

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

PROJECT:

**Feasibility Study for the Provision of City
Centre High Density Cycle Parking**

DOCUMENT:

**Dublin City Centre Cycle Parking Strategy
Report**



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Bhaile Átha Cliath
Dublin City Council



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Dublin City Council

Feasibility Study For the Provision of City Centre High Density Cycle Parking

Dublin City Centre Cycle Parking Strategy Report

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Executive Summary

Dublin City Council (DCC) and the National Transport Authority (NTA) aim to significantly increase cyclist volumes over the coming years so that by 2017, 25-30% of all new commutes within the city will be by bike. Key to achieving these targets are the provision of safe, secure cycle parking facilities at convenient locations throughout the city, as the absence of appropriate cycle parking facilities has been shown to deter people from cycling in the first place.

The purpose of this Cycle Parking Strategy Report is to devise and recommend a strategy for the provision, management and security of cycle parking facilities in Dublin City centre based on current and future demand. This Cycle Parking Strategy Report is supported by a Dublin City Centre Cycle Parking Locations Report which identifies, assesses and rates potential cycle parking locations throughout Dublin City centre. Whilst the initial scope of this study was to consider high density cycle parking locations, it became apparent that in order to meet the growing demand for cycle parking, and to satisfy other criteria, such as proximity to destination and short and medium term needs, there would be a requirement to consider a mix of small, medium and large cycle parking facilities. In this regard the scope of the study is not constrained to high density cycle parking alone.

A detailed survey of existing public cycle parking was undertaken which identified 387 existing cycle parking sites across the project area and although current capacity amounts to a total of 4,625 cycle parking spaces, survey activities undertaken within this study estimate that existing cycle parking sites can be expanded to provide an additional 5,000 spaces. In addition to this, 163 new cycle parking locations have been identified. An assessment of each of these sites suggests that a further 13,000-18,000 spaces could be provided.

Established estimates of population growth provided by the NTA have been specifically utilised in combination with Central Statistics Office Means of Travel data and DCC traffic count data to derive current and projected cycling traffic volumes. Other elements contributing to demand such as journeys to retail areas and key attractors have also been assessed, however, data limitations mean that these estimates are less robust. A number of areas where data gaps or limitations exist have been identified throughout this report and recommendations have been made aimed at resolving these.



Analysis of commuter traffic identified that in 2013 approximately 9,100 cyclists travelled into the project area during the morning peak. Combining this figure with the total number of people who are residents living within the project area that primarily travel to work, school or college by bicycle provides a total commuter cycle traffic volume of 14,500 cyclists. Projecting this total in accordance with established DCC/NTA mode share targets and population projections demonstrates that if cycling achieves a 15% mode share in 2020, the total volume will increase to 47,554 cyclists. This will increase to approximately 94,153 in 2030 if cycling reaches 25% of inbound traffic. It should be noted that a 15% mode share was originally proposed for 2017 which was unlikely to occur, although some areas will experience higher levels of demand by this time. It is anticipated that existing “latent” demand may be realised following provision of cycle parking and that an average mode share of 15% is more likely to be achieved in 2020. For the purposes of this report, a target mode share of 15% by 2020 is assumed. This is based on the fundamental principle outlined in the National Cycle Manual that lack of cycle parking is a significant deterrent to people choosing to cycle in the first place.

Private cycle parking provision is estimated to represent a significant proportion of overall supply. Limited data means that the exact representation of private parking cannot be determined at this time, however, based on the existing occupancy survey a figure of 85% private cycle parking supply has been established as an initial best estimate. Based on this initial estimate, provision of an additional 16,254 public cycle parking spaces is required during the period 2015 to 2030. The 85% private parking figure is provided as a “best guesstimate” whilst acknowledging that further surveys are required to accurately assess this figure.

The recommended implementation of these facilities has been calculated to reflect mode share targets and is staggered over this time-period. Broadly speaking based on a 15% cyclist mode share in 2020 and 25% by 2030, approximately 2,000 cycle parking spaces will be required in 2015 and a further 800/900 in each of the following five years. From 2021 to 2030 this requirement is reduced to approximately 600/700 spaces per year.

At an average cost of €350 per cycle stand this equates to an annual cost in the order of €150,000. This cost is indicative of providing basic “on-street” sheffield-stand type cycle parking spaces. High density facilities require much higher capital costs however, associated with the construction of dedicated buildings and associated infrastructure. Based on international examples a more realistic cost of €2,500 per space is anticipated for high density facilities. Assuming that approximately 3,000 of the total spaces required will be high



density, provided at a total cost of €7.5m, this results in a total capital cost in the order of €10m, or approximately €600,000 per annum for the 16 year period 2015-2030.

Expanding upon these base estimates, outline business cases have been developed which estimate the anticipated costs associated with several larger scale cycle parking solutions. These outline cases are further informed by detailed case studies of high quality cycle parking solutions implemented internationally and the examination of best practice guidelines. This additional process has revealed important insights regarding the practical considerations in implementing new cycle parking infrastructure and typical associated costs.

Statistical analysis through GIS software has allowed for the identification of specific locations across the City which represent key zones to be targeted for the provision of small, medium and large scale (high density) cycle parking provision. These zones include residential areas, employment centres, educational institutions, transport hubs, retail zones, and cultural attractions. These locations are outlined and have been considered in the development of the Dublin City Centre Cycle Parking Locations Report.

The findings from each of the research aspects included in this report have been used to inform a detailed set of recommendations which include key locations for future provision; the volume of cycle parking which will be required as mode share and population increases; policies and practices which will promote and allow for the maximum benefits to be achieved; and an implementation strategy which includes short, medium and long term recommendations.

Key to achieving cycling modal split targets is the provision of safe, secure cycle parking facilities at convenient locations throughout the city, as the absence of appropriate cycle parking facilities has been shown to deter people from cycling in the first place. The findings and recommendations contained within the Cycle Parking Strategy and Cycle Parking Locations Reports will allow for an informed approach to cycle parking expansion and facilitate controlled development of infrastructure. This will positively position Dublin City Council and the National Transport Authority to accommodate and encourage cycling growth into the future



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1 Introduction

1.1 **Report Purpose**

The purpose of this report is to devise and recommend a strategy for the provision, management and security of cycle parking facilities in Dublin City centre based on current and future demand.

1.2 **Cycle Parking Study Overview**

Dublin City Council (DCC) aims to significantly increase the mode share of cycling over the coming years. In reference to this, the development plan states that DCC’s “*vision for cycling is to make Dublin a city where people of all ages and abilities have the confidence, incentive and facilities to cycle so that by 2017, 25-30% of all new commutes within the city will be by bike*” (DCC Development Plan 2011 5.1.4.4).

Key to achieving these targets are the provision of safe, secure cycle parking facilities at convenient locations throughout the city, as the absence of appropriate cycle parking facilities has been shown to deter people from cycling in the first place (NTA National Cycle Manual 2011 - 5.5).

As identified in the National Cycle Manual, the development of a cycle parking strategy will contribute a number of positive



Figure 1.1: National Cycle Manual, Cycle Parking Strategy outcomes

This strategy report will detail data collection procedures, spatial analysis undertaken, and stakeholder engagement results. Current and future

demand will also be assessed, and a clear cycle parking strategy vision and plan will be outlined. In addition, short, medium and long term recommendations will be identified.

Coupled with the preparation of the Cycle Parking Strategy Report is the preparation of a separate Cycle Parking Locations Report. This comprises an inspection and assessment of potential cycle parking locations in relation to various criteria including anticipated demand, accessibility, capacity, suitability, planning and financial implications.

1.3

Study Scope

The scope of this report was initially to devise and recommend a strategy for the provision, management, and security of high density cycle parking facilities in the City centre based on current and future demand. Referencing “the Danish Cyclist Federation: Bicycle Parking Manual 2008”, a high density cycle parking facility can be considered one which provides cycle parking in excess of 200 spaces (Danish Cyclist Federation 2008).

In the early stages of preparing this report however, and following on from Stakeholder Workshop No. 1, it was identified that in order to meet the growing demand for cycle parking, and to satisfy other criteria, such as proximity to destination and short and medium term needs, there would be a requirement to consider a mix of small, medium and large cycle parking facilities. In this regard the scope of the study is not constrained to high density cycle parking alone.

1.4

Outline Methodology

The National Cycle Manual identifies the following steps for developing and implementing a local bicycle parking plan:

1. Data Collection;
2. Spatial Analysis;
3. Drafting the Implementation Plan;
4. Public Participation;
5. Implementation; and
6. Monitoring & Evaluation.

The methodology undertaken in this report broadly follows Steps 1 to 4, namely Data Collection, Spatial Analysis, Drafting the Implementation

Plan and Public Participation. Steps 5 and 6 are to be undertaken at a later date and are beyond the scope of this study.

- **Step 1** (Data Collection) includes mapping and assessing all existing public cycle parking in the study area and estimating the quantum of “private” cycle parking available, examining policy and guidance in relation to cycle parking and identifying the existing cycle and travel demand patterns.
- **Step 2** (Spatial Analysis) involves assessing existing and future parking demand by examining current and planned transport infrastructure, demographics and modal shift trends and targets.
- **Step 3** (Drafting the Plan) includes devising and recommending a strategy for the provision, management and security of cycle parking.
- **Step 4** (Public Participation) for this study comprises stakeholder workshops and direct consultation to gain the views and feedback of key decision makers in the city.

Further detail on the methodology used in the preparation of this report is provided in Section 3 herein.

1.5

Study Area

The study area extends from the East Link Bridge in the east, to Heuston Station and James’s Hospital in the West, the Royal Canal/North Circular Road in the North, and the Grand Canal to the South. The area boundary is illustrated in Figure 1.2 below.

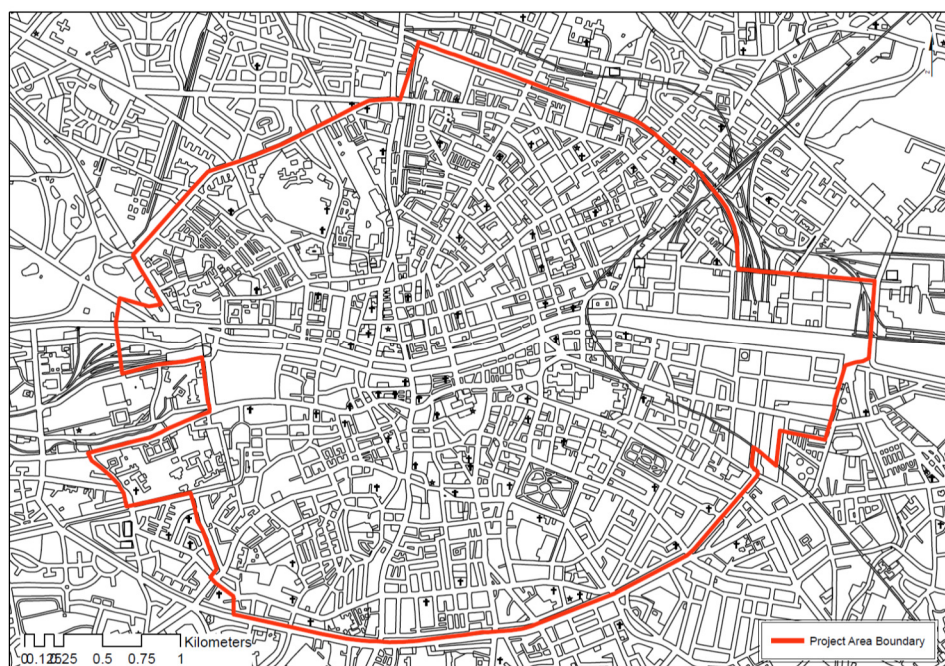


Figure 1.2: Study Area

2 Study Background

2.1 Policy & Guidance

In 2009 the Dublin Transport Office (DTO) report 'Smarter Travel: A sustainable transport future for Ireland' set out the following objective¹:

To ensure that we have sustainable travel and transport by 2020, the Government sets the following key targets:

- 500,000 more people will take alternative means to commute to work to the extent that the total share of car commuting will drop from 65% to 45%.
- Alternatives such as walking, cycling and public transport will be supported and provided to the extent that these will rise to 55% of total commuter journeys to work.

In line with this the National Cycle Policy Framework (NCPF) 2009, produced as part of the Smarter Travel initiative, set out a target for 10% of trips to be made by bike by 2020. A number of cycle parking objectives are also set out as part of the NCPF. These set out cycle parking goals relating to a number of aspects, including: Provision of infrastructure at schools and public transport, signage for available facilities, and planning related to cycle parking provision. Objectives 7 and 8 which relate to the provision of secure parking for bikes and ensuring proper integration between cycling and public transport are the central cycle parking objectives of this report.

