaken that year. As introduced previously in section 1.3.4 cycling as declined significantly in Waterford City in recent years to a stage that in 2011 it accounted for only approximately 1.7% for all journeys to school, college and work. The existing modal share for cycling, per journey purpose and per journey distance threshold is summarised in Table 3.2 below. Accordingly the cycle demand assignment exercise, the results of which are presented in drawings 9401 to 9406 (Volume 2), reflect this existing low level of cycling.

Journey Purpose	<1 km	1-4 km	4-8 km	8-12km	>12 km	Total
Work	0.05%	1.50%	0.64%	0.13%	0.05%	2.37%
Primary School	0.06%	0.46%	0.00%	0.00%	0.00%	0.52%
Secondary School	0.00%	0.34%	0.08%	0.00%	0.00%	0.42%
Third Level	0.10%	2.82%	0.31%	0.00%	0.00%	3.24%
Other	0.03%	0.56%	0.10%	0.01%	0.00%	0.70%
					<b>Total</b>	<b>1.45%</b>

Table 3.2 : 2011 Cycle Modal Share by Journey Type and Distance Threshold

It is the vision of the *National Cycle Policy Framework*, as published by the Department of Transport in 2009; that 10% of all trips in Ireland will be made by bicycle by the year 2020. To achieve this national modal share objective cycling levels in the larger urban areas such as Waterford City will need to be higher than this 10% target. Accordingly a number of authorities in Ireland, such as Galway City Council, have adopted targets that exceed this 10% national objective. Further to discussions with Waterford City Council officers, and acknowledging the very low starting position (e.g. existing cycle modal share of less than 2%) that the WCECNP study area recorded in regard to cycle use, a 10% modal share target for 2023 was considered ambitious but achievable. The greatest level of modal shift and subsequent increase in local cycling levels will be realised once the physical infrastructure recommendations of the WCECNP are implemented. Respecting the funding, planning, design and construction lead time

required to deliver many of these infrastructure recommendations the greatest level of benefits not being fully realised until closer to 2023.

Accordingly, DBFL have adopted a 10.2% modal share target for cycling by 2023 for the WCECNP. This overall modal share target and the associated targets per journey purpose and per journey distance, as presented in Table 3.3 below have been used as the modal share parameter to calculate future 2023 cycle demand.

Journey Purpose	<1 km	1-4 km	4-8 km	8-12km	>12 km	Total
Work	0.40%	6.00%	2.60%	0.80%	0.20%	10.00%
Primary School	0.70%	2.30%	0.00%	0.00%	0.00%	3.00%
Secondary School	1.00%	6.00%	3.00%	0.00%	0.00%	10.00%
Third Level	1.00%	20.00%	4.00%	0.00%	0.00%	25.00%
Other	0.14%	2.30%	0.50%	0.06%	0.00%	3.00%
				<b>Total</b>		<b>10.20%</b>

Table 3.3 : Cycle Modal Share Targets by Journey Type and Distance (2023)

### Future Trip Assignment

A similar approach to that undertaken for the existing 2013 trip assignment exercise, as discussed previously, was adopted to allocate the predicted 2023 future cycle trips onto the network. In addition to the new development (and associated trips) the 2023 modal share targets (Table 3.3) have been adopted to predict trip demand prior to these cycle trips being assigned to the adopted network and associated sections. The accumulative total of the five trip purposes enabled the calculation of the total 2023 cycle demand levels.

## 3.4 DEMAND ANALYSIS

### 3.4.1 2023 Network Demand Levels

The results of this 2023 based exercise are graphically presented in the following drawings as include within Chapter 5 of Volume 2.

- Drawing 9410 – Proposed Cycle Demand Assignment; All Journey Purposes.
- Drawing 9411 - Proposed Cycle Demand Assignment; Travel to Work
- Drawing 9412 - Proposed Cycle Demand Assignment; Travel to Primary School
- Drawing 9413- Proposed Cycle Demand Assignment; Travel to Secondary School
- Drawing 9414 - Proposed Cycle Demand Assignment; Travel to College
- Drawing 9415 - Proposed Cycle Demand Assignment; 'Other' Journey Purposes

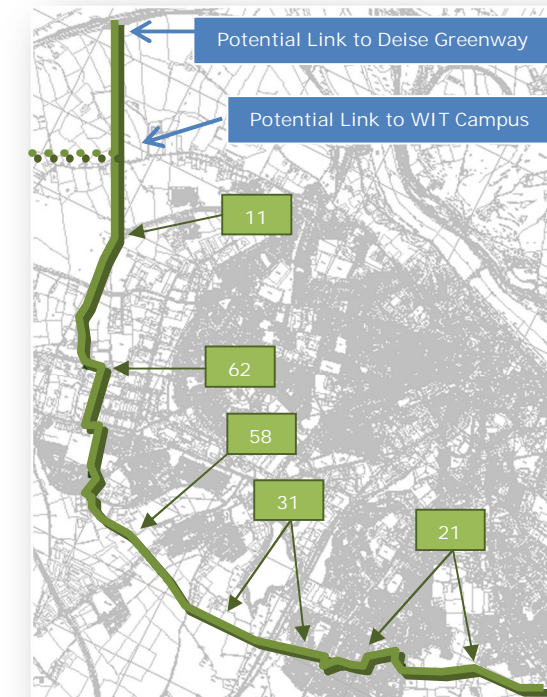
Further to the above drawings the top 20 corridors which are predicted to experience the largest level of two-way cycling activity are summarised in Table 3.4 below. The analysis indicates that cyclists traveling to the WIT facilities and the key employment centres to the west of the city very much influence the predicted network flows with two sections of the R680 Cork Road corridor recording the highest level of cyclists. Furthermore the scale of the potential development on the zoned lands to the north of the River Suir (northern sector) in parallel with the adopted modal share targets result in a notable volume of cycling activity along Fountain Street / Dock Road (R711) in the absence of any initiatives to address the barrier to cycling imposed by the Rive Suir.

Rank	Link	DBFL Code	Existing (2011)	Future (2023)
1	Killbarry Road / Cork Road – Ashe Road / Cork Road	C4D	42	161
2	Killbarry Rd / Cork Rd – Brown’s Road / Cork Road	C4C	46	146
3	Rice Brigde / Bridge St – Mall / Lombard St	C14A	37	144
4	Abbey Rd / Fountain St – Rockshire Rd / Fountain St	C22F	25	137
5	Rockshire Rd / Fountain St – Dock Rd / Rice Bridge	C22G	26	133
6	Lower Grange Rd / IRR – Ballytruckle Rd / IRR	C13D	31	125
7	Ballytruckle Rd / IRR – Tramore Rd / IRR	C13E	33	117
8	Abbey Rd / Fountain St – Abbey Rd / Newtown	C20A	15	116
9	Passage Rd/Dunmore Rd – Dunmore Rd / ORR	C12C	28	108
10	Ashe Road / Cork Road – Cork Rd / IRR	C4E	40	108
11	Rice Bridge	C22H	26	101
12	Kilbarry Rd/Ballybeg Drive – Kilbarry Rd /Tesco Roundabout	C7B	5	100
13	Kilbarry Rd / Cork Rd – Kilbarry Rd / Ballybeg Drive	C7A	8	98
14	The Folly	C13C	24	97
15	Tramore Rd / IRR – Cork Rd / IRR	C13F	31	97
16	College St / Cork Rd – Cork Rd / Tramore Rd	C14D	28	96
17	Dunmore Rd /ORR – Dunmore Rd /Brasscock Centre	C12D	27	90
18	IRR / Ballytruckle Rd – Ballytruckle Rd / Pearse Park	C9A	20	89
19	The Mall / Parnell Street	C14B	32	89
20	IRR / Johns Hill – Upper Grange Rd / Castlegange	C11B	17	86

**Table 3.4 : 2023 Future Design Year - Top 20 Cycle Demand Links**

### 3.4.2 Scheme Option Testing

The development of the various 2023 journey type origin – destination matrices also enables the option testing of any specific new or enhanced route to be investigated in terms of its ability to attract travel to school, college, work and ‘other’ cyclists (excludes leisure cyclists). The previously approach adopted can be applied to quantify the ability of any infrastructure measure to attract additional cyclists should the scheme present a new ‘short cut’ (e.g. reduced journey distance making cycling more attractive) or enhance QOS between journey O&D’s within the study area.



**Figure 3.16 : Cross City Greenway Potential 2023 Predicted Cycle Flows**

As an example an analysis has been undertaken to examine the potential demand for an orbital ‘Cross City’ Greenway as per the indicative route illustrated in Figure 3.16 above. The ‘Cross City’ Greenway has the potential to overcome many of the barriers to movement previously identified in section 2.7 (Drawing 9721) thereby reducing travel distances and enhancing the attractiveness of cycling. Furthermore its integration to the ‘leisure’ routes at Kilbary Nature Park (and potential future extension of the Park links) significantly enhances the availability of family friendly ‘leisure’ routes a market which is not adequately catered for at present in Waterford. Whilst identified as a Greenway its route linking many residential and employment area would also perform an important role accommodating commuter cyclists.

The analysis reveals that during the weekday three hour period between 0630 and 0930 this potential greenway could attach between 21 and 61 two-way cycle movements at different sections if its route. When ‘leisure’ based cyclists are considered the predicted demand could very well increase further particular if connections to other greenway facilities such as the Deise Greenway or Kilbarry Nature Park amongst other are provided. Similar scheme option testing exercise can be undertaken for either the WCECNP recommendations made in the following chapter or other potential schemes put forward for consideration by stakeholders.

### 3.5 PROPOSED CYCLE NETWORK STRUCTURE

#### 3.5.1 Network Categorisation

##### *Urban Cycle Network*

The National Cycle Manual recommends a three level Urban Cycle Network including;

- **Primary Routes** – These are the main cycle arteries that cross the urban area, and carry most cycle traffic,
- **Secondary Routes** - Links between the principal cycle routes and local zones,
- **Feeder Routes** - Cycle routes within local zones, and/or connections from zones to the network levels above

##### *Inter Urban & Greenway Network*

The Inter Urban cycle network should be accessible with convenient and integrated connections with the WCECNP 'urban' focused cycle network. Greenways are generally provided for tourist, recreational and leisure purposes however in most cases they will also perform a dual function by facilitating everyday trips to school, college and work.

#### 3.5.2 Target Quality of Service

As introduced previously in Section 2 of this report, the Quality of Service (QoS) is a measure of the degree to which the needs of cyclists are met. It is made up of criteria including;

- Pavement Condition Index,
- Number of adjacent cyclists,
- Number of conflicts per 100m of route,
- Journey (junction) time delay, and
- HGV Influence.

The existing cycle network in Waterford City & Environs has achieved a QoS score of B's & C's. With the objective of enhancing the cycling environment with the objective of making cycling more attractive it is recommended that a minimum QoS score of B is achieved on all corridors on the future cycle network (or higher were opportunities permit and are financially viable). In determining the QoS, it is permissible to have one of the criteria achieve a score of C and still achieve a QoS score of B if all other criteria score B or higher. Nevertheless, it is recommended that the width parameter does not result in a QoS score of less than B.



P28 : Example of Segregated Two-Way Cycle Track – Wicklow Town



## CHAPTER 4

# Cycle Network Proposals

## 4.0 CYCLE NETWORK PROPOSALS

### 4.1 NETWORK IDENTIFICATION

#### 4.1.1 Cycle Network

The NCM describes a cycle network as *"a defined collection of connected routes. Routes are a set of connected links and junctions that follows logical corridors between zones or urban centres. Links are individual sections between junctions."*

The purpose of the cycle network as outlined by the NCM *"is to connect the main zones of origin and destination within an urban area and should provide effective through-movement for cyclists. A well-planned cycle network will carry the vast majority of cycle journeys in cycle-km terms."*

In response to the WCECNP study requirements an **Urban Network** incorporating Primary, Secondary and Feeder Routes has been identified with integrated connections provided with complementary **Inter-urban** and **Greenway** networks the specific function of which have outlined previously in section 3.5.1.