The Regional Planning Guidelines 2010 went further, stating that "while the NCPF sets a national target of 10% of all trips by bicycle by 2020, within the GDA this should be viewed as a target to be exceeded. Within the metropolitan area in particular, there is scope for exceeding the 2020 national modal share target for cycling given that the spatial integration of higher tier population settlements with high capacity transport systems and employment areas within a relatively compact urban form allows for safe and functional cycle and walking routes from one to the other and may be more cost effective than within the more dispersed hinterland areas" (Regional Planning Guidelines 2010).

Building on the measures set out by the Dublin Transport Office, the National Transport Authority included 20 measures relating to cycling and walking in their document Draft Transport Strategy for the Greater Dublin

¹ Dublin Transport Office 2009

Area 2011-2030 ‘2030 Vision’. These measures cover a broad spectrum of actions, but measures WCY 15 and WCY 16 specifically relate to cycle parking. These are as follows:

WCY 15 states that “the Authority will seek the provision of:

- Secure on-street cycle parking in Dublin City centre and other town and village centres, in particular close to major retail, leisure or cultural destinations;
- Secure sheltered on-street cycle parking at major destinations, for longer stay purposes; and
- Secure sheltered cycle parking to meet demand at heavy rail and Metro stations, Luas stops, bus stations and busier bus stops, particularly on higher quality QBC routes” (NTA 2011).

WCY 16 states that “the Authority will seek the provision of secure, sheltered on-site cycle parking and supporting facilities for cycle commuters at:

- Schools and other education facilities;
- Workplaces; and
- Other destinations likely to attract cyclists. It will seek the incorporation into local authority Development Plans of minimum cycle parking standards set out in the Authority’s National Cycle Manual” (NTA 2011).

Broadly speaking, it is the NTA’s aim that “as part of local authority Development Plans and Local Area Plans, local authorities should prepare local transport plans for Designated Towns and Designated Districts in their area. These transport plans should address access to the centre by all modes of transport, focusing in particular on the provision of direct, safe and attractive walking, cycling and public transport connections from the surrounding area” (NTA 2011).

The Dublin City Council Development Plan (2011-2017) also includes specific objectives in relation to cycle parking. Therein a stated objective (SIO11) is:

“To prepare and implement a Dublin Cycling Strategy which sets out the City Council’s cycling policies, targets and programmes, together with an annual report on progress towards objectives which will include:

- A new cycle parking strategy to provide guidance on the nature, quantum and location of cycling parking facilities in the city to address cycle parking needs at public transport stops and interchanges, and other key destinations and attractions” (DCC Development Plan 5.1.4.4).

Refer to Appendix A for a full list of references made in preparation of this report.

2.2

Commitment to Cycling

Following on from these established targets, a number of commitments have been made to help achieve these goals, to improve cycling across the city, and to establish cycling as a viable primary travel mode for the public. The National Cycle Policy Framework 2009 set out 19 specific objectives and 109 integrated actions committing to cycling related developments, including: cycle routes, signage, parking, maintenance, and urban design amongst others.

Significant investments in cycling infrastructure to date include:

- Premium Cycle Routes;
- 235km Primary Cycle Routes;
- 400km Secondary Cycle Routes;
- Bike-to-Work Schemes;
- Dublin Bikes; and
- Greater Dublin Area Cycle Network Plan (Dublin Metropolitan Area).



Figure 2.1: Coca-Cola Zero Dublin Bikes

These measures have led to significant increases in the volumes of cyclist travelling throughout Dublin City as demonstrated in the NTA’s Annual Canal Cordon Traffic Report 2006-2013. This shows that there has been an increase of



Figure 2.2: Grand Canal Premium Cycle Route

14.1% in number of cyclists crossing the canals between 2012 and 2013, and that between 2006 and 2013 the volume of cyclists increased by 87%.

2.3

Defining the need for cycle parking

The National Cycle Manual states that:

“The availability of appropriate bicycle parking facilities at either end of a trip will heavily influence the decision to travel by bicycle in the first instance.

The absence of such facilities, and the consequent risk of vandalism or theft, has been shown to undermine the investment in the overall network infrastructure.

Cycle parking is an integral part of any cycle network, but can also precede any dedicated cycle infrastructure, in order to address the cycle parking needs at the outset” (National Cycle Manual 2011).

3 Methodology

3.1

Introduction

The methodology undertaken in this report broadly follows Steps 1 to 4 of the 6 step process to *Developing and Implementing a Local Bicycle Parking Plan* outlined in the National Cycle Manual. These steps are outlined below.

- **Step 1 - Data Collection**
 - Mapping and assessing all existing public cycle parking in the study area and estimating the quantum of “private” cycle parking available;
 - Examining policy and guidance in relation to cycle parking; and
 - Identifying the existing cycle and travel demand patterns.
- **Step 2 - Spatial Analysis**
 - The assessment of existing and future parking demand by examining current and planned transport infrastructure, demographics and modal shift trends and targets.
- **Step 3 - Drafting the Plan**
 - Devising and recommending a strategy for the provision, management and security of cycle parking.
- **Step 4 - Public Participation**
 - For this study public participation comprises Stakeholder Workshops and direct consultation with key stakeholders to gain the views and feedback of key decision makers in the city.

The process involved with each step is detailed hereunder.

3.2**Step 1 - Data Collection**

Establishing a complete picture of the cycle parking network and usage characteristics throughout Dublin City centre is critical to the assessment of existing cycle parking demand and the identification of sites for cycle parking expansion.

To achieve this a sample number of cycle stands we initially mapped and assessed to ensure DCC/NTA agreement with regard to content, format and output. This progressed to the mapping of all cycle stands and hoops within the Study Area and a methodical qualitative assessment using data capture, spreadsheet and GIS software.

The identification of existing locations and recording of all associated site attributes which has been undertaken as part of this feasibility study has provided a detailed understanding of the current cycle parking network, particularly in regard to capacity, occupancy, condition, security, and the range of facilities available to the cycling community. This data combined with detailed analysis of cycle parking demand has allowed for the identification of sites for cycle parking facilities to be developed and expanded in line with the targets set out in section 2.1 of this report.

It should be noted however, that additional surveys should be conducted to establish cycle parking occupancy levels at individual sites throughout the day to enable development of a more accurate cycle parking demand profile. It is estimated that each city wide occupancy survey would take up to 10-12 full man days. This could also provide a greater understanding of existing “private²” cycle parking as this is likely to represent a considerable proportion of overall cycle parking supply in the city.

3.3**Step 2 - Spatial Analysis**

All factors contributing to the selection and expansion of cycle parking sites have been assessed and mapped as a means of identifying potential development sites. Mapped elements include employment centres, education facilities, town/district centres, transport hubs, leisure and sports centres, public event centres, and tourism and heritage destinations. Particular attention has been given to planned infrastructure, demographics, and travel characteristics associated with the residents of Dublin City centre as well as those who commute to it.

In addition to independent data analysis, information has been provided by DCC and the NTA, in particular in relation to the Greater Dublin Area (GDA) Cycle Network Plan. This includes proposed cycle routes and

² Private parking refers to the private provision of cycle parking facilities associated with businesses and residential buildings.

existing/future cycle SATURN model outputs, and development plan mapping which identifies development zoning.

The spatial analysis element has been split into three key outputs:

1. Demand Analysis;
2. Supply Analysis; and
3. Influencing Factors.

These key outputs are further expanded hereunder.

1 - Demand Analysis

This is principally based on two elements, the volume of cyclists travelling inbound through the canal cordons on a daily basis, and the volume of residents living within the project area whose primary means of travel is by bicycle.

Demand data is supplemented by POWSCAR means of travel information which is solely used to denote the destinations of people travelling to work, school, or college by bicycle within the project area.

2 - Supply Analysis

Divided into two sections: public cycle parking supply; and private cycle parking supply.

- Public cycle parking supply is informed by a detailed assessment of existing cycle parking infrastructure.
- Private parking supply is informed by survey data from DublinTown which assessed the volume of parking made available by 145 businesses operating within the project area. This data is not substantial enough to be utilised as a primary source, but has merely been included to provide an insight into typical private cycle parking provision in lieu of the necessary data which is not currently available.

3 - Influencing Factors

Influencing factors considered include current and planned public transport and cycling network; major developments; main transport hubs; cultural attractions; and key shopping destinations.

Each element has been mapped and assessed using GIS tools. Cross referencing these outputs informs the selection of potential cycle parking development and expansion by highlighting concentrations of cycle parking provision, cycling behaviour, trip attractors, and trip generators.

The production of “heat maps³” depicting these concentrations has been central to this assessment. Refer to Appendix B for a selection of the heat maps produced.

Heat maps have also been produced to show where the current demand exists for cycle parking, both in terms of demand associated with project area residents, and demand associated with commuters travelling into the project area. This differentiation of demand is key to informing decision making regarding the types of sites to be developed. Some estimation of other demand aspects has been undertaken, such as cycling in key retail areas. However, this analysis is based on limited available statistics and further surveys are recommended to achieve a more thorough understanding of retail related cycle parking requirements.

Furthermore, residential and employment based population projections have been applied to the project area to gain a sense of future growth patterns. Accounting for this growth allows for the identification of future demand concentrations, which in turn informs the identification of new cycle parking sites so that DCC and the NTA are positively positioned to cater for future demand.

3.4

Step 3 Draft Plan

Based on the output from the Spatial Analysis, this Dublin City Centre Cycle Parking Strategy Report identifies a strategy for the provision, management and security of cycle parking facilities in the city, including high density locations, expansion of existing on-street parking and development of rail and transport hub cycle parking locations. Potential sites have been identified in the Dublin City Centre Cycle Parking Locations Report.

3.5

Step 4 Public participation

Stakeholder consultation has been undertaken during the feasibility/data collection stage to gather stakeholder’s views and to gauge demand for cycle parking and to identify constraints and other particular requirements. This has included a round-table discussion at the outset of the project with key stakeholders including DCC, NTA and the Cycling Forum as well as an initial Workshop to present the study and to identify Stakeholder needs, opinions and attitudes in relation to cycle parking. An additional workshop was also held to outline the initial findings of the Draft Cycle Parking Strategy and Draft Cycle Parking Locations Report.

³ The term heat-mapping refers to the mapping specific features to highlight variations in their concentrations throughout an area. This allows for the identification of specific locations for further assessment.

4 Data Collection

4.1 Existing Public Cycle Parking Facilities

The survey of existing cycle parking was undertaken using smartphone enabled GIS software. Initially a sample selection of existing cycle parking facilities in the city centre were mapped and assessed using various criteria.

Following discussions with DCC and the NTA and further site review, the site location assessment criteria were refined. These criteria covered factors such as type of stand, number of stands, location, lighting, security, capacity, occupancy, proximity to network, and estimate of expansion capacity.

Using data capture, spreadsheet and GIS software, a detailed survey was then undertaken in a methodical fashion to record all publically accessible “on-street” cycle parking stands and hoop facilities in the study area. The survey was undertaken during the months of June and July 2014 and the individual sites were assessed based on the agreed criteria. Sites were also photographed and occupancy was recorded. The occupancy recorded provides a snapshot of facility usage although it should be noted that due to the project timetable the survey was undertaken during the school holiday period. The occupancy surveys therefore did not include for any potential demand associated with schools. As such further demand analysis surveys are recommended to determine more accurate usage characteristics at specific sites across different time periods.

A total of 387 existing on street cycle parking sites were identified across the project area. The estimated current capacity amounts to a total of 4,626 cycle parking spaces. The following table highlights the results of the existing public cycle parking survey.

Stand Type	No. of Existing Cycle Stands	Total number of cycle parking spaces
Sheffield Stands	2035	4070
Hoops	49	98
Stainless Steel	169	338
Railings	60	120
Total	2313	4626

Figure 4.1: Existing cycle parking facilities – Current Capacity (Halcrow Barry 2014)

Figure 4.2 below identifies the locations of cycle parking facilities surveyed.

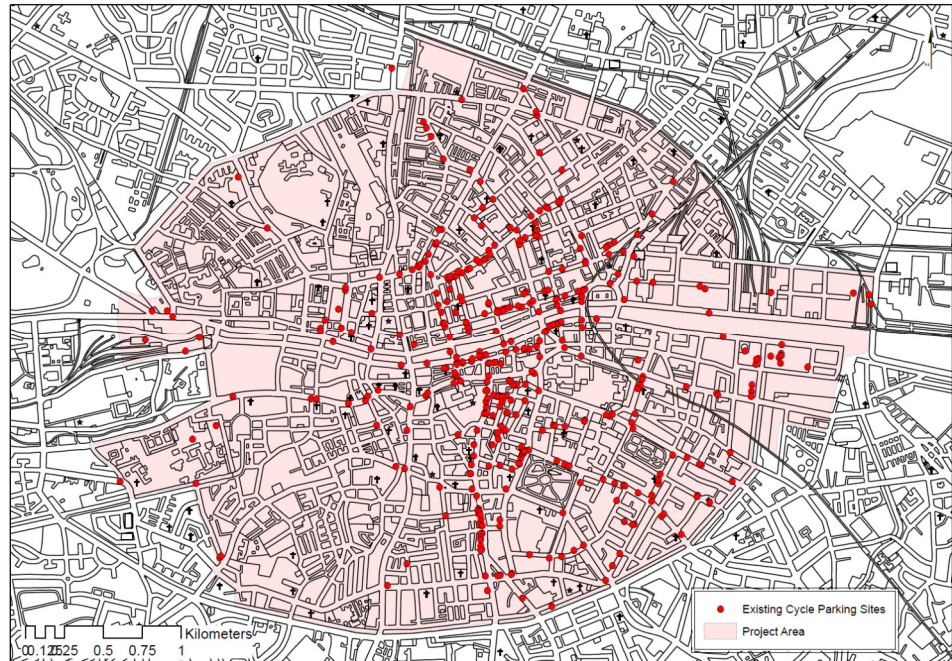


Figure 4.2: Existing cycle parking sites surveyed by Halcrow Barry (Halcrow Barry 2014)

4.2

Estimation of Private Parking Facilities

A survey conducted by DublinTown in August 2014 provides an insight into the current level of private cycle parking provision in Dublin city centre. This survey examined the cycling behaviour of 145 Dublin city centre businesses and included an assessment of cycle parking provision at these locations. Figure 4.3 provides an overview of the businesses that participated in this survey.

Number of Employees	Proportion of Business	Number of Businesses
1 to 5	22.8%	33
5 to 10	17.9%	26
10 to 20	15.2%	22
20 to 50	16.6%	24
50 to 100	11.0%	16
100 to 250	4.8%	7
250 +	11.7%	17

Figure 4.3: DublinTown cycling study – Profile of 145 surveyed businesses (DublinTown 2014)

Overall, 44% of businesses surveyed stated that they provide private cycle parking facilities for employees. This amounts to a total of 1,723 cycle parking spaces. Additional qualitative data was recorded which is useful in putting this volume of private cycle parking provision into context and assessing the opportunities and constraints associated with future private cycle parking provision.

When asked ‘how many private cycle parking spaces does your business provide for employees?’ two of the businesses gave responses of “lots” and “unlimited”. This suggests the total volume of cycle parking supplied by these 145 businesses is likely to be greater than 1,723.

Participants were also asked “would you consider adding or expanding the facilities you offer to staff who cycle?” (DublinTown 2014). In response, there was roughly a 50/50 split between yes and no. Of the businesses who said no, the majority quoted a lack of space as the reason that they wouldn’t provide or expand facilities. The issue of cost was the second most frequent response given.

According to the survey respondents, the most common reasons preventing businesses from developing or expanding private cycle parking facilities are listed in figure 4.4 below.

Reasons for not providing or expanding private cycle parking facilities	
1	Lack of Space
2	Cost
3	Protected structure prevents it
4	No control to develop it

Figure 4.4: Most common reasons preventing businesses from developing or expanding private cycle parking facilities.

As one would expect, the study suggests that there is a range of cycle parking available in terms of capacity across the businesses surveyed, from a single space to several hundred. However, there is no indication of what businesses provide what level of parking and where they are located. This is due to confidentiality restrictions and unfortunately it prevents further examination of this aspect. As previously mentioned, this data is not substantial enough to be utilised as a primary source, but has merely been included to provide an insight into typical private cycle parking provision in lieu of the necessary data which is not currently available.

The survey suggests that a substantial volume of private cycle parking is currently provided throughout the City centre and it is of critical importance for future investment that a greater understanding of the scale of this provision is achieved. It is recommended that a comprehensive survey of private cycle parking provision is undertaken to establish baseline estimates to inform future rollout of infrastructure.

5 Existing Cycle Parking Demand

5.1 Introduction

Determining the current level of demand for cycle parking requires analysis of the project area's population demographics, cycling traffic statistics and bicycle use. These elements enable the development of a clearer understanding of current cycling behaviour and cycling traffic patterns. To assess these patterns it has been necessary to look at several data sources, these include:

- Dublin City Council Canal Cordon Traffic Counts;
- Central Statistics Office (CSO) Census 2011 population and means of travel data; and
- CSO place of work, school or college census of anonymised records (POWSCAR 2011) data.

This data has allowed for the assessment of cycling behaviour on several levels, namely: bicycle use as a commuting mode, cycle traffic into and out of Dublin city centre, and concentrations of cyclists throughout the project area.

Gaining an understanding of the different types of hubs for cycling activity will allow for a more informed decision when selecting the type of cycle parking that should be put in place. For example, hubs which are exclusively residential, may be more suited to the on-street bicycle lockers currently being trialled by Dublin City Council (DCC Beta Projects), whereas the type of high density cycle parking currently in place at Drury street may be more suited to commuter hubs.

To a certain extent the canal cordon traffic count data and POWSCAR commuter means of travel data reflect the same traffic volumes. To avoid statistical duplication they should not be added together. However, both sources have been used in this analysis as the canal cordon counts represent the most accurate source in terms actual traffic volumes entering the city centre, whereas the POWSCAR data is the only source available for the actual destinations of commuter traffic. POWSCAR does not represent other journey types such as retail or recreational trips, nevertheless it remains an important indicator of mode use.

5.2 **Dublin City Council Canal Cordon Traffic Count Data**

5.2.1 *Data Collection & Analysis*

The canal cordon traffic counts are undertaken annually over a two day period. Data is gathered between 07:00 and 19:00 at the 33 locations marking the entry and exit points of the city centre. To assess the results, the average traffic levels over the two days has been calculated for each site and for each of the time intervals defined in the survey.

The relevance of the canal cordon traffic counts to the cycle parking strategy is threefold:

- a) The data provides accurate mode share information in terms of vehicle trips;
- b) It is the most accurate source available to ascertain the actual volume of cyclists entering the project area on an average day; and
- c) The survey results allow the creation of a detailed profile of cycling traffic throughout the day and across each of the city's entry and exit points.

5.2.2 *Mode Share & Traffic Volumes*

According to the "National Transport Authority's summary results report for the Dublin city canal cordon counts 2006 – 2013 "there was an increase of 14.1% in the number of cyclists crossing the canal cordon between 2012 and 2013. A total⁴ of 9,061 cyclists were counted in 2013 compared to 7,943 cyclists in 2012 "(NTA 2013).

Between 2006 and 2013 the volume of cyclists crossing the canal cordon during the morning peak period has increased by 87.2%. In 2013 cyclists represented 10% of total inbound vehicle traffic between 07:00 and 10:00. Looking at the volume of person trips, the proportion of cyclists is 4.7% of the total 192,188 people entering the city centre.

5.2.3 *Daily Traffic Flows across the Canal Cordon Sites*

The level of cycling traffic into and out of the city is by no means consistent, either throughout the day or across each of the counter locations. Figures 5.1 and 5.2 below demonstrate this, highlighting

⁴ Total here refers to traffic during the peak period between 07:00 and 10:00 which is the focus of this report. The average daily cycling traffic inbound through all Canal Cordon count locations in 2012 was approximately 16,500 between 07:00 and 19:00.

morning and evening peaks, and concentrations of traffic⁵ at certain cordon locations (NTA 2013).

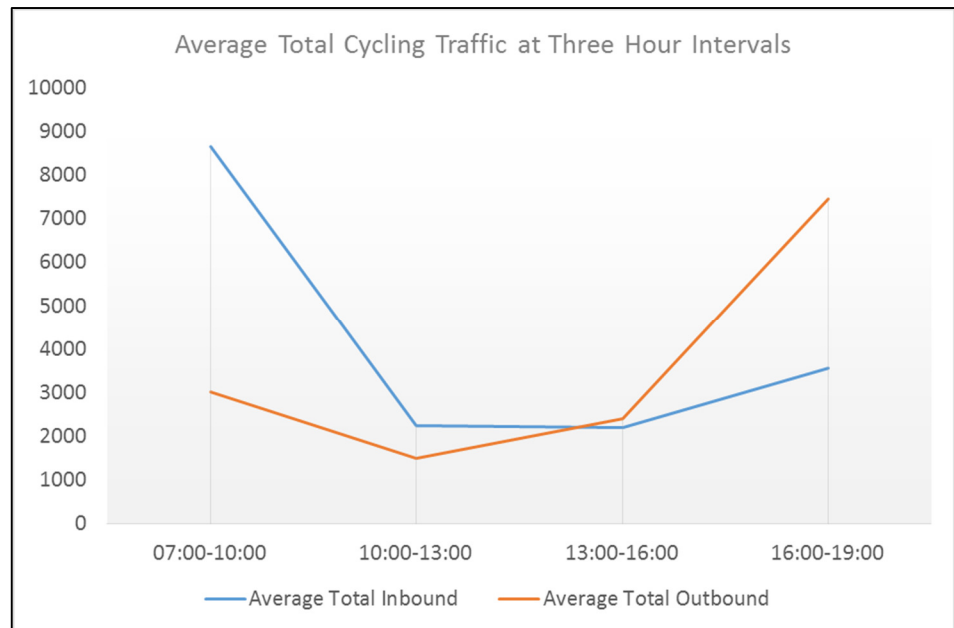


Figure 5.1: Cycling traffic at three hour intervals averaged over the two days of the annual traffic count survey (DCC 2012⁶, Canal Cordon Traffic Counts Statistics – Raw Data).

⁵ The raw data does not provide the detail necessary to account for occupancy. As such, the values quoted refer to vehicle trips (with the exception of pedestrian traffic) and corresponding conclusions should be considered in this context.

⁶ In this report prior reference has been made to 2013 Canal Cordon Traffic Count data and this is based on the National Transport Authority's summary results report for the Dublin city canal cordon counts 2006 – 2013 rather than the complete raw dataset which was unavailable at the commencement of this study. As such, raw data for 2012 has primarily been used to inform the detailed analysis of Canal Cordon Traffic Counts.

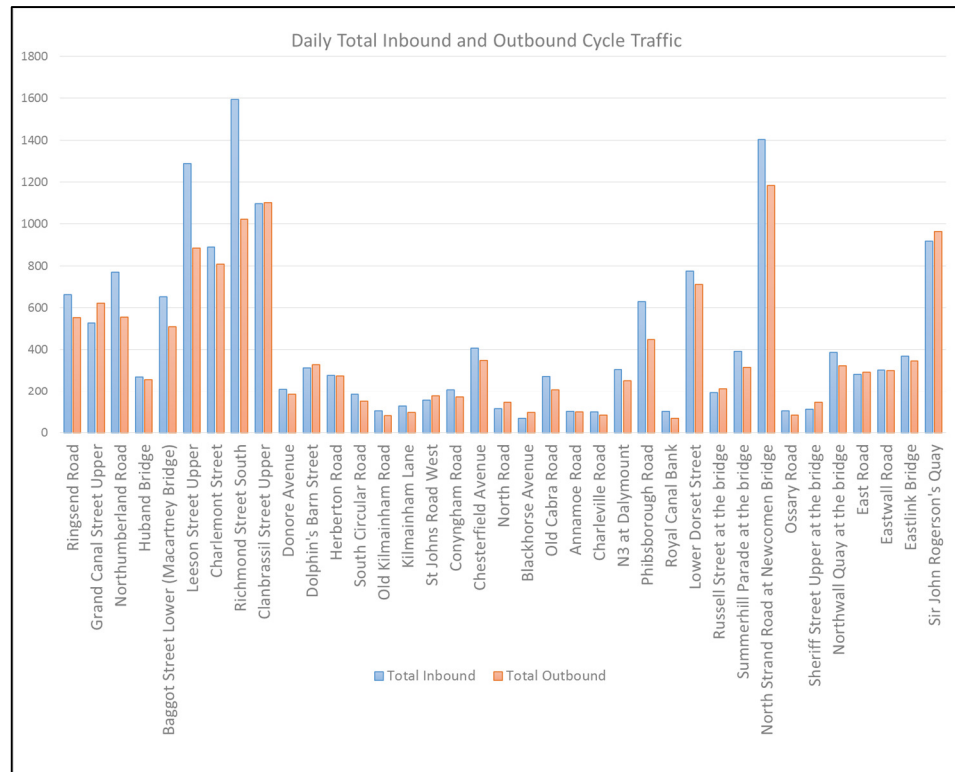


Figure 5.2: Daily inbound and outbound cycle traffic - Average total across the two days of surveying (DCC 2012, Canal Cordon Traffic Count Statistics – Raw Data).