The identified WCECNP is graphically presented in the following drawings as include within Chapter 7 of Volume 2.

- Drawing 9710 – Proposed Cycle Network; Urban Network Sheet 1 of 9.
- Drawing 9711 - Proposed Cycle Network; Urban Network Sheet 2 of 9.
- Drawing 9712 - Proposed Cycle Network; Urban Network Sheet 3 of 9.
- Drawing 9713 - Proposed Cycle Network; Urban Network Sheet 4 of 9.
- Drawing 9714 - Proposed Cycle Network; Urban Network Sheet 5 of 9.
- Drawing 9715 - Proposed Cycle Network; Urban Network Sheet 6 of 9.
- Drawing 9716 – Proposed Cycle Network; Urban Network Sheet 7 of 9.
- Drawing 9717 – Proposed Cycle Network; Urban Network Sheet 8 of 9.
- Drawing 9718 – Proposed Cycle Network; Urban Network Sheet 9 of 9.
- Drawing 9719 – Proposed Cycle Network; Inter Urban & Greenway Network.
- Drawing 9720 – Proposed Urban Cycle Network Schematic.

As discussed previously in section 3.5.2 a minimum QoS score of B is recommended on all routes on the WCECNP. Nevertheless where opportunities permit, particularly along the Primary classified routes or secondary / feeder routes that provide access to national and secondary schools, the delivery of a route with a higher score of A or A+

could provide additional benefits for the cyclist and positively influence the general public's perception of the local cycling environment.

#### 4.1.2 Infrastructure Identification

Further to the development of the WCECNP as introduced above one of the principal methods of (a) delivering the recommended QoS levels and (b) enhancing the general public perception of local cycling safety levels; is the approach adopted for the evaluation and subsequent design of the cycling infrastructure.

The NCM adopts the *National Cycle Policy Frameworks* methodology in regard to the evaluation / identification of the most appropriate cycle facility to be provided along any given corridor. The NCM states that *"this approach requires the cycle designer to fundamentally (re)assess the degree to which the existing traffic is a 'given'."* The following hierarchical process is recommended with the designer encouraged to *"consider the possibility of providing for cyclists in a mixed traffic environment first."*

- 1) Traffic volume reduction.
- 2) Traffic calming to reduce vehicle speeds.
- 3) Junction treatment and traffic management.
- 4) Redistribution of carriageway.
- 5) Introduction of cycle lanes and cycle tracks.
- 6) Implementation of Cycleway (public road for the exclusive use of cyclists & pedestrians).

The NCM presents the guidance graph reproduced in Figure 4.1 below which is to be used as an evaluation tool in regard to the determination of the appropriate type of cycle infrastructure to be provide in direct reference to (a) the corridors traffic volumes and (b) actual speed of motorised traffic. This 'tool' is used in reference to the following 9 number NCM guidance notes.

- 1) Techniques for using the graph,
- 2) Threshold values,
- 3) Traffic volumes,
- 4) Actual vehicle speeds,
- 5) The relative speed of motorized traffic,
- 6) Critical Thresholds,
- 7) Multi-Lane Roads,

- 8) Limiting right hand turn pockets,
- 9) Feasibility of wide scale segregation.

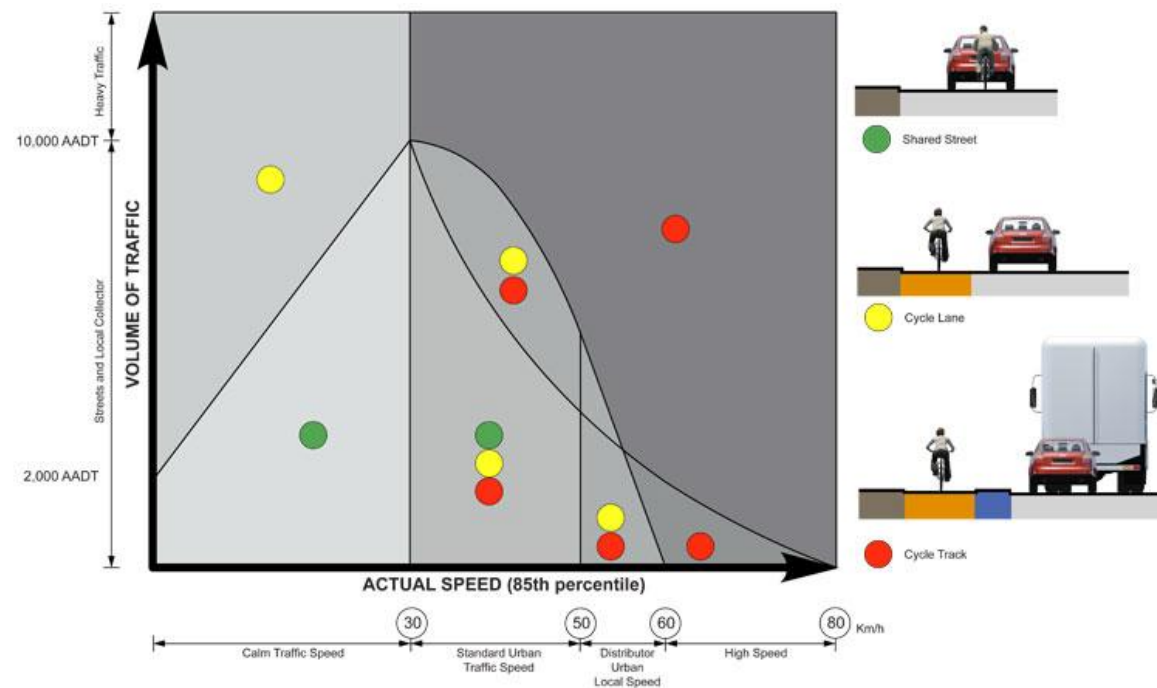


Figure 4.1 : NCM Cycle Infrastructure Guidance Graph

Complementing these key infrastructure evaluation themes DBFL have also considered the following criteria with the objective of achieving an appropriate balance between the conflicting demands placed upon each unique street corridor.

- The principles of sustainable safety (Section 1.3.1)
- The core requirements of a cyclist (Section 3.1.1)
- The nonconformity and variation of priority in regard to cyclists core requirements as generated between the different types of cyclists (Figure 3.1)
- The volume and type of cyclists predicted to use a specific corridor.
- The ability to influence the emergence of an integrated, multifunction 'place' based streets.
- The ability to positively influence the general public perception of cycling.

The stakeholder consultation exercise undertaken during the initial data collection stages clearly indicated a preference for the provision of segregated cycling facilities. Segregated facilities, either 'lightly' or comprehensively applied, are generally perceived by the stakeholders as offering a greater degree of separation from motorised traffic thereby addressing their fears in regard to the vulnerability of cyclists and associated road safety concerns. Such preferences for segregated facilities can present challenges

in terms of the delivery, integration / connectivity with other links of the network, maintaining cyclist's momentum and headway, and road safety. Nevertheless, where considered appropriate the identification of segregated cycling facilities form an fundamental component of the following infrastructure proposals.

#### 4.1.3 Preliminary WCECNP Infrastructure Proposals

In reference to Figure 2.3 the following sections provide a summary of the preliminary infrastructure proposals identified for (i) the North East Sector, (ii) the Western sector, and (iii) the Southern Sector in addition to the core (iv) City Centre area.

The identified infrastructure proposals very much represent preliminary concepts as per the study's tender documentation requirements. The final scheme should be subject to more detailed site investigations and traffic surveys, stakeholder consultation, detail design, and costing exercises before progressing to planning and / or construction stage. Furthermore it is noted that there may be more than one solution along any particular corridor in regard to the provision of cycling infrastructure.

Opportunities to implement any specific cycle infrastructure scheme will be actively influenced by the ability to minimise / relocate existing on-street car parking bays, the ability to utilise existing private lands to accommodate corridor widening specifically for the cycle infrastructure (e.g. at school frontages, private development lands, etc), the availability of funding; and the need to minimise impact upon specific sensitive environments. The preliminary proposals as detailed graphically within the following 9 drawings (Chapter 8 Volume 2) could be influenced by such opportunities.

- Drawing 9741 – Proposed Cycle Facilities; Sheet 1 of 9.
- Drawing 9742 - Proposed Cycle Facilities; Sheet 2 of 9.
- Drawing 9743 - Proposed Cycle Facilities; Sheet 3 of 9.
- Drawing 9744 - Proposed Cycle Facilities; Sheet 4 of 9.
- Drawing 9745 - Proposed Cycle Facilities; Sheet 5 of 9.
- Drawing 9746 - Proposed Cycle Facilities; Sheet 6 of 9.
- Drawing 9747 – Proposed Cycle Facilities; Sheet 7 of 9.
- Drawing 9748 – Proposed Cycle Facilities; Sheet 8 of 9.
- Drawing 9749 – Proposed Cycle Facilities; Sheet 9 of 9.

A total of 14 principal radial corridors, 5 orbital 'circular' routes and up to 7 potential Greenways are identified. Table A1 and Table A2 (Appendix A) provide a summary of

the principal characteristics (Retention of existing infrastructure, proposed new infrastructure and mixed traffic cycle environments) and associated lengths / distances for the various subsections that together form each the 14 principal radial corridors and 5 orbital routes (as designated by the letter C).

Complementing the above cycle infrastructure drawings Table B1 through to Table B12 (Appendix B) details the principal sub sections (144 number) of the identified WCECNP with a word description of the infrastructure proposals provided along with supplementary information regard key features / initiatives that will be required to deliver the identified infrastructure proposals.

#### 4.1.4 Specific Features of the WCECNP Infrastructure Proposals

##### *Corridor Links*

Unfortunately it is not always feasible or straight forward in some instances to readily retrofit dedicated cycle infrastructure measures to the existing streetscapes without imposing significant changes to the prevailing traffic management regime.

In some circumstances it may prove possible to reassign road carriageway by the rationalisation of the footpath, open space or on-street vehicle parking areas to accommodate new cycling infrastructure where cycle demand and safety concerns justify such measures. Rationalisation proposals in regard to on-street vehicle parking (car parking for residents, local businesses, etc. in addition to servicing requirements) however needs to adequately evaluate the actual demand (day and night) for on-street vehicle parking facilities. If a genuine validated demand for on-street vehicle parking is identified that (a) cannot be accommodated within reason on neighbouring streets then either (b) additional off-street car parking should be provided locally, (c) a mixed traffic regime considered with cyclists required to share the carriageway with motorised vehicles, or (d) the cycle route is relocated onto another street corridor. Such measures are considered as an integral part of the cycle infrastructure identification process introduced above in 4.1.3. The multifunctional characteristics of the WCECNP study areas transport network, particularly the streets across the city centre area, has necessitated that each of these alternative approaches are considered.

Notwithstanding the above approaches it may prove appropriate to implement a more strategic multimodal focused approach to managing traffic and associated accessibility demands across a specific area or along a particular corridor. This approach adopts a

medium or long term vision in regard to managing the demand from the private motor vehicle whilst maximising sustainable accessibility levels. This strategic approach could also include the provision of dedicated public transport priority measures and / or new linkages. The resulting reassignment of vehicular traffic could provide the opportunity to redesign the existing streetscapes thereby enabling dedicated cycling infrastructure to be incorporated into the new traffic management arrangement. A number of corridors could benefit from such a strategic approach include amongst others;

- R680 Cork Rd / Manor St / Parnell St Corridor,
- Slievekeale Road Corridor,
- Roanmore Pk / Hennessey's Rd / Newgate St / Stephen St Corridor
- Morgan St Corridor (between Summerhill and Ballybricken)
- Ozanam St Corridor
- Colbeck St / Henrieta St / High St Corridor

The ability to implement strategic focused traffic management 'visions' along any of these corridors is subject to an area wide traffic management appraisal which is beyond the scope and potentially the timeframe (2023) of the WCECNP study. Nevertheless, this should not necessarily mean that such initiatives are not considered during the lifespan (2013-2023) of this version (First Issue – 2014) of the WCECNP. Whilst alternative funding streams and street enhancement projects (Public transport priority, streetscape / public realm enhancements, private development opportunities etc.) may provide the opportunity to bring forward a number of these strategic schemes (either in stages or entire corridor) the identification and subsequent forward planning of such schemes will significantly advance the delivery and ease by which these strategic schemes can be facilitated.