Generally there tends to be more cyclists entering the city than exiting it over the period covered by the survey. This most likely suggests that the balance of inbound traffic is leaving after 19:00 when the survey concludes.

Appendix C, Tables 1, 2 and 3, provide a more detailed overview of the traffic count data collected by Dublin City Council at cordon count locations in 2012.

5.3 Central Statistics Office (CSO) Census 2011

5.3.1 Data Collection & Analysis

While the canal cordon traffic counts provides us with the total volume of cyclists entering the city on a daily basis, analysis of 2011 Census data allows us to determine the volume of cyclists living within the project area and their mode share across different areas of the city. In line with this, the commuting population of the project area can also be determined

To maximise the level of detail that can be achieved in this aspect of the assessment, the analysis has been undertaken on the scale of small areas⁷ which have been defined by the Central Statistics Office. This

⁷ “Small Areas are areas of population comprising between 50 and 200 dwellings created by The National Institute of Regional and Spatial Analysis (NIRSA) on behalf of the Ordnance Survey Ireland (OSI) in consultation with CSO. Small Areas were designed as the lowest level of geography

allows us to divide the city into more than 500 areas which can be individually analysed.

The total population of the small areas, wholly or partially contained within the project area, was approximately 120,000 in 2011. Of this total, 73,294 residents commute to work, school or college. Of this commuting population, 7.31 percent travel by bike, which is a total of 5,356 commuting cyclists.

5.3.2

Resident Cyclist⁸ Concentrations

Significant volumes can be seen across the project area, but resident cyclists are most prevalent on the outskirts in several areas of the city's east and west sides. The distribution of resident cyclists across the study area is detailed in Figure 5.3 following.

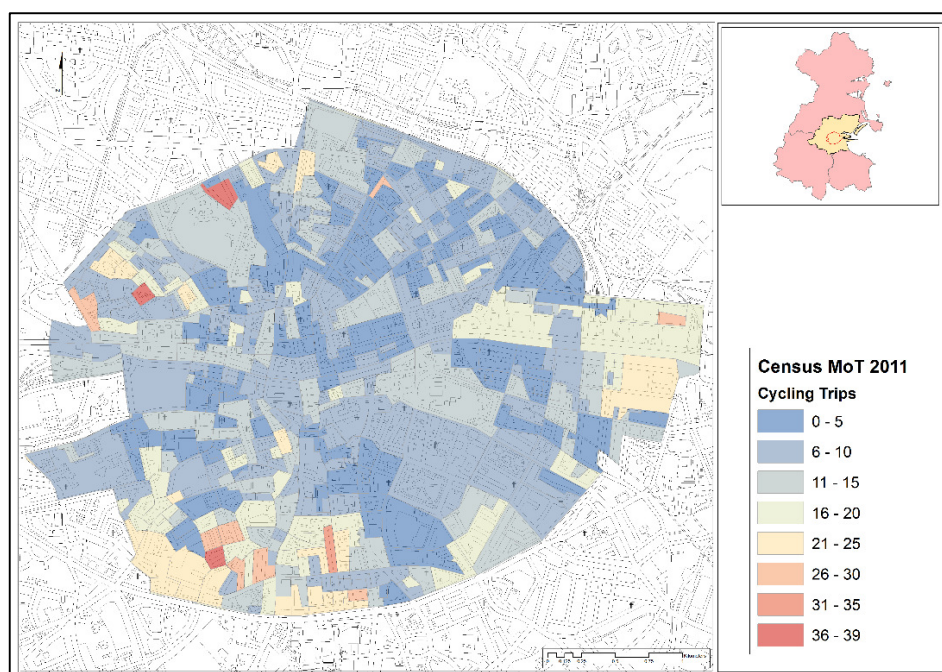


Figure 5.3: Means of Travel (MoT): City centre resident cyclists 2011 (CSO Census 2011 Small Areas)

The population range across all small area sites is between 75 and 1,941 people. The rate of cycling to work, school or college varies relatively significantly across the project area, from a high of 22% to a low of zero. To put these zero value zones into context, their total populations range between 96 and 241 people. Figure 5.4 below provides an overview of the Census 2011 means of travel statistics for residents of the small areas of

for the compilation of statistics in line with data protection and generally comprise either complete or part of townlands or neighbourhoods. There is a constraint on Small Areas that they must nest within Electoral Division boundaries. Small areas were used as the basis for the Enumeration in Census 2011. Enumerators were assigned a number of adjacent Small Areas constituting around 400 dwelling in which they had to visit every dwelling and deliver and collect a completed census form and record the dwelling status of unoccupied dwellings. The small area boundaries have been amended in line with population data from Census 2011” (Central Statistics Office).

⁸ For the purposes of this assessment resident cyclists are defined as cyclist living within the project area.

the city centre. It shows that walking is by far the most common means of transport, followed by bus or coach users and next by car drivers. Cycling is the fourth most popular mode.

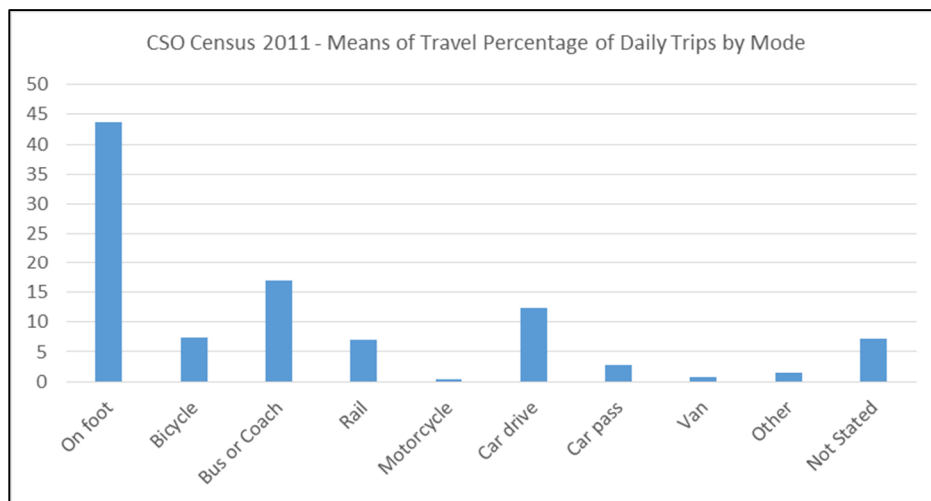


Figure 5.4: CSO Census 2011 Small Areas – Means of Travel Percentage of Daily Trips of city centre residents by Mode (Central Statistics Office Census 2011)

5.4

5.4.1

Demand within Specific Locations (POWSCAR Data)

Traffic Volumes & Mode Share

Further detail on the level of commuter cycling journeys to the project area has been identified through the analysis of CSO POWSCAR⁹ data. POWSCAR data reflects a similar proportion of the city centre cycling traffic to the canal cordon traffic count data. Cordon traffic counts provide the most accurate means to determine traffic volumes, whereas POWSCAR allows us to isolate concentrations of cycling traffic with the same small area boundaries used to assess resident cyclists. Within our research POWSCAR is solely used for the purpose of identifying demand locations.

Figure 5.5 below provides an overview of the modal distribution of traffic entering the project area according to the POWSCAR survey.

Mode	All Modes	On Foot	Bicycle	Bus or Coach	Rail	Motorcycle
Total	220,977	40,330	14,917	53,586	38,586	2,331
Percentage	100%	18%	7%	24%	17%	1%
Mode	Car Driver	Car Passenger	Van	Other	Work at Home	Not Stated
Total	61,582	6,666	1,465	156	145	1,223
Percentage	28%	3%	1%	0%	0%	1%

Figure 5.5: POWSCAR 2011 – Daily modal distribution for commuter trips into Dublin City Centre (CSO POWSCAR 2011)

⁹As part of the Census 2011 processing programme the place of work, school or college details were geo-coded. All workers resident in Ireland on Census night were coded to their place of work and all Irish resident students from the age of 5 and upwards were coded to their place of school/college. A detailed file containing the demographic and socio-economic characteristics of these residents along with information on the origin and destination of their journeys is available for analysis under strict conditions and has been used by in the form of a special tabulation put together by the CSO following formal request.

This data shows us that 220,977 people travel into the project area on a daily basis. In contrast to the traffic associated with residents of the project area, the majority of POWSCAR journeys are made by car drivers. These account for 61,582 person trips. Bus users closely follow car drivers with 53,586 trips, and walking is the third most used mode, representing a total of 40,330 trips. Cyclists account for 6.75% of these commuters, with 14,917 choosing this mode. This places cycling as the fifth most popular mode following rail, which accounts for approximately 17% of person trips.

5.4.2

Cyclists Travelling into the Project Area

Mapping the POWSCAR data highlights the primary destinations for cycling commuters into the project, as illustrated in Figure 5.6 following.

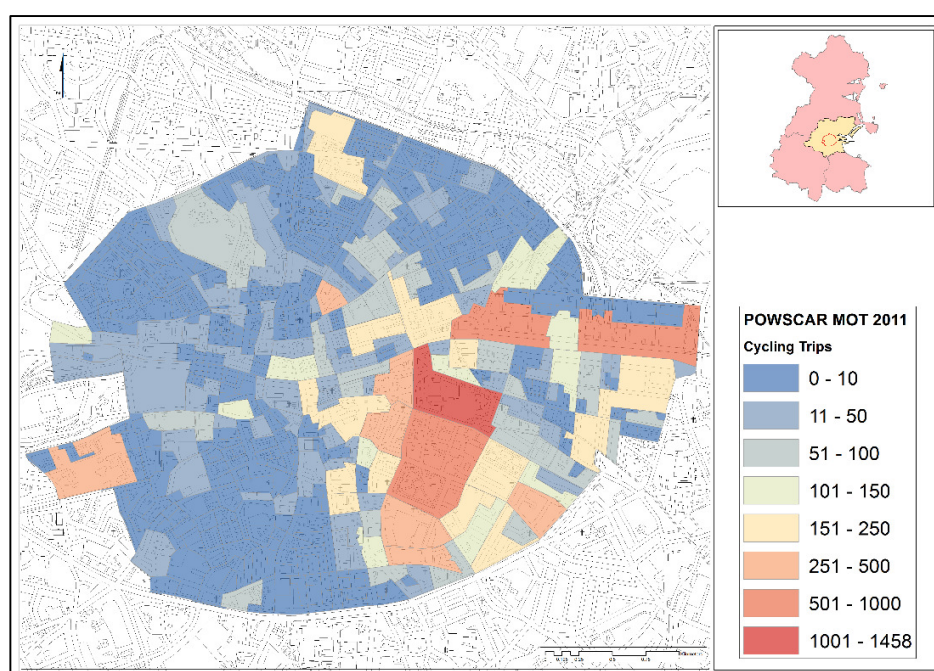


Figure 5.6: POWSCAR Means of Travel (MoT) 2011 – Daily trips to work, school, or college by bicycle (CSO 2011).

Concentrations of commuter cyclist destinations are particularly evident from Trinity College to Stephens Green, the areas surrounding Harcourt Street, Earlsfort Terrace, Leeson Street and from Grafton Street West as far as Aungier Street as well as from Custom House Quay as far as the 3 Arena. Additionally, for cyclists and overall commuter travel, St. James's Hospital in the south-west of the city and the Mater Hospital in the North of the city represent significant hubs.

5.5 Summary of Key Concentrations of Cycling Traffic & Traffic Volumes

Figure 5.7 following summarises the current estimate of the two key contributors to cycle parking demand; cyclists traveling into the city and cyclists living in the city.

Traffic Type	Year	Mode Share	Traffic
Inbound Canal Cordon Traffic at 33 Count Sites	2012	6.57% of vehicle trips	14,917
Cyclists Living Within the Projected Area	2011	7.31% of person trips	5,356
Total			20,273

Figure 5.7: Summary of current cycle parking demand for Dublin City centre

It can be seen that cyclists living in the city centre account for approximately 25% of the total cycling traffic within the project area.

5.6 Other Elements Contributing to Existing Cycle Parking Demand

Although the canal cordon traffic counts and census means of travel data provide the base cyclist volumes which inform required cycle parking provision, further assessment is necessary to gain an insight into the locations where parking should be provided. This has been achieved to a certain extent through the analysis of POWSCAR data, however, this relates specifically to journeys to work, school, or college, and does not indicate demand associated with other trip purposes such as retail journeys or recreational trips.