Further to a number of sustainability concerns regarding the city centres existing traffic management system and the objectives of the Waterford City Development Plan (2013-2019) the identification of a forward planning focused traffic management strategy could provide the opportunity to further enhance the cycling environment as an integrated component of an area wide multi modal focused long term strategy for the city centre.

Notwithstanding the constraints that existing one-way streets impose upon local cycle accessibility, Drawing Number 9702 (Section 8 Volume 2) presents a potential concept for Parnell St as part of a strategic long term approach to traffic management along the R680 Cork Rd / Manor St / Parnell St corridor. This specific concept considers

introducing a one-way traffic arrangement whilst cycling is accommodated in both directions by means of a cycle lane (eastbound) and a segregated contra flow cycle track (westbound). The cycle track is accommodated by the reassignment of road space (existing westbound lane and on-street parking). This concept or similar could be applied to the entire R680 Cork Rd / Manor St / Parnell St corridor in the context that existing westbound traffic travelling along this corridor is accommodated by means of an alternative route as delivered by a long term access and mobility strategy for the city centre. Similar approaches could be applied on the above corridors subject to more detailed assessment.

#### *Shared Facilities – Motorised Traffic*

As outlined in the NCM cyclists can potentially be accommodated with 'shared streets' which requires cyclists and motorised vehicles to share the same carriageway. Further to the vehicle volume / speed thresholds detailed in the NCM potential examples include "quite streets" (low vehicle volume / speed environment) and urban streets which the application of traffic calming measures proactively influences vehicle speeds to be no higher than 30kph.

Due to a number of streetscape constraints the WCECNP has incorporated a number of such 'mixed' links however acknowledging the perspective of such arrangements by both young (including parents of children) and inexperienced cyclists it is recommended that with the exception of 'quite streets' such shared arrangements should be minimised as part of a long term traffic management strategy particularly near schools.

#### *Shared Facilities – Pedestrian Traffic*

It is widely acknowledged that the speed differentiation between motorised vehicles and cyclist's activity influences a routes level of attraction, comfort and safety from a cyclist's perspective. Similarly pedestrians and cyclists travel at different speeds and have different needs, which require different approaches to planning networks and designing infrastructure. In some circumstances pedestrians and cyclists can share the same space safely and effectively. Nevertheless most pedestrians and cyclists would prefer to have their own spaces so that both groups can travel at their own speed and without concerns over conflict. The NCM states that "*shared facilities are disliked by both pedestrians and cyclists and result in reduced Quality of Service for both modes. With the exception of purpose-designed shared streets, shared facilities should be avoided.*"

Nevertheless, responding to funding constraints and initial low usage predictions (and subsequent low frequency of potential conflicts) dedicated shared walking and cycling facilities have emerged in many urban areas. International best practice reinforces the NCM recommendation that where feasible shared walking and cycling facilities should not be provided in particular cases. Parameters such as activity intensity (e.g. the combined number of pedestrians and cyclists seeking to use a shared facility within a defined area) and associated usage levels, type of user, gradient, boundary treatments, location, desired QoS, and if the facility accommodates one or two-way traffic should all be considered during the design process.

Notwithstanding the above best practice guidance, funding constraints can also unfortunately influence the infrastructure design. In such circumstances, particularly if pedestrian / cycle usage is predicted to increase in the long term, the design should be 'adaptable' thereby enabling future enhancement works to be readily and cost effectively retrofitted with minimum disruption and the retention of as much (if not all) of the initial infrastructure.

In regard to 'shared streets' such as the emerging streets forming the Viking Triangle and existing 'pedestrianized' streets across the city centre the initial design and regulations applied to such linkages should consider the needs of cyclists to ensure that they are attractive for cyclists and not represent barriers to movement by bicycle.

#### *Junctions and Network Nodes*

Nodes on the cycle network include (a) road crossing points and associated facilities, (b) priority junctions, (c) signal controlled junctions and (d) roundabout junctions. Motor vehicle / bicycle conflicts are predominately focused upon such junctions and nodes. As such the approach to accommodating cyclists at junctions is important from a road safety perspective in addition to ensuring that the appropriate desired QoS is achieved.

The consideration of the cyclist's specific needs is paramount. Accordingly best practice recommends that the core user requirements (Section 3.1) can be adopted as a design 'check list' during the evaluation of different infrastructure treatments at junctions.

- *Road Safety – are there specific issues that need to be resolved, or specific problem locations, based on the collision record of the junction? How can subjective safety for cyclists be enhanced?*



- *Coherence – is the junction legible and intuitive for cyclists – it is clear how a given move should be made and what position should be taken to do it? is junction treatment consistent along a route?*
- *Directness – are cyclists asked to deviate from their travel desire lines? Could exemptions be made for cyclists from banned movements or even from certain signals?*
- *Attractiveness – are there opportunities to create usable, attractive public space as part of junction redesign? What is the balance that should be struck between traffic management infrastructure, and the potential for reducing street clutter, and the overall appearance of the area?*
- *Comfort – can conflicting movements be managed so that all cyclists can feel confident in negotiating the junction? What constraints does capacity impose?*
- *Adaptability – how might the use of the junction vary through the day, week or year, and over time (might we expect to find a demand for cycling at particular times of day, and growing over time?) Is there a role for trialling new layouts?*

Whilst the network infrastructure drawings 9741 to 9749 (Section 8 Volume 2) provide indicative concepts at the key junctions on the proposed network, which should in turn during the detail design stage reflect the guidance outlined within the NCM, the following provides a summary of some of the most notable junction enhancement recommendations.

- Inner Ring Road / Tramore Rd Roundabout: Short Term – Convert to ‘Dutch Style’ roundabout with cyclists segregated from other road users with orbital cycle tracks provided. Long Term – Consider signalisation.
- Inner Ring Road / Cork Rd Roundabout: Short Term – Convert to ‘Dutch Style’ roundabout with cyclists segregated from other road users with orbital cycle tracks and appropriate crossing facilities on each arm. Long Term – Consider signalisation.
- Inner Ring Road / Dunmore Road Roundabout: Medium Term – Consider signalisation.
- Edmund Rice Bridge / Dock Rd / Sallypark Roundabout: Medium Term – Consider signalisation.

In response to the level of cyclists projected to travel through the existing Cork Road / Claremount (Sunrise Crescent) / Ballybeg Drive junction in 2023 a preliminary design layout

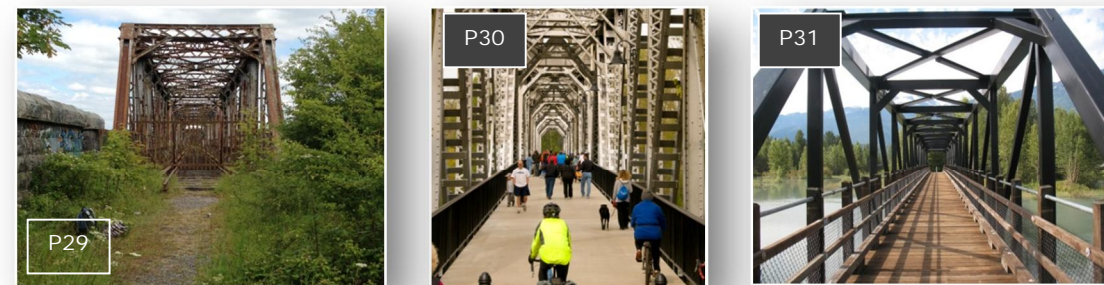
has been compiled as a short / medium term deliverable at this key junction. Drawing 9701 as included in Section 9 Volume 3 presents the initial junction proposal.

### River Crossings

The WCECNP incorporates a total of 5 river crossing proposals with the objective of minimising the segregation and subsequent barrier to movement imposed by the River Suir as its travels through the WCECNP study area.

- **B1 – Old Red Iron Railway Bridge**

Whilst representing a long term initiative the reopening of the Old Red Iron Railway Bridge (P29) as a walk / cycle greenway connection provides the opportunity to link zoned development lands in addition to delivering a traffic free link between the Deise Greenway and the New Ross Greenway via the proposed Belmont Greenway. There are many examples of similar initiatives (P30 – Salem, Oregon; P31 – Revelstoke, British Columbia) which the reuse of old iron railway bridges both safeguards local heritage in addition to providing important walk / cycle linkages between urban areas and along recreational greenways.



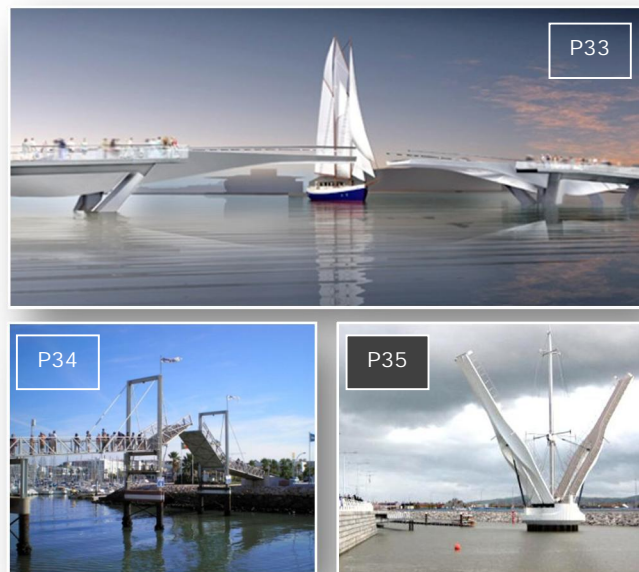
- **B2 – Pedestrian / Cycle Bridge at Clock Tower**

As introduced previously in section 3.2.6; PLUTS identified the opportunity of providing a pedestrian/cycle bridge to link the north and south quays. Whilst initial proposals very much represent iconic architecturally impressive landmark structures alternative concepts could enhance the deliverability of such objectives.

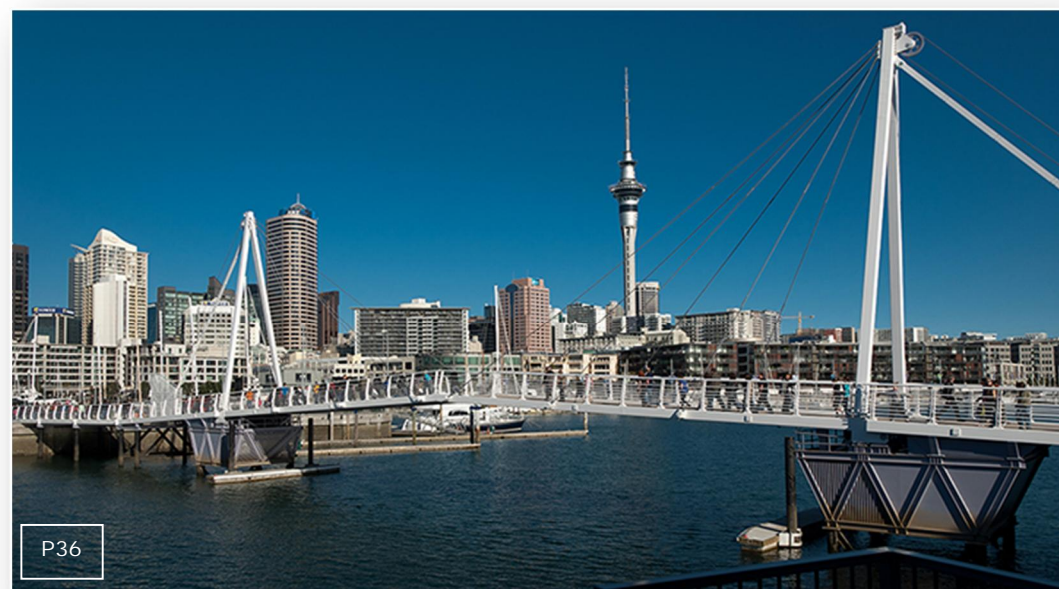


- **B3 – Pedestrian / Cycle Bridge at Christendom**

The WCECNP identifies the opportunity of providing a second pedestrian / cycle bridge across the River Suir with the objective of enhancing the level of sustainable accessibility and reducing journey distances between Ferrybank and the Dunmore Rd / Ardkeen area of the study area.