Travel associated with other factors such as main cultural and social attractions, transport hubs, and cycle routes have also been assessed as additional parking provision is required to meet the needs of these journeys.

Cyclists travelling to specific destinations will likely stop along their route on occasion for a variety of reasons and may require additional parking to facilitate or even encourage these stops. Although detailed statistics are not available, it is also probable that many people arriving in Dublin City centre by public transport continue, or indeed could choose to continue, their journey by bicycle, for example by utilising Dublin Bikes. Similarly, many people may also cycle to public transport hubs. Ensuring adequate cycle parking provision at transport hubs not only facilitates these trips, but may also encourage more people to choose this multimodal approach as a viable travel option. This would further assist in achieving targeted mode share increases and is an aspect which is recognised within the objectives of the National Cycle Policy Framework (NCPF) 2009. Analysis of these additional factors has been undertaken and is described in the sections that follow.

5.6.1

Demand Associated with Transport Hubs

Figure 5.8 below provides a representation of all rail transport hubs within or immediately adjacent to the project area. It shows the daily footfall of passengers boarding and alighting at these locations. In considering the data relating to Luas stops, it should be noted that passenger numbers are based on census data gathered for a single day in November 2013. Therefore it may not necessarily be representative of travel throughout the year.

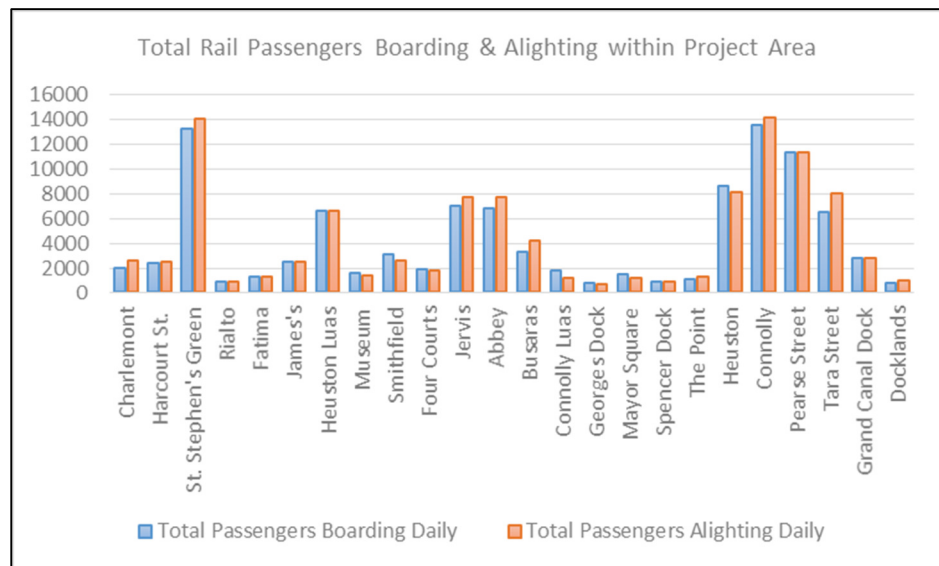


Figure 5.8: Total Rail Passenger Numbers Boarding & Alighting within the project area daily (Luas Statistics 2013 – NTA, Heavy Rail Statistics 2012 NTA – Rail Census 2012).

This data is also represented in figure 5.9 below which divides each stop by rail line. Comparing the totals for each mode shows that all Luas stops combined carry more people than heavy rail. Connolly Station (heavy rail) is the busiest station in terms of alighting passengers, with 14,128 passengers entering the city centre at this location daily. The St. Stephen's Green stop on the Luas Green Line is the second busiest rail transport hub with 13,977 passengers alighting here daily. Pearse Street, Tara Street, Heuston Station (light and heavy rail), Jervis Street, and Abbey Street are also significant passenger carriers.

As Connolly Station and Heuston Station represent both light rail and heavy rail hubs the statistics can be somewhat deceptive. Cumulating the totals for each of these in each case provides a true reflection of the actual traveller volumes in these areas. This shows that Connolly Station remains the busiest entry point to the city centre, accounting for 15,383 passengers while Heuston Station ranks second with 14,705 alighting passengers.

Line	Station	Total Passengers Alighting Daily	Total Passengers Boarding Daily
Green Line	Charlemount	2,635	2,069
	Harcourt Street	2,492	2,421
	St. Stephens Green	13,977	13,248
Red Line	Rialto	884	924
	Fatima	1,340	1,375
	James	2,562	2,526
	Heuston	6,607	6,639
	Museum	1,451	1,629
	Smithfield	2,598	3,174
	Four Courts	1,819	1,886
	Jervis	7,677	7,001
	Abbey	7,711	6,818
	BusAras	4,232	3,308
	Connolly	1,255	1,874
	Georges Dock	691	818
	Mayor Square	1,265	1,543
	Spencer Dock	938	950
	The Point	1,300	1,158
Light Rail Total 2013		61,434	59,361
Dart and Commuter / National Rail Services	Heuston	8,098	8,650
	Connolly	14,128	13,477
	Pearse Street	11,271	11,312
	Tara Street	7,971	6,556
	Grand Canal Dock	2,833	2,825
	Docklands	1,048	811
Heavy Rail Total 2012		45,349	43,631
Total Light and Heavy Rail		106,783	102,992
Total Light and Heavy Rail - Inbound Boarding and Alighting		209,775	

Figure 5.9: Passenger Numbers Boarding & Alighting within the project area Daily (Luas Statistics 2013 – NTA, Heavy Rail Statistics 2012 NTA – Rail Census 2012).

In terms of passengers boarding at these location, Connolly is again the busiest station, Heuston remains in second position, and St. Stephen's Green ranks third. Pearse Street station also accounts for a large volume of passenger boardings with a significantly greater number of passengers than the other remaining stops.

While this section has only looked at rail transport hubs, as statistics for bus passengers are not available for specific sites, the analysis of cycle

parking provision does include Bus Áras as a key transport hub as it is the most prominent departure and arrivals point in the city for regional bus services.

The data available does not break down passenger numbers at each station each hour and it is unknown how many alighting passengers undertake the next leg of their journey by bicycle. It is therefore very difficult to approximate the maximum number of cycle parking spaces required at each location, and whether or not existing cycle parking is adequate. It is therefore recommended that further surveys and analysis are undertaken in this regard,

5.6.2

Demand Associated with Cycle Routes

As part of the Dublin Cycle Network Plan 2013, cycling demand related to specific traffic routes was assessed. Figure 5.10 below identifies this demand within Dublin City centre and across the surrounding arterial routes. The map is an output from a model assessing traffic flows across the Greater Dublin Area. The Dublin Cycle Network Plan report describes the main cycle traffic circulation routes during the morning peak as weighted “towards the eastern part of the City centre and, in particular, to the office district in the south-eastern part between College Green and Ballsbridge. This is as a result of two factors: the traditional concentration of offices in the southern Georgian district around Merrion Square and Ballsbridge; and the recent major redevelopment of the Docklands area to accommodate major office buildings in a concentration that is greater than elsewhere in the city” (Dublin Cycle Network Plan 2013).

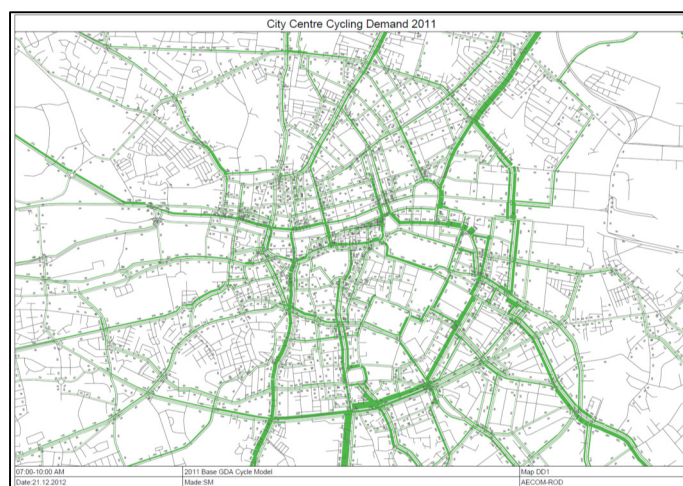


Figure 5.10: City Centre Cycling Demand 2011 – Morning Peak (Dublin Cycle Network Plan 2013).

Although the route related demand is less significant than the actual destinations of cycle traffic in the context of cycle parking provision, it has assisted with the identification of geographic areas where cycling is especially high.

5.6.3

Demand Associated with Key Retail Areas

Chapter 10 of the Dublin City Development Plan 2011 – 2017 identifies two principal shopping districts within the city centre, Henry Street and surrounding areas, and Grafton Street and surrounding areas.

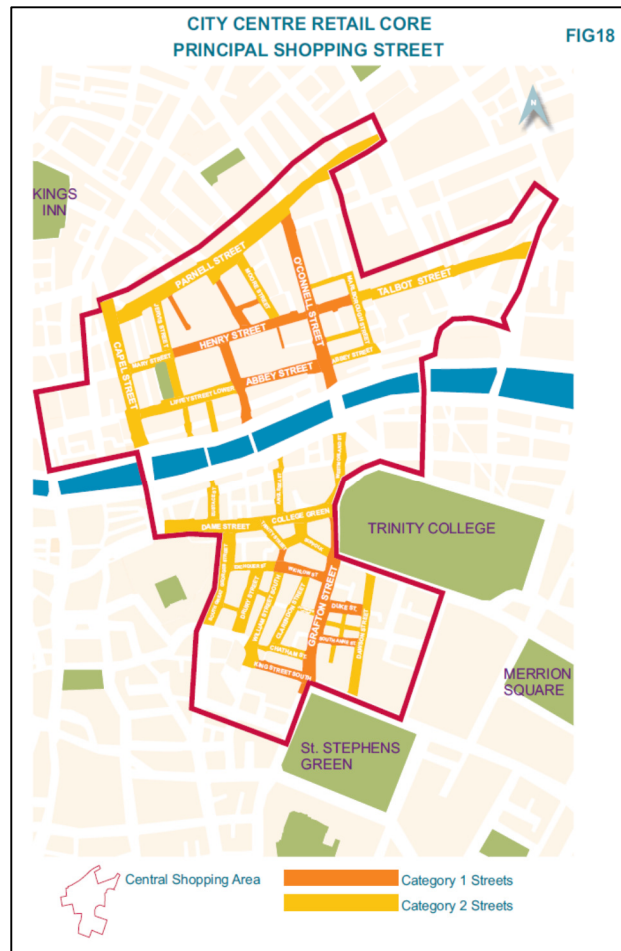


Figure 5.11: Shopping districts: Principal shopping streets within Dublin City centre (DCC Dublin City Development Plan 2011 – 2017).

Figure 5.11 above outlines these principal retail destinations. The Dublin City Development Plan defines Dublin's principal shopping streets as Category 1¹⁰ and Category 2¹¹ streets and these classifications are useful in considering the type of cycle parking that is suited to these locations.

The primary data source available to assess the level of traffic within the retail core is Dublin City Council's pedestrian traffic count data. Pedestrian traffic counters are positioned in a number of locations throughout the city including the primary Category 1 shopping areas of Grafton Street and Henry Street.

¹⁰ Category 1 streets include “the main shopping streets as well as shopping malls and arcades. They are located within the area defined as the City Centre Retail Core. In order to realise the objectives of the Retail Core Framework Plan and to strengthen the retail offer of the city centre, the land use objectives will be in favour of higher order retail use at ground floor level” (DCC Dublin City Development Plan 2011 – 2017).

¹¹ Category 2 streets include “those which already have a mix of retail and non-retail uses. In order to strengthen the retail character of these streets, further development of retail frontages will be encouraged. Complementary non-retail uses such as a cafés and restaurants that add to the vibrancy of the street and create a mixed-use environment to provide for a more integrated shopping and leisure experience, will be considered favourably but with regard also to the primary retail function of the street” (DCC Dublin City Development Plan 2011 – 2017).

Assessment of Pedestrian Traffic Flows

The pedestrian counters provide data for both inbound and outbound traffic. Within the scope of this assessment, the inbound traffic provides adequate data to allow us to approximate cycle traffic. Cumulating figures for both directions would also lead to a level of duplication. Although there is likely to be a significant level of through pedestrian traffic, particularly on Grafton Street, many cyclists are also likely to return along the same route to get back to their parked bicycles. The time people spend away from their bicycles is an additional consideration in determining parking requirements, but this aspect has not been identified in the data sources made available.

Figures 5.12 and 5.13 below illustrate the average hourly pedestrian traffic volumes over 24 hours on Henry Street and Grafton Street in 2013. The data also reflects the average daily variation in traffic levels.