The Christendom / Abbeylands area north of the river is zoned for significant future residential development in addition to accommodating existing employment facilities. This second pedestrian / cycle bridge seeks to supplement the PLUTS city centre proposal (Clock Tower). Its design would need to consider similar design challenges to the structure proposed at the Clock Tower particularly the need to accommodate maritime traffic along the river. Whilst graphically illustrated as being located adjoining Glenville Park (narrowest point of the river) it could subject to further studies be located anywhere between Canada St and Glenville Park. Similar dedicated walk / cycle bridge connections include the proposed 'Kissing Bridge' in Copenhagen (P33); Lagos marina, Portugal (P34), the recently opened Dragon Bridge in Rhyl, North Wales (P35) and the Wynyard Crossing in Auckland, New Zealand (P36) amongst others.



- **B4 – Down River Eastern Road Crossing**

The adopted PLUTS strategy includes the long term recommendation for a high level river crossing located in the general vicinity of Maypark. Whilst subject to more detailed investigation the strategy seeks to provide a road connection between the zoned lands in Christendom / Abbeypark, Ferrybank and the Outer Ring Road as located to the south of the River Suir. Whilst the PLUTS strategy predominately sees the role of this river crossing (P37) as accommodating motorised traffic its function should be extended to include dedicated cycle infrastructure. The WCECNP acknowledges that this downriver crossing represents a long term objective with its delivery being sometime away. Nevertheless in the interim forward planning will seek to safeguard its delivery through the preservation of approach corridors. This process should also include the preservation of the necessary cycle linkages.



- **B5 – Edmund Rice Bridge**

The analysis of the 2014 traffic surveys established that the Edmund Rice Bridge currently accommodates a notable number of cyclists even through the road carriageway on the bridge and both the Dock Road and Sallypark approaches to the bridge are very much vehicle dominated with no existing dedicated cycle facilities provided. As a result a number of cyclists were observed to use the pedestrian footpaths when traveling over the bridge structure and on its Ferrybank approaches. In the context that none of the other river crossings are delivered by 2023, the cycle forecasting exercise predicts a significant increase in cyclists traveling across Rice Bridge. With the objective of providing appropriate QoS for cyclists and addressing roads safety concerns it is recommended that cycle facilities are implemented on Edmund Rice Bridge. Whilst two potential approaches are available (e.g. provide one-way facilities on both sides or a single

two-way cycling facility on one side of the existing bridge structure) the need to provide a seamless integration with emerging (and proposed) cycle facilities on all approaches to the bridge steers towards the provision of one-way cycle facilities along both sides of the bridge structure. Adopting the approach utilised at Chapelizod, Dublin (P37) and Newbridge, (P38 & P39) one potential solution considers the reassignment of the existing footpaths across Edmund Rice Bridge to cycle tracks and the provision of new pedestrian footpaths cantilevered from the side of the existing bridge structure. An alternative solution is to provide independent pedestrian bridges parallel to the existing bridge between the river banks and the two centrally located bridge abutments. Subject to further studies it may prove possible to provide side 'footpath' extensions (cantilevered from the bridge decks edge) to the two bascule spans as part of either of these two solutions.



*Greenways*

The WCECNP identifies a total of 9 number Greenways as outlined below.

- Nature Park Greenway,
- St Johns River Greenway
- The Deise Greenway,
- The New Ross Greenway,
- Belmont Greenway,
- Rosslare Rail Corridor Greenway.
- Cross City Greenway,
- Knockhouse Greenway,
- The River Suir Greenway.

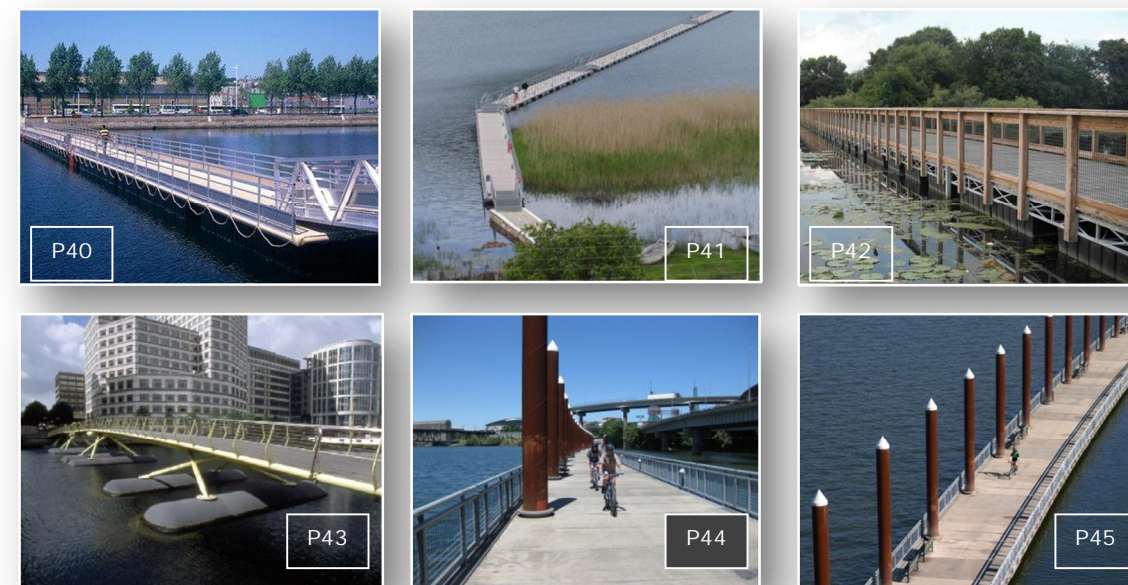


Whilst the Waterford Nature Park Greenway already exists its role could be maximised through the provision of addition connections to the urban areas located to the north. The St Johns River Greenway is an extension north-eastwards of the existing Old

Tramore Railway line facility with the OPW delivering further sections of this Greenway as part of the emerging Flood Defence Works.

The next four Greenways have been carried forward from a number of different Kilkenny County Council studies and reports. Of these four facilities the Rosslare Rail Corridor Greenway may prove to be the most difficult to deliver due to the need to retain an operational railway line to / from the Port of Waterford facilities at Belview. Nevertheless further investigations may prove it possible to provide a Greenway parallel but segregated from the railway infrastructure between the Old Abbey Church (Ferrybank Scouts Hall eastwards as far as the IDA Science and Business Park at Belview (Via Waste Water Treatment Facility).

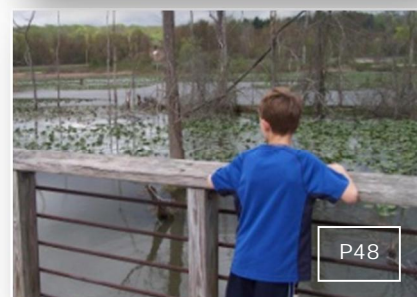
The final three Greenways have been identified based upon the POWSCAR trip origin and destination characteristics, the opportunities to link future development lands and existing employment / residential area, in addition to the potential they have in terms of leisure and potential tourism facilities. The routes of the orbital 'Cross City' Greenway' and radial Knockhouse Greenway are presented in Drawing 9710 (Volume 2) with a number of sections of these two routes to be delivered as part of future development located in the northwest sector of the study area. The River Suir Greenway, as illustrated in Drawing 9731 (Volume 2) is an enhancement of Waterford City Councils long standing objective to implement a river walk along the southern banks of the River Suir. With the objective of addressing existing delivery constraints two sections of the Greenway (or more if desired) could incorporate a 'floating' greenway through the use of a modular pontoon system as used in Le Havre, France (P40); Greece (P41); Summit Lake, Ohio (P42); Docklands, London (P43) and Portland, Oregon (P44 & P45).



### Sensitive Environmental Areas

A number of the identified infrastructure corridors including the River Suir Greenway and the Cross City Greenway pass through sensitive environmental areas. These areas are ecologically important and sensitive to both development and related activities. Such areas in the study area should therefore be assumed to have a potentially high sensitivity. A number of species and habitats located within such areas are of particular significance due to their protection under National and European legislation. Whilst such legislation may not preclude development the proposed greenways could have potential construction and activity-related impacts which need to be investigated fully and addressed formally to comply with the appropriate legislative requirements.

In all such cases the route planning and specific design will require a sympathetic approach which may result in a more comprehensive and costly infrastructure proposal that 'bridges' sensitive habitats thereby minimising both temporary (construction) and permanent (activity) impacts as part of an overall balanced approach to achieving sustainable accessibility. Accordingly the Greenway proposals will need to be subject to full ecological and habitat assessment in line with legal requirements and protection afforded to such sensitive sites by the Wildlife Act (1976) and Wildlife Amendment act (2000). Examples of Greenways through sensitive environments area include Cuyahoga Vally National Park, Ohio (P46 & P48); RSPB Nature Reserve, Conway, Wales (P47); and RSPB Rye Meads, Hertfordshire, England (P49).



## 4.2 PROPOSED CYCLE NETWORK NORTH EAST SECTOR

### 4.2.1 Existing Facilities

#### Route 10a:

A 200m section of this route currently benefits from an off road cycle track in a southbound direction on Ross Road adjacent to Ferrybank Shopping Centre. (Drawing No. 132041-9202 in Volume 2 Section 2)

#### G10 (Belmount Greenway):

Approximately 330m of this section on the Clover Meadows Access Road has off road segregated cycle track in both directions (Drawing No. 132041-9202 in Volume 2 Section 2).

#### Route 11a:

For approximately 400m approaching the N29 along Abbey Road currently has segregated off road cycle tracks in place in an eastbound direction (Drawing No. 132041-9206 in Volume 2 Section 2).

#### Route 11b:

This route currently benefits from segregated off road cycle tracks in the northbound direction (Drawing No. 132041-9206 in Volume 2 Section 2).

#### Route 7:

This route currently benefits from shared cycle / pedestrian facilities in both directions for approximately 1km (Drawing No. 132041-9202 in Volume 2 Section 2).

### 4.2.2 Demand Forecast

The predicted 2023 peak period cyclist quantities in this region of the study area range from less than 10 to greater than 55 cyclists (Drawing No. 132041-9410 in Volume 2 Section 5). The highest quantities are predicted to occur on Routes 10, 10a, 11 and 12 with a maximum rate predicted on Route 10a of 137 cyclists.

### 4.2.3 Radial Routes

Radial routes in the North East Region of the study area include;

Radial Route 7: Sally Park – R448 Newrath Road

Radial Route 10a – 10c: Rice Bridge to Bellview Port

Radial Route 11 & 11a: Ross Road / Abbey Road junction to Abbey Road / N29 junction

Radial Route 12:Rockshire Road – Mount Sion Road

Dedicated cycle infrastructure proposals have been assigned to all of the above radial routes as described in Appendix A and B in addition to being shown graphically in Drawing Numbers 132041-9742, 9743, 9745 & 9746 in Volume 2 Section 8.