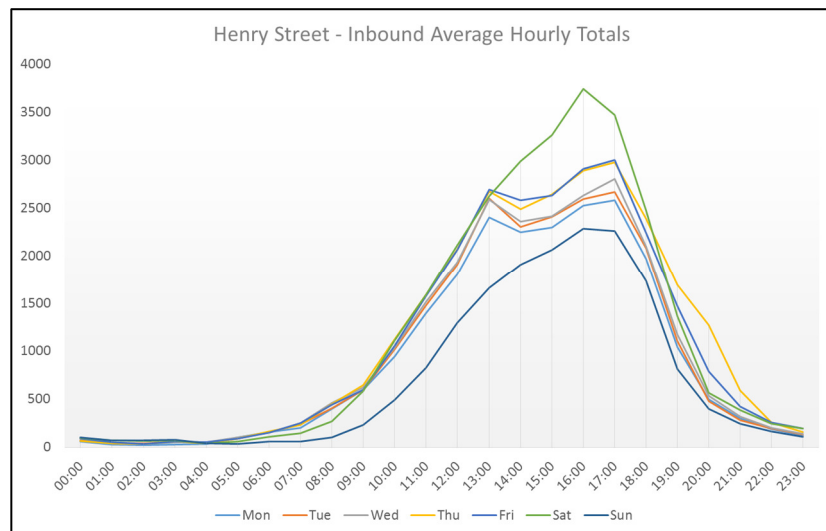


Figure 5.12: Henry Street Pedestrian Traffic – Inbound Average Hourly Totals (DCC Raw Pedestrian Count Data 2013).

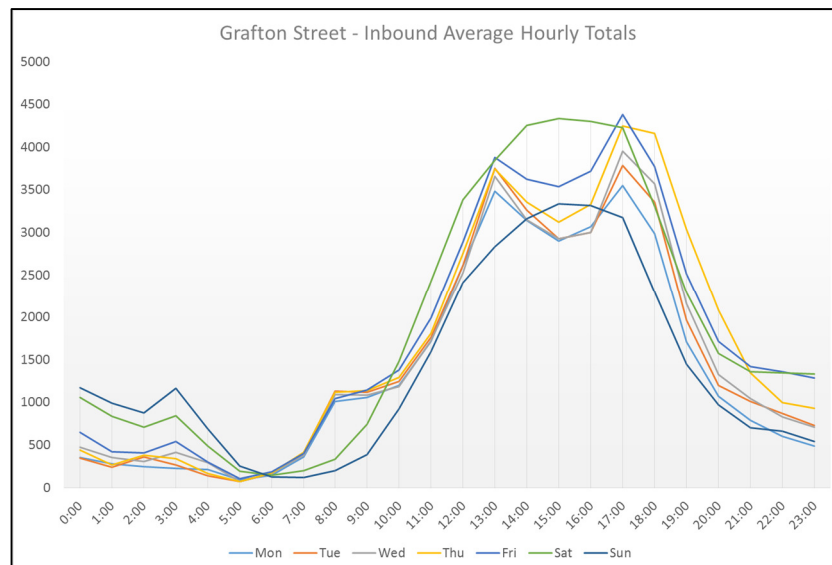


Figure 5.13: Grafton Street Pedestrian Traffic – Inbound Average Hourly Totals (DCC Raw Pedestrian Count Data 2013).

The flow of pedestrian traffic on Grafton Street, as shown in figure 5.13 above, has a more consistent profile than Henry Street, with a far higher level of evening and night-time pedestrian traffic.

The differences in traffic characteristics between Henry Street and Grafton Street are quite clear. The data alludes to the location of each street within the city. Grafton Street's higher levels of night-time activity reflect the proximity to a vast number of pubs, clubs, restaurants, and social venues, as well as the importance of the street as a main thoroughfare.

Estimating Cyclist Volumes

Looking at pedestrian flows provides an insight into the footfall characteristics in these areas. Comparing this with other available data we can approximate the number of cyclists travelling to these locations. The basis of this estimated cycle traffic is the DIT Arrow Report on Shopper Travel Behaviour in Dublin City Centre 2011¹². This is the most recent survey of its kind, and it is the only source available which provides an indication of the mode share of people moving through the Grafton Street and Henry Street areas.

The shopper travel behaviour study interviewed 1,009 people in total, 513 on Grafton Street and 496 on Henry Street. The study found that the mode share of cyclists on Grafton Street was 9%, which was three times more than Henry Street, where cyclists represented just 3% of the total traffic. Applying these findings to DCC's pedestrian footfall data shows that on an average day, 3,434 cyclists visit the Grafton Street area, compared to 709 cyclists traveling to the Henry Street area.

The highest hourly pedestrian footfall value on any given day for an average week are listed in figure 5.14 below. Applying the mode share values to these figures provides a value for the maximum number of cyclists visiting these areas on an hourly basis according to the available statistics.

Street Name	Highest Average Hourly Footfall	Volume of Cyclists according to observed mode share
Henry Street	3,737	112
Grafton Street	4,385	395

Figure 5.14: Highest Daily Average Hourly Pedestrian Footfall and Associated Cyclist Volumes (DIT Arrow Shopper Travel Behaviour Study/DCC Pedestrian Traffic Counts).

¹² It should be noted that the shopper travel behaviour study did not collect any data on weekend traffic at these locations. The survey was undertaken midweek between 15:00 and 18:00 in March 2011.

The estimated cycle parking requirement in these areas is likely to be higher than suggested for a number of reasons. Cyclists visiting surrounding areas may use the same parking facilities, and cumulative effects whereby bicycles build up over time if more cyclists arrive than depart. Additionally, the basis of the mode share estimates is the shopper behaviour study undertaken mid-week in the late afternoon. Although this provides a valuable snapshot, it has been shown that significant traffic occurs throughout the day, particularly around lunchtime, as well as at weekends. For these periods the mode share is unknown.

5.6.4

Current Demand Associated with Key Attractors

In considering cycle parking requirements the key cultural and social attractions throughout Dublin City centre have been assessed. Figure 5.15 below illustrates and compares the average volume of daily visitors to these points of interest.

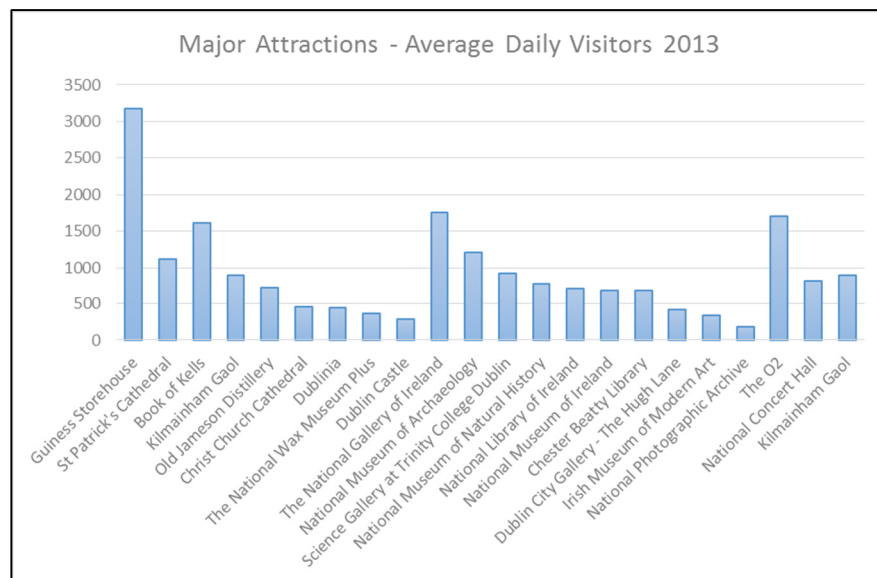


Figure 5.15: Average Volume of Daily Visitors to Key Cultural and Social Attractions within or in close proximity to Dublin City Centre (Fáilte Ireland 2013).

The total footfall across these locations amounts to 23,010 visitors on average per day. In applying this data to our demand analysis, consideration has been given to the fact that a number of the venues listed would not actually have this level of footfall on a daily basis, but would attract far higher numbers on particular days less frequently throughout the year. Concert and event venues represent such places, for instance: the 3 Arena (previously known as the O2); the National Concert Hall; and the Guinness Storehouse.

Croke Park and Dublin Zoo also fit within this category and represent extremely important attractors, in fact they are both ranked amongst the top attractors in Dublin. Although their locations are just outside the project area they have been accounted for in this assessment. Several other

prominent attractions are not listed in figure 5.15 above as their associated visitor numbers are unknown.

Figure 5.16 below highlights the distribution of all identified cultural and social attractions across the project area. The scale used to define the area surrounding each site is based on guidelines for acceptable cycle parking distances depending on function, time and service levels, as proposed by the Danish Cyclists Foundation in their Cycling Manual 2008. The manual suggests that 0m – 5m is appropriate for shopping streets, 5m – 10m for other shopping destinations, 10m – 30m for day parking, and 30m – 100m for 24 hour and night parking. The DCF suggest that “the duration of the parking decides how far cyclists are prepared to walk from the parking facility to their final destination and this is a key consideration of the cycle parking strategy.

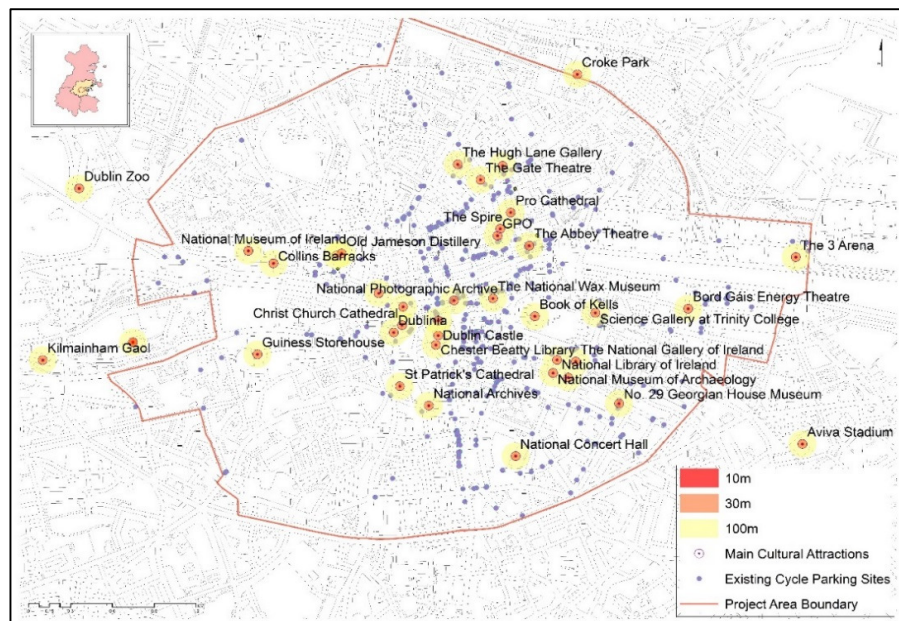


Figure 5.16: The Distribution of Key Cultural and Social Attractions within or in close proximity to Dublin City Centre in Relation to Existing Cycle Parking Facilities (Halcrow Barry 2014).

From figure 5.16 it is clear that although many of these key attractions are centrally located and have some level of cycle parking provision nearby, many venues have none at all within close proximity. Several key destinations within the city centre have an unknown level of cycle parking. Education institutions, such as the many Dublin Institute of Technology (DIT) premises scattered throughout the project area (but which are to be brought together into Grangegorman over a phased period), represent zones where cycle parking knowledge gaps exist and further assessment is required.

Trinity College is another example of such a destination and has been noted in other aspects of our analysis as being an important cycling hub within the city. Although it has been possible to gather some information

on specific details, aspects such as access restrictions and facility types are unknown. It has been identified that approximately 1,000 official bicycle parking spaces are provided within Trinity College and temporary parking facilities are placed throughout the campus during the college year and removed during the summer. Despite the current level of provision it has also been identified that a problem with haphazard cycle parking within the college still exists.

Undertaking a detailed assessment of all institutions which might provide substantial cycle parking volumes is a significant exercise, and although this is beyond the scope of this project, it is recommended that such an exercise be undertaken in the future and that it should be considered in combination with any assessment of other potential sources of privately supplied cycle parking.

5.7

Summary of Existing Cycle Parking Demand

The factors influencing commuter demand have been examined in detail within this section. Particular focus has been on deriving cycle parking demand associated with commuter traffic based on two key sources, canal cordon traffic counts and Census data. These sources have allowed for accurate estimates of traffic volumes, and further detailed assessment of POWSCAR data has provided the means to visualise the spatial distribution of this traffic. Through POWSCAR it has been possible to isolate areas representing key cycle traffic concentrations, and consequently areas where cycle traffic is minimal.

Although it has been shown that cycle parking demand is primarily based on commuter traffic, that is, cycle traffic travelling inbound through the canal cordon during the morning peak and cycle traffic associated with people living within Dublin City centre, several other contributing factors also need to be accounted for. The City's main attractions, retail areas and social hubs have also been shown to generate significant cycle traffic volumes. In regard to this, associated cycle traffic estimates have been made to give a sense of the proportionate representation of these demand aspects. However, it has been noted that existing data sources are limited and tend to undermine any efforts to derive accurate figures. As such, a key recommendation is that detailed surveying, which takes into account travel behaviour, should be undertaken. The findings of such an exercise would prove invaluable in accurately predicting cycle parking demand beyond commuter traffic and would complement existing high quality datasets such as cordon counts, Census data/POWSCAR, and City centre footfall counts. This is similarly true in relation to the recommendation of a survey to establish the current level of private cycle parking supply, an aspect where it has been highlighted that there is a significant lack of data.

6 Future Cycle Parking Demand

6.1 *Projected Demand*

The National Transport Authority's population growth projections for 2030 have been used to estimate the growth in cycling traffic within the project area. Details of this process are discussed in the following sections.

For the purposes of this assessment the maximum total demand for cycle parking spaces at any one time is estimated to be equivalent to the volume of traffic travelling through the canal cordon inbound during the morning peak plus the total volume of cyclists living within the project area.

6.2 *Projected Population Growth*

The NTA's population growth estimates^{13 14} are discussed in detail in their 2030 Vision: Draft Transport Strategy 2011 – 2030.

These estimates identify that “although a slowdown in population growth has recently taken place associated with the economic downturn, the forecasts estimate that by 2030 the population of the GDA will grow to 2.29 million, representing an increase of 39% over 2006 levels” (NTA Draft Transport Strategy 2011). This expected rate of growth shows that the city centre's share of GDA population is set to increase from the 2006 level of 6%, to 9% by 2030. In terms of city centre employment growth, the expectation is for an increase from the 2006 level of 25% of GDA employment to 28% by 2030.

An impression of the scale of change which is anticipated to occur in Dublin City centre between 2011 and 2030 is provided in figures 6.1 and 6.2 below. Of particular note are the areas highlighted in purple which denote 2030 populations of between 2,000 and 11,000 people. A total of 30 areas with projected populations greater than 2,000 exist within the project area and it can be seen from figure 6.2 that most of these have a limited number of public on-street cycle parking provision.

¹³ The NTA's population growth estimates are primarily based on information “from regional population projections produced by the Central Statistics Office (CSO) and the subsequent circular from the Department of the Environment, Heritage and Local Government (DOEHLG)...The CSO Population and Labour Force Projections 2011 to 2041 M2F1 (Traditional scenario) figure was used to estimate the population for 2030 (this involved interpolating between 2026 and 2031)” (NTA Draft Transport Strategy 2011).

¹⁴ The population forecasts used in the Strategy assume that the 2030 share of the State's population living in the GDA will remain constant at the 2006 share of 39 %...In the period up to 2030, all areas of the GDA are expected to see a growth in population, with the fastest rate of growth expected in the city centre and the Metropolitan outer suburbs” (NTA Draft Transport Strategy 2011).

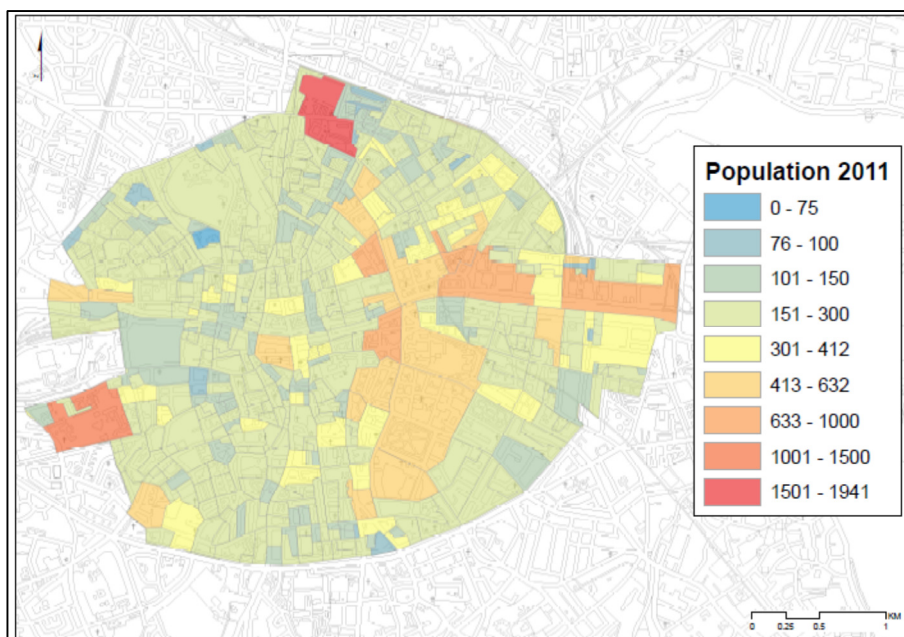


Figure 6.1: Small Areas Population 2011 (CSO Census 2011).

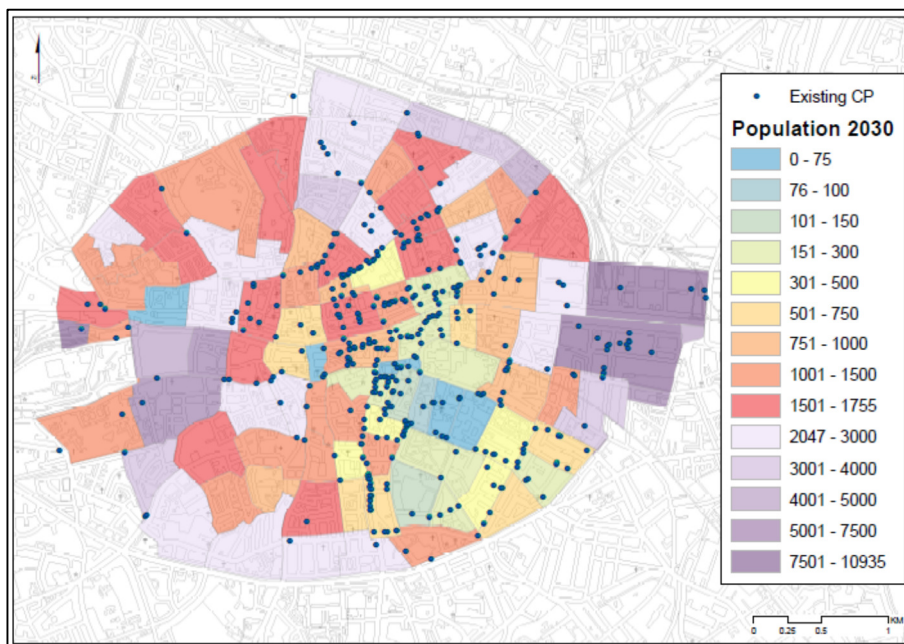


Figure 6.2: NTA Projected Population 2030 – Projections applied to boundaries defined in the provided NTA dataset (NTA 2014).

A full list of the NTA areas within the project boundary is included in Appendix C Tables 8 and 9. These tables show the projected population for 2030 within each NTA defined zone, existing cycle parking facility locations and proposed expansion at each site, as well as cultural/social attractions and current/planned transport infrastructure.

6.3

Growth Forecasts and Mode Share Targets

It is acknowledged that the NTA/CSO forecasts have accounted for all relevant variables. As such, further analysis of influencing factors has not been undertaken as per the scope of this study. Demand estimates within this study are based on NTA population projections, however, in

assessing the application of these calculations to our own estimates¹⁵ there are a number of considerations, the most relevant of which are as follows:

- In our estimates the proportion of the total population of commuters travelling to work, school, or college is assumed to be the same each year to 2030;
- The rate of growth applied to our projections is assumed to be constant between 2011 and 2030; and
- The rate of growth applied to our data is the same for all constituent locations of the project area.

In line with the scope of the study an approach of providing a reasonable approximation of future cycling behaviour has been taken. The estimates presented here should be considered as an approximation of demand levels. It should be noted that factors such as those described above could impact these estimates. The projections¹⁶ put forward examine the scenario where future cycling traffic achieves a modal share of 25 to 30 percent by 2030.

6.4

Future Residential and Commuter Cyclist Volumes

In 2011, 104,911 people living within the project area were accounted for as part of the means of travel to work, school, or college aspect of the national census. This represents 62% of the total project area population. For the purposes of our projections, it is assumed that the same percentage of the total population will be travelling to work, school, or college in 2020 and 2030 as in 2011. This implies that by 2020 the total will be 126,095 people, and by 2030 this will increase to 149,633 people.

Under the scenario whereby cycling retains a modal share of 7.31%, the number of people whose primary means of travel is cycling will be 6,436 in 2020 and 7,636 in 2030. If the mode share were to increase to 25% by 2030 (with 15% by 2020), there would be 13,453 cyclists by 2020 and 26,525 cyclists by 2030. Figure 6.3 below summarises these means of travel estimates.

¹⁵ Rather than directly using the projections laid out in the data provided, the project area growth rate has been applied to Census 2011 data and the associated area boundaries provided by the Central Statistics Office. This is necessary to ensure that the ability to compare and contrast findings from other aspects of our research is maintained. The means of travel data considered in this study is associated with CSO small area boundaries and not those used in the NTA dataset provided.

¹⁶ The NTA population estimates indicate a 2030 population of 242,755 within the city centre. Applying this total to the 2011 population figures for the project area implies a growth rate of 2.24 percent of the 2011 total per annum. This is the growth rate which has been used in estimating demand growth.

Census 2011 Small Areas Means of Travel	2011	2017	2020	2030
Cyclists living within the project area at 7.31% Total person trips	5,356	6,076	6,436	7,636
Cyclists living within the project area at 25% Total person trips (with 2020 at 15% mode share)	5,356	9,493	13,453	26,525

Figure 6.3: Projected population and number of people living in the study area who cycle.

In addition to the projections based on 2011 Census data, the NTA's estimated population growth has been applied to Dublin City Council's canal cordon cycle traffic count data for 2012.¹⁷

As mentioned previously, DCC aim to increase the overall cycling mode share at canal cordon sites to 15% by 2020 (DCC Development Plan 2011 5.1.2). Applying the NTA's estimated project area population growth rate, 2.24% of the base year total per annum, identifies that the volume of traffic through the canal cordon sites will increase from a 2012 total (33 canal cordon count sites) of 459,145 inbound and outbound daily vehicle trips, to 510,569 vehicle trips by 2017. Based on these estimates¹⁸, a total of 19,938 cyclists will travel through the 33 canal cordon sites by 2017, if cycling were to represent 9.3% of the mode share, with a total of 67,627 by 2030 if cycling were to represent 25% of mode share.

Figure 6.4 below outlines the mode share growth targets in the context of existing cycle traffic within the project area.

Year / Mode Share	Morning Peak Cycle Traffic		
	Canal Cordon Cyclists Inbound	Resident Cyclists	Total
Existing 2014 Traffic	9,100 ¹⁹	5,400 ²⁰	14,500
2020 (Cycling at 15% Mode Share)	34,101	13,453	47,554
2030 (Cycling at 25% Mode Share)	67,627	26,525	94,153

Figure 6.4: Mode Share and Cycle Traffic Volumes Projected in Line with Established Mode Share Targets and Projected Population Growth Rates.

¹⁷ Similar assumptions have been made in calculating the cycling traffic growth at canal cordon sites as those which were made for the means of travel data.

¹⁸ It should be noted that these estimates are based on total vehicle traffic through the cordon, and do not account for vehicle occupancy. As such, the number of people actually travelling into or out of Dublin City is likely to be substantially higher. Therefore, the projected number of cyclists for 2017 could be far greater if vehicle passengers switch mode and contribute to cycling growth.

¹⁹ 2013 Canal cordon count figures

²⁰ 2011 Resident cyclist figures

The maximum total cycle parking demand is approximately 94,000 cyclists if cycling represents a 25% mode share in 2030. Figure 6.5 below outlines the mode share targets set out by DCC and the NTA for 2020 and 2030 broken down to show the actual year-on-year growth and the associated increase in required cycle parking spaces.