#### 4.2.4 Orbital Routes

There is one proposed orbital route in this sector;

Orbital Route C6: From proposed Bridge Crossing B3 to proposed Bridge Crossing B1 (See Drawing 132041-9720 in Volume 2 Section 7)

This orbital route is proposed to be mainly an off road facility however some sections will require passage through residential areas resulting in mixed traffic along quiet roads at these locations. Dedicated cycle infrastructure proposals have been assigned to this route as described in Appendix A and B in addition to being shown graphically in Drawing Numbers 132041-9742, 9743, 9745 & 9746 in Volume 2 Section 8.

#### 4.2.5 Greenways

There are three greenways proposed (See Drawing Numbers 132041-9742, 9743, 9745 & 9746 in Volume 2 Section 8) within this region including;

G8 – New Ross Greenway: Replaces the disused New Ross rail line and could potentially run between Waterford and New Ross

G9 – Rosslare Greenway: Requires further investigation but is proposed to run adjacent to existing rail line but diverts inland before reaching the Port of Waterford facilities.

G10 – Belmont Greenway: From proposed Bridge Crossing B3 to proposed Bridge Crossing B1

This greenway performs a dual function as an orbital route (Orbital Route C6 above) potentially accommodating leisure, tourist and everyday cyclists.

### 4.3 PROPOSED CYCLE NETWORK WESTERN SECTOR

#### 4.3.1 Existing Facilities

Route 1: The emerging works along the Quays and the Mall consist of a mix of on road cycle lanes and cycle / bus lanes. (Drawing No. 132041-9202, 9205 in Volume 2 Section 2).

Route 1a: This route benefits from cycle lanes in both directions for approximately 1.6km over the entire section of this route. However the cycle lanes north east of the inner ring road roundabout junction are proposed to be converted to mandatory as part of this study and potentially utilising part of the playing fields for an off road facility (Drawing No. 132041-9204, 9205 in Volume 2 Section 2).

Route 1b: This route benefits from cycle lanes in both directions for approximately 700m and a greenway facility adjacent to John's River. However the cycle lanes north of the inner ring road roundabout junction are proposed to be converted to mandatory as part of this study (Drawing No. 132041-9205 in Volume 2 Section 2).

Route 1c: This route benefits from cycle lanes in both directions for approximately 1.5km. However the cycle lanes are proposed to be converted to mandatory as part of this study (Drawing No. 132041-9204 in Volume 2 Section 2).

Route 4: This route benefits from off road segregated cycle tracks in both directions for approximately 450m and advisory cycle lanes for approximately 1.8km. However the cycle lanes are proposed to be converted to mandatory as part of this study (Drawing No. 132041-9201, 9202 in Volume 2 Section 2).

Route 5: This route currently has approximately 1.5km of on road mandatory cycle lanes in both directions. There is approximately 130m of advisory cycle lanes which is proposed to be converted to mandatory cycle lanes as part of this study (Drawing No. 132041-9201 in Volume 2 Section 2).

Route 14 (Western Sector): This route currently has approximately 540m (including 310m also associated with Route 4) of on road advisory cycle lanes in both directions and 350m of off road segregated cycle track. It is proposed to convert the advisory cycle lanes to mandatory cycle lanes as part of this study (Drawing No. 132041-9204 in Volume 2 Section 2).

Route C1 (Western Sector): This route currently has approximately 230m of on road mandatory cycle lanes in both directions (Drawing No. 132041-9205 in Volume 2 Section 2).

Route C2 (Western Sector): This route consists entirely of shared cycle / pedestrian facility adjacent to the Outer Ring Road (Drawing No. 132041-9201, 9204, 9207 in Volume 2 Section 2).

Route C5: This route currently has approximately 60m of on road advisory cycle lanes in both directions. It is proposed to convert the advisory cycle lanes to mandatory cycle lanes as part of this study (Drawing No. 132041-9204 in Volume 2 Section 2).

#### 4.3.2 Demand Forecast

The predicted 2023 peak period cyclist quantities in this sector of the study area ranges from less than 10 to greater than 55 cyclists (Drawing No. 132041-9410 in Volume 2 Section 5). The highest volumes are predicted to occur on Routes 1, 1a, 1c, 6, 5, 4, C1 with a maximum rate predicted on Route 1a of 161 cyclists between 0630 and 0930 on a typical weekday.

#### 4.3.3 Radial Routes

Radial routes in the Western Sector of the study area include;

Radial Route 1-1d: Rice Bridge to Holycross (Whitfield Clinic) with branches off for Tramore Road (1b), Six Cross Roads (1c) and IDA (1d)

Radial Route 3: Rice Bridge to Cork Road / Ashe Road Junction

Radial Route 4-4c: Ballybricken Green to IDA (Northern Extent) via Gracedieu / Carrickphierish with links off for Bilbarry (4a), Radial Route 13 (4b) and Radial Route 5 (4c).

Radial Route 5, 5a: Ballybricken Green to Cleaboy Road / Outer Ring Road Roundabout with a link off for Radial Routes 6 & 3 (5b).

Radial Route 6: Michael St. / New St. Junction to Brown's Road / Cork Road Junction via Barrack St. and Slievekeale Rd.

Radial Route 13: Knockhouse Rd to WIT Carriganore Campus

Dedicated cycle infrastructure proposals have been assigned to all of the above radial routes as described in Appendix A and B in addition to being shown graphically in Drawing Numbers 132041-9741, 9742, 9744, 9745 & 9747 in Volume 2 Section 8.

#### 4.3.4 Orbital Routes

There are five proposed orbital routes in this sector including;

Orbital Route C1 (Western Section): This is the western section of the Inner Ring Road

Orbital Route C2 (Western Section): This is the western section of the Outer Ring Road and does not involve any future cycle infrastructure additions

Orbital Route C3 (C3a): This relatively short orbital route runs from Bridge Street / The Glen to Patrick St. / Arundel Square. Space is limited along this route however the one way section around Ballybricken Green can accommodate cycle infrastructure.

Orbital Route C4 (Western Section): Orbital route C4 runs from Bath Street to lower Yellow Road via College St, Manor Hill and Newports Square. It is possible to implement dedicated cycle infrastructure over the College St. section of this route.

Orbital Route C5: From Tramore Road / Nature Park to Cork Road / Ballybeg Drive Junction. This route incorporated a section of the Nature Park Greenway and a new link through to Lacken Wood from the Nature Park.

Orbital Route 14 (Western Section): This orbital route is proposed to perform a dual function as a greenway as well. The western section is proposed to run from a proposed minor bridge structure over John's River to the future residential zoned development plan lands in Carrickphierish. A large proportion of this proposed route is planned to run through Greenfield sites and will perform a vital predominately off road cycle facility between major residential areas and employment zones.

Dedicated cycle infrastructure proposals have been assigned to most routes introduced above except in those cases stated. The tables in Appendix A and B provide outline descriptions of the preliminary infrastructure proposals with Drawing Numbers 132041-9741, 9742, 9744 & 9745 in Volume 2 Section 8 graphically presenting the proposed dedicated cycle infrastructure.

#### 4.3.5 Greenways

There are five greenways proposed / existing (See Drawing Numbers 132041-9720 in Volume 2 Section 7) within this sector including;

G1 – The Deise Greenway:The Deise Greenway is proposed to run between Waterford City and Dungarvan along the disused Kilmeaden – Dungarvan railway line and adjacent to the Waterford & Suir Valley tourist train.

G2 – Cross City Greenway:Proposed to run from a proposed minor bridge structure over John's River to the future residential zoned development plan lands in Carrickphierish and potentially connect to the Deise Greenway. A large proportion of this proposed route is planned to run through Greenfield sites.

G3 - John's River Greenway:Runs adjacent to John's River. A section along Tramore Road is complete to date.

G4 - Nature Park Greenway:Existing Greenway within the Nature Park with proposed new linkages to the proposed surrounding cycle network.

G6 – Knockhouse Greenway: Proposed to run in through the residential zoned development plan lands within Carrickphierish and Gracedieu connecting to the Deise Greenway in the proximity of proposed bridge crossing B1 and again via a link through WIT Carriganore Campus.

G7 – Tramore Greenway: From Outer Ring Road to Tramore

#### 4.4 PROPOSED CYCLE NETWORK SOUTHERN SECTOR

##### 4.4.1 Existing Facilities

Route 2, 2a: There is currently approximately 2.3km of 2-way cycle lanes and 870m of bus / lanes along this route 2 and approximately 380m of cycle lanes on Route 2a (Drawing No. 9205 & 9208 Volume 2 Section 2)

Route 8a: This route currently benefits from advisory cycle lanes over approximately 820m in both directions as shown in Drawing No. 132041-9205 & 9208 in Volume 2 Section 2.

Route 8b: This route currently benefits from segregated cycle tracks over approximately 720m however the southbound facility extends for only approximately 270m. These

facilities are proposed to be upgraded in order to provide dedicated cycle infrastructure through these accesses. The extent of the existing facilities on this section is shown in Drawing No. 132041-9205 & 9208 in Volume 2 Section 2.

Route 9a: There is currently approximately 100m of advisory cycle lanes in both directions on approach to Gaelscoil Port Lairge (Drawing No. 132041-9208 in Volume 2 Section 2) which are proposed to be upgraded to mandatory cycle lanes as part of this study.

Route C1:There are currently approximately 800m lanes over this section in both directions which are predominately advisory (Drawing No. 132041-9205 in Volume 2 Section 2). It is proposed to upgrade the advisory cycle lanes to mandatory as part of this plan.

Route C2: This route consists entirely of shared cycle / pedestrian facility adjacent to the Outer Ring Road with the exception of the section between Williamstown Road Roundabout and the University Hospital Waterford Roundabout (Drawing No. 132041-9207 & 9208 in Volume 2 Section 2).

##### 4.4.2 Demand Forecast

The predicted 2023 peak period cyclist quantities in this sector of the study area ranges from less than 10 to greater than 55 cyclists (Drawing No. 132041-9410 in Volume 2 Section 5). The highest volumes are predicted to occur on Routes 2, 8a, 9, & C1 with a maximum rate predicted on Route C1 of 125 cyclists between 0630 and 0930 on a typical weekday..

##### 4.4.3 Radial Routes

Radial routes in the Southern Sector of the study area include;

Radial Route 2, 2a: From the Mall to Newtown Road and Dunmore Road through to Knockboy.

Radial Route 8, 8a, 8b, 8c:From Parnell St / Johns St Junction to the Outer Ring Road via the Old Tramore road (8a) and Lower Grange Road (8b). There is a proposed link (8c) from route 8a to 8b through to route 9 via St. Otteran's Hospital.

Radial Route 9, 9a: From John's Hill / Ballytruckle Road Junction to Knockboy

Dedicated cycle infrastructure proposals have been assigned to all of the above radial routes as described in Appendix B and shown graphically in Drawing Numbers 132041-9741, 9742, 9744, 9745 & 9747 in Volume 2 Section 8. However in some sections, there is insufficient road space to accommodate dedicated facilities in which case a mixed traffic arrangement is proposed.

#### 4.4.4 Orbital Routes

There are three proposed orbital routes in this sector including;

Orbital Route C1 (East Section): This is the Eastern section of the Inner Ring Road from Passage Road / Newtown Road / Dumore Road Junction to John's River.

Orbital Route C2 (East Section): This is the Eastern section of the Outer Ring Road.

Orbital Route 14 (East Section): This orbital route is proposed to perform a dual function as a greenway as well. The eastern section is proposed to run from a proposed minor bridge structure over John's River to the Williamstown Road / Outer Ring Road Roundabout. This proposed route is planned to run through Greenfield sites and quiet residential areas. It will perform a vital predominately off road cycle facility between major residential areas and employment zones.

The nature of the cycle infrastructure proposal on these orbital routes are described in Appendix B and Drawing Numbers 132041-9741, 9742, 9744 & 9745 in Volume 2 Section 8 graphically present the proposed dedicated cycle infrastructure.

#### 4.4.5 Greenways

There are three greenways proposed (See Drawing No. 132041-9720 in Volume 2 Section 7) within this sector including;

G3 – John's River Greenway: This Greenway borders both the western and southern sectors of the study area and as mentioned above it runs adjacent to John's River..

G5 – River Suir Greenway: This proposed Greenway would run from Adelphi Quay through to Blenheim Heights (Drawing No. 132041-9731 in Volume 2 Section 9 with the potential to extend to the Dunmore Road in the southern extremities of the study area. This idyllic Greenway would be ideal for leisure / tourist cycle trips as well as providing an off road route for pupils at the schools along the route.

G14 – Cross City Greenway (East Section): This section of the Cross City Greenway is proposed to run from a proposed minor bridge structure over John's River to the Williamstown Road / Outer Ring Road Roundabout. This proposed route is planned to run through Greenfield sites and quiet residential areas. It will perform a vital predominately off road cycle facility between major residential areas and employment zones and will cater for leisure and tourist cycle trips.

#### 4.5 CITY CENTRE

##### 4.5.1 Bike & Ride

###### *Plunkett Rail Station*

With the implementation of proposed new cycle infrastructure, the railway station will become much more accessible by bicycle. The absence of dedicated infrastructure on all approaches may currently discourage people to Bike & Ride and this is compounded by the high traffic volumes on all approach roads especially during peak times. Presently there are no 'long term' bicycle parking facilities at the rail station which may also discourage people to Park & Ride.

###### *Bus Station & Rapid Bus Stop*

There are two major bus termini in Waterford City that provide inter-urban services which would benefit from improved cycle infrastructure. These include the bus station for Bus Eireann services on The Quays and the Rapid Bus main interchange on Parnell Street. The emerging road infrastructure on the Quays will benefit cyclists greatly on approach to the Bus Station however there are currently no cycle parking facilities at the Bus Station or Rapid Bus Stop.

##### 4.5.2 On-Street Cycle Parking

Currently there are 88 public bicycle parking spaces in the general vicinity of the city core. On streets within the city core area it is generally proposed to provide two to three additional bicycle parking stands accommodating at least 4 bicycles (up to 6) at a 17 new bicycle parking sites. Accordingly a minimum of 68 additional on-street cycle parking spaces in the city core area as illustrated in Figure 4.1 below is recommended. In addition bicycle stands and lockers are also proposed to be provided at both the Bus and Rail Stations in order to encourage Bike & Ride practices with initial capacity for at



least 8 bicycles to be parked at each location resulting in a total additional cycle parking spaces of 84 between the city core and Bus/Rail Stations. It is recommended that all future cycle parking stands are either Sheffield Stands or Hoop Stands.

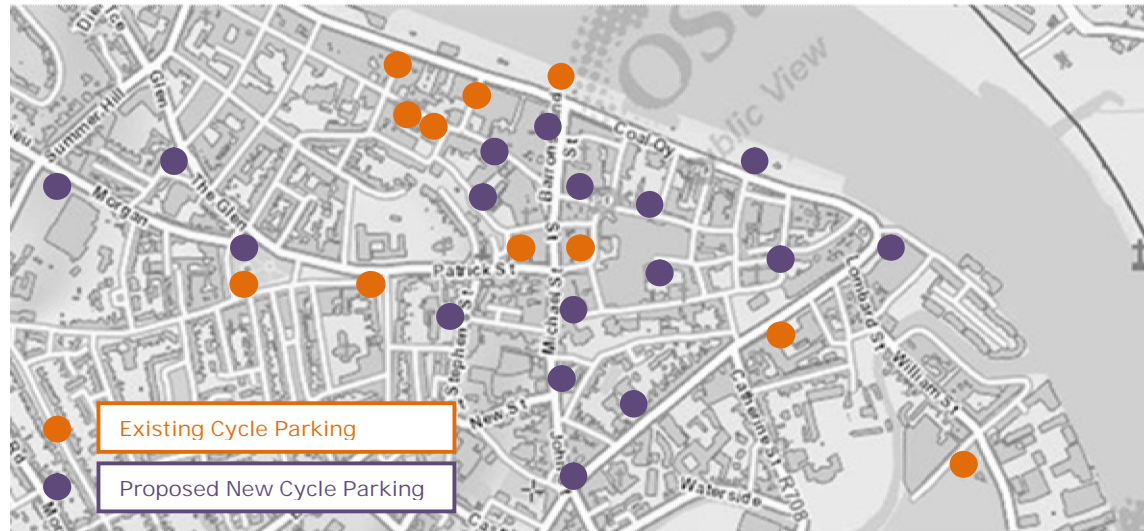


Figure 4.2 : Existing & Proposed On-Street Cycle Parking Provision in City Core Area

#### 4.5.3 Historic City Centre Constraints

The core area across Waterford City Centre retains its medieval street layout resulting in narrow streets which are not compatible for retrofitting cycle infrastructure. Measures that could impact existing motor vehicle accessibility may prove necessary in order to provide dedicated cycle facilities. Such measures could include converting streets into 'cycle streets' or converting two-way streets to one-way arrangement with contra flow cycle lanes provided.

It may prove appropriate to implement a more strategic multimodal focused approach to managing traffic and associated accessibility demands across the core city centre area. This approach adopts a medium or long term vision in regard to managing the demand from the private motor vehicle whilst maximising sustainable accessibility levels. This strategic approach could also include the provision of dedicated public transport priority measures and / or new linkages. The resulting reassignment of vehicular traffic could provide the opportunity to redesign the existing streetscapes thereby enabling dedicated cycling infrastructure to be incorporated into the new traffic management arrangement.

The ability to implement strategic focused traffic management 'visions' along any of these corridors is subject to an area wide traffic management appraisal which is beyond the scope and potentially the timeframe (2023) of the WCECNP study. Nevertheless, this should not necessarily mean that such initiatives are not considered during the lifespan (2013-2023) of this version (First Issue – 2014) of the WCECNP.

## 4.6 SUPPLEMENTARY RECOMMENDATIONS

### 4.6.1 Complementary Initiatives

The following initiatives are recommended as they will assist in the implementation, use, appreciation and ongoing development of the WCECNP.

- a) Develop stakeholder and volunteer partnerships in regard to the implementation, maintenance and monitoring of key routes such as the Greenway proposals.
- b) Initiate a WCECNP marketing, promotion and awareness campaign,
- c) Either in support of (b) above or in isolation development a comprehensive 'cycle' promotion section of the authority's website including reference to the WCECNP documentation.
- d) Continue the roll-out of the walking / cycling way-finding initiative.
- e) Research, develop and adopt a Cycle Parking Strategy which provides guidance on the appropriate type of bicycle parking to be provided thereby supplementing the cycle parking standards in the local development plan.
- f) Ensure all construction traffic management plans adequately addresses the temporary closure of cycle lanes during periods of on-street road works.
- g) Ensure that all development and road infrastructure proposals are subject to a comprehensive cycle audit as per the IHT guidance.
- h) Consider the implementation of temporary trails to test potentially challenging cycle infrastructure measures / scheme.
- i) Remove existing vehicle diverge and merge facilities as located within 50kph areas.
- j) Continue to provide support for cycle training programmes particularly as local schools and clubs.
- k) Review and update the WCECNP at least every five years.



## APPENDIX A

# Proposed Corridor Characteristics and Lengths

**Table A1 : Corridor Cycle Facility Provisional Distances**

Corridor	Sub-Corridor	Existing Cycle Infrastructure (metres)	Proposed Infrastructure (metres)		Total Corridor Length (m)
			New Dedicated Cycle Infrastructure	Mixed with Traffic Arrangement	
1	1	182*	1762	412	2356
	1a	2392	2006	229	4627
	1b	2087	1056	0	3143
	1c	1498	176	90	1764
	1d	0	1102	0	1102
2	2	2268	895	458	3621
	2a	1103	956	55	2114
3	3	0	554	1802	2356
4	4	2191	45	895	3131
	4a	0	1977	0	1977
	4b	0	2288	189	2477
	4c	0	430	369	799
5	5	1586	1873	661	4120
	5a	0	889	0	889
6	6	0	2111	889	3000
7	7	1189	0	1214	2403
8	8	0	769	394	1163
	8a	1073	1196	0	2269
	8b	679	265	651	1595 (+2092)
	8c	0	1432	0	1432
9	9	0	1429	643	2072
	9a	113	2660	0	2773
10	10	0	321	0	321
	10a	0	2082	0	2082
	10b	0	2407	0	2407
	10c	0	2777	0	2777

**Table A2 : Corridor Cycle Facility Provisional Distances**

Corridor	Sub-Corridor	Existing Cycle Infrastructure (metres)	Proposed Infrastructure (metres)		Total Corridor Length (m)
			New Dedicated Cycle Infrastructure	Mixed with Traffic Arrangement	
11	11	0	2138	0	2138
	11a	410	2025	0	2435
12	12	0	1514	0	1514
13	13	0	2907	0	2907
14	14	0	7367	0	7367
	14a	0	955	473	1428
C1	C1	1073	1111	52	2236
	C1a	0	206	0	206
C2	C2	9207	0	0	9207
C3	C3	0	70	697	767
	C3a	0	229	0	229
C4	C4	0	196	984	1180

\* Doesn't include emerging works on the Quay

Note: Based on corridor length (i.e. not total linear quantity of cycle infrastructure)



## APPENDIX B

# Proposed Corridor Infrastructure Concepts

TABLE B1 : Proposed Cycle Infrastructure Concepts

ID	Location	Distance	Concept Description	Comment
1	Park Road	265 m	2.5m segregated off road cycle track. 3.25m traffic lanes	Move all on street parking onto school grounds. Also set back school boundary wall.
2	Alphonsus Rd	191 m	2.5m off road cycle track with varying width physical barrier.	Convert street to one-way in northbound direction. Parallel parking on one side for 120m on northern section and 45° angled parking for the remainder
3	Newtown Rd (@ Park Rd junction)	81 m	Mandatory cycle lane in southbound direction to link existing infrastructure	
4	Newtown Rd (@ Passage Rd junction)	98 m	Mandatory cycle lane in northbound direction to join existing infrastructure (Advisory through junction)	
5	Dunmore Road: Maypark Ln/ Dunmore Rd Roundabout to Ardkeen Roundabout	181 m SB 165 m NB	3m shared cycle / pedestrian facility at footpath level. (Alternatively 2m cycle track in both directions)	Not enough carriageway space to implement along the full length of this section. (Alternative: Require part of hospital lands)
6	Ardkeen Roundabout to Dunmore Rd Traffic Signals	532 m SB 411 m NB	Southbound: 2m mandatory cycle lane. Northbound: 2m off road cycle track or 3m shared cycle / bus lane. 2m cycle track within grass verge on approach to roundabout	Southbound: Require section of green area at Coppingers Court north of signal junction. Also require a section of grass verge south of signal junction. Northbound: Set back Viewmount Park boundary wall.
7	Outer Ring Road – Ardkeen Roaroundabout to Williamstown Road Roundabout	1022m EB 983m WB	2m off road cycle track in both directions	Within grass verges
8	Dunmore Rd – Grantstown Pk Roundabout to existing cycle lanes to south	124m SB 102m NB	1.6m mandatory cycle lanes	Encroach into parking bay in southbound direction
9	Knockboy to Dunmore Rd	462m SB 661m NB	Southbound: 1.8-2.0m cycle track Northbound: 2m raised cycle lane (50mm) 2m off road cycle track behind bus stop on Dunmore Rd meet with existing cycle lanes	Use Grass verge in both directions.

TABLE B2 : Proposed Cycle Infrastructure Concepts

ID	Location	Distance	Concept Description	Comment
10	Williamstown Rd	2205 SB 2206 NB	Southbound: 2m mandatory cycle lane Northbound: 2m raised cycle lane (50mm)	Utilise grass verge in northbound direction and part of footpath in southbound direction. Traffic lane widths range from 3.25-3.65m.
11	Upper Grange Rd	449 SB 464 NB	Southbound: 2m segregated cycle track north of roundabout, 3m shared cycle / pedestrian facility south of roundabout. Northbound: 2m segregated cycle track	Cycle tracks within grass verge/ green areas.
12	The Folly	326 EB 313 WB	1.8-2m mandatory cycle lanes in both directions.	Utilise grass verges. Junction layout alterations required at Inner Ring Rd / John's Hill / Upper Grange Rd Junction.
13	Inner Ring Road	146 EB 113 WB	Eastbound: 1.8m mandatory cycle lane. Westbound: 1.8m mandatory cycle lane, shared cycle/ pedestrian space at junction Inner Ring Road / Ballytruckle Rd Junction.	Utilise grass verges to accommodate proposed cycle facilities where necessary.
14	Inner Ring Road (East of Cork Rd roundabout)	66 EB 66 WB	2m mandatory cycle lane in both directions	Utilise grass verges to accommodate proposed cycle facilities. Convert to off road cycle track if Dutch concept is implemented at roundabout
15	Inner Ring Road (West of Cork Rd roundabout)	153 EB 96 WB	2m mandatory cycle lane in both directions	Utilise grass verges to accommodate proposed cycle facilities. Convert to off road cycle track if Dutch concept is implemented at Cork Rd roundabout
16	Ashe Rd / Cork Rd Jct – Ashe Rd/ IRR Jct	217 NB 240 SB	Northbound: 1.8m mandatory cycle lane Southbound: 3m shared cycle / pedestrian facility	Northbound: Cycle lane ends approx 40m from traffic signals due to additional traffic lane, potentially reduce to one traffic lane to accommodate cycle lane. Southbound: Utilise grass verge to accommodate cycle / pedestrian facility.
17	Ashe Rd	135 NB 135 SB	Northbound: 2m Mandatory cycle lane Southbound: 1.8m cycle track	Utilise grass verge for proposed cycle track
18	Ashe Rd / Matties Hill / Vincent White Rd	580	2.5-3m segregated two-way cycle track, 2m on road mandatory cycle lane app. Vincent White Rd / Keanes Rd / Tycor Rd Roundabout	Utilise grass area for proposed cycle track. Potential to provide a cycle / pedestrian access through to Church Rd from Roanmore Crescent.

TABLE B3 : Proposed Cycle Infrastructure Concepts				
ID	Location	Distance	Concept Description	Comment
19	Keane's Rd	459 NB 182 SB	Northbound: 1.8m mandatory cycle lane Southbound: 1.8m mandatory cycle lane in northern section	Utilise grass verge for northbound cycle facilities. Difficult to accommodate two way cycle facilities over the entire length of section.
20	Browne's Rd – Tycor Rd	1460 NB 1482 SB	1.8-2m raised cycle lanes. 3m shared pedestrian / cycle facility approaching Vincent White Rd / Keanes Rd / Tycor Rd Roundabout.	Utilise grass verge for cycle facilities. Require part of grassed area at Browne's Rd / Cork Rd junction to accommodate proposed cycle lanes.
21	Slievekeale Rd	218 EB 223 WB	Eastbound: 2m segregated contra flow cycle track separated by 0.5-0.7m physical barrier. Westbound: 2m mandatory cycle lane in direction of traffic	Convert to one-way traffic in westbound direction Traffic lane width varies from 3.25m to 3.5m+.
22	Cleaboy Rd	434 EB 580 WB	Eastbound: 2m raised cycle lane (50mm) as far as Hazelbourne access Westbound: 1.8-2m segregated cycle track	Utilise grass verge / green areas.
23	Cleaboy Rd	402	2.5m two-way segregated cycle track on southern side of the road	Within grassed areas
24	Cleaboy Rd / Crescent Drive	576	2.5m two-way segregated cycle track	Within grassed areas
25	Vincent White Rd / Matties Hill	150	2.5m two-way segregated cycle track	Within grassed area & provide alternative cycle / pedestrian access to school
26	College St	128 EB 195 WB	Southeast bound: 2m advisory cycle lane with buffer for parked cars Northwest bound: Segregated cycle track for first 65m then 2m mandatory cycle lane	Reduce parking width along college street. Utilise part of WIT lands for cycle track
27	Cork Road	204 NB 193 SB	Northbound: 2m advisory cycle lane through access, 2m off road cycle track, 2 m mandatory cycle lane approaching traffic signals.. Southbound: 2m mandatory cycle lane	Utilise section of WIT lands
28	Cork Road	260 NB 270 SB	1.6m mandatory on road cycle lanes in both directions (advisory through junctions / parking locations)	Road realignment and removal of existing build out required.
29	Cork Road	128 NB 178 SB	2m mandatory cycle lanes in both directions	Remove central hatching

TABLE B4 : Proposed Cycle Infrastructure Concepts				
ID	Location	Distance	Concept Description	Comment
30	Tramore Road	98 NB 82 SB	Northbound: 2m mandatory cycle lane Southbound: 1.75m mandatory cycle lane	Tie into existing cycle lanes
31	Lower Grange / Ballytruckle Rd	406 NB 400 SB	1.8m mandatory cycle lanes in both directions	Convert hard shoulder adjacent to green area to cycle lane
32	Ballytruckle Rd	366	1.8m contraflow cycle lane. Mixed traffic in southbound direction	3m one way traffic lane. Cyclists travelling in the direction of general traffic shares the traffic lane. 2m parking retained.
33	John's Hill	176	1.8m contraflow raised cycle lane	Convert to one way street in with a 3.25m mixed traffic lane. Reduce footpath to 1.8m. 2m parallel parking provided
34	John's Hill	147	2m raised cycle lane for contraflow cyclists	Convert to one way street in with a 3.25m mixed traffic lane. 2m parallel parking provided.
35	John's Hill	100 NB 327 SB	1.8m contraflow raised cycle lane.	Convert to one way street with a 3.25m mixed traffic lane.
36	Passage Road	400 EB 104 WB	1.8m contraflow cycle lane with 3.25m mixed traffic lane. 1.8m advisory cycle lane in direction of traffic over a 103m section	Convert to one way street in eastbound direction with a 3.25m mixed traffic lane. Retain on street parking. Reduce footpath width at western end of street to 1.8m along northern side of the road.
37	Lwr Newtown Rd	207	2.5m cycle track. Segregated where possible at wider sections	Convert to one way traffic in westbound direction. Parking on one side only. Replace parallel parking with 45° angled parking. 3.25m traffic lane.
38	Water Street	152	2.5m segregated cycle track with 0.5m physical barrier. 3.25m traffic lanes	Set back school boundary wall.
39	Ballytruckle Road (South)	212	2.5m segregated cycle track with 0.5m physical barrier.	Reduce footpath on east side of roadway to 2m and provide 2m width parallel car parking. 6m road width

TABLE B5 : Proposed Cycle Infrastructure Concepts

ID	Location	Distance	Concept Description	Comment
40	Ballytruckle Road (South)	206 NB 168 SB	Northbound: 2m mandatory cycle lane. Southbound: 2m mandatory cycle lane (advisory through junction) – mixed traffic through narrow section	Utilise green area in southbound direction. 3.25m general traffic lanes. Reduced road width results in mixed traffic in southbound direction for most of this section.
41	Ballytruckle Road (South) / Old Tramore Rd	672 NB 598 SB	Mixture of 2m cycle tracks and 2m mandatory cycle lanes (advisory through junctions).	Set back wall at Ursuline Crescent. Utilise grassed verge / green areas for cycle tracks.
42	Lower Grange	127 NB 376 SB	Northbound: Continue existing cycle track through side roads as raised cycle lanes (50mm). Southbound: 2m segregated cycle track for first 200m, then 2m advisory cycle lane to meet existing infrastructure	Utilise grass verge / green areas for southbound cycle track
43	Ballybricken Green	311	2m mandatory where possible – 2m advisory at side roads, car parking and bus stops	
44	Lower Yellow Road	48 EB 105WB	1.8m on-road advisory cycle lanes	Reduce the depth of car parking space on south side of the roadway over approx. 50m.
45	The Quays		As per emerging Green Route works	
46	Quarry Rd / Bilbarry Rd / Quarry Rd		As per Part 8 planning for Gratton Quay / Bilbarry Rd & Quarry Rd Improvement works	
47	Knockhouse Rd	-	Continue Existing cycle tracks through side road accesses as raised cycle lanes (50mm)	
48	Ballybeg Drive	1310 EB 1300 WB	Eastbound: 2m mandatory cycle lane / cycle tracks Westbound: 2m cycle track	Reduce parking bay widths to 2.4m and use grass verges. Utilise grass verge / park along southern edge of roadway for westbound cycle track
49	Ballybeg Drive	687 EB 637 WB	2m off road cycle track in both directions	Utilise grass verges
50	Cork Road	565 EB 555 WB	Eastbound: 2m on-road mandatory cycle lane (advisory through side roads and bus stop) then 2m cycle track. Westbound: 2m cycle track then transition to mandatory cycle lane approaching Browne's Road Signalised Jct.	Use grass verges / green areas for cycle tracks. Encroach slightly into WIT lands at Browne's Road junction to allow right turn lane for cyclists.

TABLE B6 : Proposed Cycle Infrastructure Concepts

ID	Location	Distance	Concept Description	Comment
51	Cork Road	866 EB 534 WB	Eastbound: 2m cycle track / lane then mixed traffic through Cork Rd/ Ballybeg Dr Junction then 2m mandatory cycle lane Westbound: 2m cycle track then mixed traffic through Cork Rd/ Ballybeg Dr Junction then 2m mandatory cycle lane	Use grass verges for cycle tracks.
52	Ross Road	1126 NB 362 SB	Northbound: 2m mandatory cycle lane - 2m cycle track – 3m shared cycle / pedestrian facility / 2m cycle track Southbound: 2m mandatory cycle lane	Reduce the width of the ghost island in the southern area of this section. Use grass verge / green areas for cycle tracks.
53	Clover Meadows – Rathculliheen	295	Off road cycle track similar to existing Clover Meadows facilities	Consistent with "Active Travel Strategy Development for Ferrybank" proposals.
54	R711	2212 NB 2246 SB	Off Road cycle tracks lanes. 3m shared cycle / pedestrian facility for first 186m in northbound direction.	Convert hard shoulder. Convert existing northbound 3m footpath to a shared facility. Convert southbound 4m footpath to 2m footpath with 2m cycle track (grade separated).
55	N29	2539 NB 2541 SB	Off road cycle tracks	Convert hard shoulder to cycle lanes
56	People's Park	244	2.5m cycle way	
57	IDA	782	2.75m two-way cycle track	Utilise grass verges within IDA
58	IDA	741	2.75m two-way cycle track	Utilise grass verges within IDA
59	Lismore Pk – IDA	100	3.5-5m Greenway	Through green area between Lismore Park and the IDA
60	Logloss	22	2.5m two way off road cycle way	Link through grassed area between Logloss residential area and Carrickphierish Rd.
61	Carrickphierish	1366 EB 1370 WB	Convert existing advisory cycle lanes to mandatory	Retain advisory cycle lanes at parking bays, bus stops and accesses.
62	Cleaboy Road	194	Convert existing advisory cycle lanes to mandatory	
63	Kilbarry	1463 NB 1438 SB	Convert existing advisory cycle lanes to mandatory	
64	Ballybeg Drive	47 EB 47 WB	Convert existing advisory cycle lanes to mandatory	
65	Kilbarry	211 EB 201 WB	Convert existing advisory cycle lanes to mandatory	

TABLE B7 : Proposed Cycle Infrastructure Concepts

ID	Location	Distance	Concept Description	Comment
66	Cork Road	402 EB 345 WB	Eastbound: 2m cycle track within grassed area. Westbound: Convert existing substandard advisory cycle lane to 2m on road mandatory cycle lane	Existing cycle lanes are sub standard in width and should be mandatory. Potentially utilise sports field to provide segregated cycle track in eastbound direction.
67	Inner Ring Road	247 EB 216 WB	Increase width of cycle lanes to 2m and convert to mandatory	Utilise part of grass verges to achieve desired cycle lane width
68	Inner Ring Road	390 EB 404 WB	Increase width of cycle lanes to 2m and convert to mandatory	Utilise part of grass verges to achieve desired cycle lane width
69	Tramore Road	246 NB 249 SB	Convert existing advisory cycle lanes to mandatory	
70	Old Tramore Road	1073 NB 639 SB	Convert existing advisory cycle lanes to mandatory	
71	Dunmore Road	378 SB	Convert existing southbound advisory cycle lane to mandatory	
72	Newtown Road/ Dunmore Road	1226 NB 1776 SB	Convert existing advisory cycle lanes to mandatory	
73	Suir Greenway	6640	See Drawing 132041-9731	
74	Parnell Street		See Drawing 132041-9702	
75	Cork Rd Junction		See Drawing 132041-9701	
76	New Ross Railway Line	6444 (in study area)	3.5-5m wide Greenway	Replace disused railway tracks. Provide accesses along route to serve residential areas
77	Rosslare Greenway	7362 (in study area)	3.5-5m Greenway	Subject to further investigation.
78	Belmount	1383	3.5-5m Greenway	Provide accesses along route for access to / from residential areas
79	Abbey Road	4123	2m cycle lane in eastbound direction	Consistent with "Active Travel Strategy Development for Ferrybank" proposals. Entire length (& two way) possible subject to road upgrade as part of future development works.
80	Old Railway Bridge	1354	Cycle / pedestrian Bridge Crossing. 3.5-5m Greenway from Bridge to proposed Deise Greenway and to the R448 Newrath Road	Convert old railway bridge to a cycle / pedestrian bridge. Utilise disused railway line for greenway.

TABLE B8 : Proposed Cycle Infrastructure Concepts

ID	Location	Distance	Concept Description	Comment
81	City Centre Bridge	335	Proposed city centre bridge for pedestrians & cyclists	As part of PLUTS 2004 proposals
82	River Suir	245	Cycle bridge	DBFL proposed cycle bridge across narrow section of River Suir
83	River Suir	290	Proposed bridge	As part of 'Ferrybank-Belview' Local Area Plan 2009
84	Proposed Primary Care Facility – St Ottorans	609	3m shared off road cycle / pedestrian facility	As part of St. Otteran's Hospital proposals
85	Cork Road	76 NB	2m Mandatory Cycle Lane	Use part of grass verge to accommodate cycle lane up to roundabout
86	Sunrise Crescent	390	2.5m cycle track separated from road by 1.25m grass verge. 1.8m footpath	Use existing grass verge
87	Keane's Road	59	Shared cycle / pedestrian facility min 3m width	Within existing wide footpath
88	Matties Hill	124 SB	1.8m mandatory cycle lane – 1.8m advisory through junction	
89	St. John's River Banks	1434	Greenway along St. John's River banks	As per Waterford City Development Plan 2013-2019 Objectives
90	Ballybeg-IDA	334	3.5-5m Greenway	Utilise boundary of sports grounds
91	Nature Park – Lacken Wood	98	3.5-5m Greenway	
92	Kilbarry	1364	3.5-5m Greenway	Passes through a small section of Kilbarry Bog. Minor bridge structure required over St. John's River
93	Nature Park – Cherrymount	193	3.5-5m Greenway	Minor bridge structure required over St. John's River. Utilises green area between Ashley Drive and Tramore Road & between Tramore Road and The Nature Park
94	Ballytruckle / Lower Grange	1161	3.5-5m Greenway	Link between Upper Grange Road & Lower Grange Road
95	St. Otteran's – Ballytruckle	620	3.5-5m Greenway	From St. Otteran's Hospital proposed cycle infrastructure to proposed Upper Grange Road – Lower Grange Rd Greenway
96	IDA (Northern Extent)	765	2.5m cycle track	Utilise grass verge and grass areas



TABLE B9 : Proposed Cycle Infrastructure Concepts				
ID	Location	Distance	Concept Description	Comment
97	Carrickphierish / Bawndaw	1064	3.5-5m Greenway	From IDA (Northern Extent) to Gracedieu East
98	Deise Greenway	5478 (in study area)	Proposed Waterford to Dungarvan greenway	Along disused railway line
99	WIT Research Campus	410	3.5-5m Greenway	Link from WIT to proposed Deise Greenway over existing bridge
100	Tramore Road	858	Proposed Extension to existing St. John's Greenway	
101	Tramore Road	1440	3.5-5m Greenway	From Nature Park to Outer Ring Road utilising disused railway (as proposed in the Kilbarry Bog Management Plan
102	Knockboy	1100	Convert existing advisory cycle lanes to mandatory	
103	Upper Grange Road	257 NB 325 SB	Mix of 1.8-2m cycle tracks, advisory cycle lanes and mandatory cycle lanes in both directions	Reduce hatching south of physical island and use grass verges and green areas
104	Ballytruckle Green to John's Hill	396	3.5-5m Greenway	Use northern boundary of existing sports field and woodland area
105	Cleaboy Rd	237 EB 91 WB	Eastbound: 2m cycle track then 2m mandatory cycle lane Westbound: 2m cycle track	Use grass verges and remove road hatching on approach to roundabout junction
106	Passage Road	214 EB 270 WB	1.75m mandatory cycle lanes in both directions (advisory through junction)	Remove all on street parking and reduce footpath width to 1.6m. Minimum road width of 6m.
107	Ardkeen Village – Grange Manor	626	3.5-5m wide Greenway	Within grass areas within / adjacent to residential areas
108	Water St - St. Otteron's Place	327	2.5m two way segregated cycle track	Utilise People's Park lands
109	St. John's River Banks	682	Extension to Development Plan objective St. John's River Walk Facility	Convert Waterside to a one way street in westbound direction
110	St. John's Park	138 NB 195 SB	1.8m raised cycle lane (50mm) in both directions	Reduce footpaths and parallel parking to 2m. Remaining road width >6.5m
111	Ballytruckle – St. John's Greenway	417	3.5-5m Greenway	Within grass areas to the north of Riverwalk apartments.
112	Ballytruckle Road	-	Cycle / Pedestrian Access	Re-open access between Inner Ring Road and Ballytruckle Road

TABLE B10 : Proposed Cycle Infrastructure Concepts				
ID	Location	Distance	Concept Description	Comment
113	Michael Street	55 NB 14 SB	2m segregated contra flow cycle track. Mixed traffic in direction of traffic	Relocate taxi storage on Michael St. to proposed a extended taxi rank in Arundel Square
114	Stephan Street	142 NB	2m raised (50mm) contra flow cycle lane	Convert to one way street in Southbound direction
115	Sunrise Crescent	220	2.5m two way segregated cycle track	Utilise grass areas
116	Manor St. John	499	2.5m two way segregated cycle track	Utilise grass areas
117	Church Road / St. Pauls Sports Ground	385	2.5m two way segregated cycle track	Utilise grass areas (Sports grounds perimeter)
118	Upper Yellow Road	191	2m mandatory cycle lane in Eastbound direction	Remove on street parking along northern side of road
119	Logloss	718	3.5-5m Greenway	Utilise grass areas and sports field perimeter or existing paved path along the eastern and northern pitch boundary.
120	Ozanam St	269	2.5m segregated two way cycle track	Will require school boundary wall to be set back by approximately 2m. Convert to one-way traffic in westbound direction and retain on street parking on south so roadway. 3.35m traffic lane
121	Rice Bridge	216	Convert existing footpaths to cycle tracks	Requires a cantilever footbridge to be constructed along Rice Bridge for pedestrians
122	Dock Road	610 EB 602 WB	2m off road cycle track in eastbound direction. Shared cycle bus lane in westbound direction	Require removal / reduction of central median to accommodate cycle track
123	Dock Road / Fountain Street	313 EB 373 WB	2m off road cycle track in both directions.	Will require encroachment into bus stop area on approach to traffic signals. To the east of this section either reduce number of traffic lanes or remove a section of the central median
124	Abbey Rd / New Ross Railway	165	2m cycle lane leading to 3.5-5m greenway	Connect with proposed New Ross Rail Line Greenway
125	Newrath Road (R448)	585 each way	2m raised cycle lane in each direction	Remove central median. 3.5m traffic lanes
126	IDA	342	3.5-5m greenway	

TABLE B11 : Proposed Cycle Infrastructure Concepts				
ID	Location	Distance	Concept Description	Comment
127	Skibbereen Road	678	2.5m two-way segregated cycle tracks	Utilise grass areas. Mixed traffic at eastern section of corridor.
128	Tir Connell Ave	320	3.5-5m Greenway	Utilise grass area. Mixed traffic within northern section of corridor.
129	Lower Newtown Rd (Eastern Section)	132	2m off road segregated contra flow cycle track	Convert to one way traffic in the western direction
130	Sleavekeale Rd	393	Raised 1.8m contra flow cycle lane	Convert to one way traffic in westbound direction. Parking permitted along the south side of the corridor only.
131	Rockshire Rd	187 NB 184 SB	1.7m mandatory cycle lanes	Require part of wide footpath in southbound section to be converted to cycle lane
132	Rockshire Rd	418 NB 317 SB	Northbound: 2m mandatory cycle lane Southbound: 2m cycle track	Cycle track within grass verges
133	Mount Sion Rd	855 NB 847 SB	2m mandatory cycle lanes in both directions	Use grass verges where necessary
134	Newrath	834	3.5m Greenway between R448 Newrath Road roundabout and old Newrath Road.	Use grass verge.
135	Aldi / Clover Meadows / Ross Road Roundabout		2m cycle tracks	Within grass verge. Continue existing / proposed facilities on approach roads to meet proposed cycle tracks adjacent to roundabout
136	Abbeylands	127	3.5m Greenway	Through green area to proposed Clover Meadows to Rathcullieen cycle infrastructure
137	St. John's Sports Ground / Manor Lawn Estate	398	3.5m Greenway	Route through St. John's sports ground & upgrade existing path from Manor Park Estate to Vincent White Road
138	R 708 Airport Road	5600	3.5m Greenway	Utilise grass verges
139	Nature Park – Kilbarry	376	Two way off road cycle track	Utilise grass verges
140	St. Mary's NS, Ballygunner	153 EB 181 WB	2m mandatory cycle lanes in both directions	Utilise section of parking area east of school
141	Gracedieu	2260 NB/SB 3104 EB/WB	3.5-5m Greenway	Subject to future development in this area

TABLE B12 : Proposed Cycle Infrastructure Concepts				
ID	Location	Distance	Concept Description	Comment
142	Pearse Park	286	Off road cycle track in one direction	Reduction in on-street parking necessary
143	IDA	355	2.5m 2 way cycle track	Utilise Grass verges
144	Westside Business Park - IDA	775	3.5m Greenway	Within existing undeveloped lands from IDA through to Carrickphierish