Year	Mode Share of Cyclists Living Within the City Centre	Total Projected Volume of Resident Cyclists	Mode Share of Cyclists Crossing the Canal Cordon Inbound (morning peak hour)	Total Projected Volume of Cyclists Crossing the Canal Cordon Inbound (morning peak hour)	Total Volume of Resident Cyclists and Cyclists Crossing the Canal Cordon Inbound (morning peak hour)
2014	7.3%	5,836	4.7%	9,467	15,303
2015	8.6%	7,007	5.5%	11,316	18,323
2016	9.9%	8,229	7%	15,545	23,773
2017	11.2%	9,493	9.3%	19,938	29,431
2018	12.5%	10,800	11%	24,495	35,295
2019	13.8%	12,150	13.1%	29,216	41,366
2020	15%	13,453	15%	34,101	47,554
2021	16%	14,612	16%	37,065	51,678
2022	17%	15,805	17%	40,116	55,921
2023	18%	17,030	18%	43,253	60,283
2024	19%	18,288	19%	46,477	64,765
2025	20%	19,579	20%	49,787	69,366
2026	21%	20,902	21%	53,183	74,086
2027	22%	22,259	22%	56,666	78,925
2028	23%	23,648	23%	60,230	83,879
2029	24%	25,070	24%	63,886	88,956
2030	25%	26,525	25%	67,627	94,153
Projections are based on a 2.24% increase per annum of the base year total and account for mode share targets for 2020 and 2030 put forward in DCC and NTA					
Mode share estimates reflect the targets set out by the NTA and DCC for 2020 and 2030 and estimated traffic volumes reflect annual estimate modal share					
Inbound morning peak refers to the period between 07:00 and 10:00					
Resident cyclists refers to cyclists living within the city centre					

Figure 6.5: Rate of growth in cycling demand factoring projected population growth and targeted mode share increases.

6.5

Summary of Future Cycle Parking Demand

Figure 6.6 following illustrates that to meet the projected existing cycle parking demand in 2015 a total of 2,055 further spaces will be required, on top of the current public cycle parking provision. This takes into account the estimate that private parking will continue to account for an estimated 85% of demand. The 85% private parking figure is provided as a “best guesstimate” based on an existing occupancy survey whilst

acknowledging that further surveys are required to accurately assess this figure. The data shows that approximately 2,000 spaces will be required in 2015 to bridge the existing gap in cycle parking supply. A further 800-900 spaces per year will be required in 2016 to 2020 if a cycling mode share target of 15% is to be achieved in 2020. From 2020 this requirement is reduced to between 600 and 800 spaces per year in order to achieve a cycling mode share of 25% in 2030. This means that by 2030 a total of 13,500 public cycle parking spaces will be required. Adding a further 76,000 private cycle parking spaces plus the existing provision of 4,500 on-street public cycle parking spaces will meet the projected 94,000 cyclists accessing Dublin City centre in 2030.

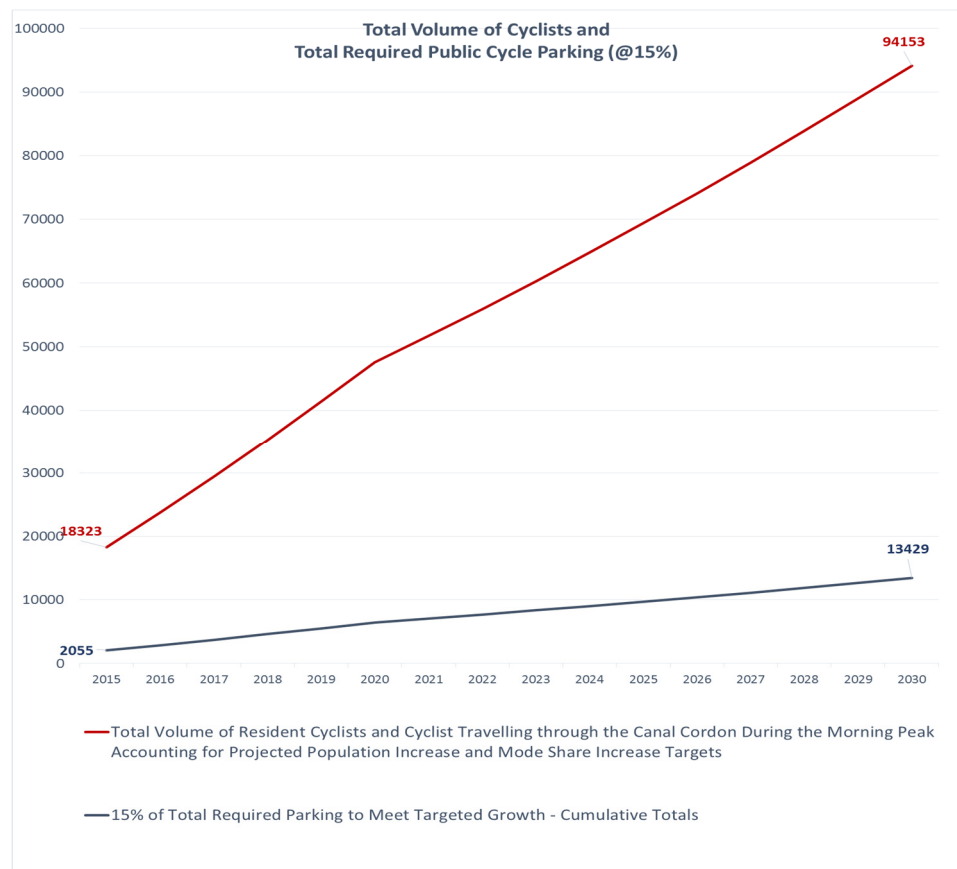


Figure 6.6: Rate of growth in cycling demand factoring projected population growth and targeted mode share increases. Total volume of cyclists and total required public cycle parking (@15%)

It has been shown that in addition to cycle parking demand associated with residential and inbound commuter cycling traffic, demand is also derived from retail and social journeys. Although the data required to assess this aspect is limited, the volume of these trips has been shown to be significant and must be adequately accounted for. An important element in establishing the exact volume of cycle parking associated with social and retail journeys will be the gathering of mode use data for these locations. This will assist in accurately assessing cycle parking requirements, which will be additional to the demand levels derived above from traffic counts and Census data.

7 Cycle Parking Design Considerations and Case Studies

7.1 *Introduction*

The following chapter provides additional context for the findings which have been outlined in previous sections by examining the practical aspects of cycle parking implementation. In doing this, a review of stakeholder feedback gathered through the workshops outlining the main requirements identified in addition to a best practice infrastructure provision is examined and a number of case studies are outlined, along with a review of existing Development Plan standards. The case studies provide details of existing approaches to addressing cycle parking demand and illustrate the various cycle parking implementation models and funding models, and demonstrate the need for a range of solutions tailored to a locations specific cycle parking targets and cycle traffic characteristics.

7.2 *Stakeholder Workshops and Responses to Draft Proposals*

Two Stakeholder Workshops were undertaken to discuss scheme proposals with stakeholders and to obtain comments that could help inform the process. The first was held on the 17th of July and the second on the 16th of October.

7.2.1 *Workshop 1 Outcomes*

A reoccurring theme throughout workshop 1 was the requirement to provide cyclists with safe, secure and sufficient cycle parking. One of the key issues raised was the proximity/location of the cycle parking to the cyclist's destination.

It was concluded that short-term cycle parking (less than a few hours) should be within 50m to 100m, while long-term cycle parking (day long) people were generally willing to walk 250m to 500m. It was also vital to get the balance right between large scale high density cycle parking hidden away from public view, as well as on street visible cycle parking around the city. As regards specific locations, it was concluded that Dublin City transport hubs were an ideal place to provide high density cycle parking, in particular around Bus Áras.

A number of attendees considered that taking advantage of vacant lots, brown field sites and vacant buildings would be key to the success of cycle parking in Dublin City centre. A further emphasis was also needed in cycle parking provision in development plans and planning permissions. Finally public interaction and feedback as well as discovering popular areas to encourage passive security is also a vital aspect in cycle parking.

7.2.2

Workshop 2 Outcomes

A key outcome of Workshop No. 2 was that further studies are required to determine the capacity of private or “off-street” cycle parking in Dublin City centre. This is needed to determine the amount of spaces needed to meet future demand targets. Measures are also needed to encourage businesses to provide more cycling parking; such as including general objectives in the Development Plan in relation to cycle parking and increasing development plan standards in relation to cycle parking requirements. Additional studies are needed to assess the demand profile for cycle parking throughout the day to determine potential peak demand and associated shortfall.

7.3

Best Practice Design Considerations

The Danish Cyclists Foundation (DCF) provides one of the most clear and comprehensive guidance documents on the subject of cycle parking implementation. Their primary contention is that to get rid of “anarchic” cycle parking practices, authorities must ensure that enough parking spaces are provided, that they are well located, that the facilities provided are designed to appropriate standards, and that influencing factors and type of use are fully considered.

The guidance document identifies three crucial requirements:

- “The solutions must ensure that the necessary parking area and number of parking spaces are available;
- The solutions must ensure that bicycle parking facilities are located and laid out in a way that encourages use; and
- The solutions must signal order, system and balance.

7.3.1

Location Considerations

The European Commission funded project ‘Bicy’, in their report ‘Bicycle Parking Made Easy: A guide to the construction of bicycle parking facilities’, recommends that signage to the nearest bicycle park should be posted at all major destinations including train stations, shopping centres and other high traffic locations. Parking facilities should be accessible and easy to find, and ideally well-integrated into any existing cycle path network.

According to the Danish Cyclists Federation the length of time that users intend to park at specific locations is a key determinant of the distance that they are willing to walk from where they park to their final destination. It is recommended that very short-term parking should be positioned between 0 and 15 metres from the expected destination, whereas up to 100 metres is recommended for long-term and over-night parking where security, safety and comfort represent a greater consideration.

A variation of these recommended walking distances is provided in the City of London Cycle Parking Strategy 2013. Based on local survey data it has been determined that a maximum walking distance of 200 metres from an on-street cycle parking facility, and 350 metres for an off-street facility should be adhered to.

‘Bicy’ also provide some insight on this aspect, suggesting that the shorter the stopover at the destination, the lower the acceptable distance between destination and parking space, less than 5 metres is stated to be acceptable if visiting a single shop, and 15 to 35 metres is acceptable for all day parking.

7.3.2

Space Requirements, Usability and Accessibility

Primary consideration should be given to accessibility and the provision of adequate space for cyclists to use parking facilities. Ease of movement and user friendliness are critical.

The Danish guidance discusses the limitations on providing compact parking solutions and the layout of parking facilities. It is not explicitly stated that compact solutions should be avoided, but it is recommended that it is implemented in a suitable manner. Angled parking can also provide a space saving solution and is considered most suitable when space is at a premium. Two-tier stands can also be effective, although, these should be useable by all cyclists²¹.



Figure 7.1: Side by Side Cycle Parking

The City of London Cycle Parking Strategy recommends a minimum standard of 2 metres by 1 metre per stand for Sheffield stands allowing for 2 bikes per stand. For same level side-by-side parking 0.8 metres by 2 metres is advised in the Bicy’s “Bicycle Parking Made Easy” report. Guidance from the Danish Cycling Manual are fairly consistent with these recommendations but suggest a smaller required width of 60cm for side-by-side parking.

²¹ Some two-tier racks are not compatible with certain types of bicycle and locking mechanisms. Some require bicycles which use integrated locks and can only accommodate smaller tyres than those commonly found on mountain bikes. Care should be taken in selecting such facilities to ensure that the needs of as many potential customers as possible are met.

7.3.3

Facility Design

The primary considerations related to stand types and facilities are as follows:

- “The design and layout of the facility has a bearing on how and how much it is used. Both the stands and the bicycle parking facility as a whole should obviously be of a high quality and robust.
- A bicycle parking facility should not be hidden away or camouflaged. It should be visible, and it should look good at all times, whether empty, half-full or full of bicycles (Danish Cyclists Foundation 2008);
- Lockers for storage of accessories such as helmets and panniers are advised as an additional attractive element and potentially means to increase patronage. Lockers for individual bicycles can also be attractive, particularly among users of high quality or expensive bicycles (Bicy);
- Provision of self-service stations equipped with air pumps, repair tools, battery charging equipment, or inner tube vending machines are also viewed as particularly attractive and useful in increasing patronage (Bicy);
- Easily accessible, barrier-free facilities at ground level are considered ideal, as is covered/sheltered parking, particularly where bicycles are likely to be parked for long periods (Bicy);
- The individual stand should be designed so it offers satisfactory support for the bicycle. The stand should never cause the bicycle wheel to buckle or in any other way damage the bicycle;
- Sturdy stands typically require less maintenance. However, stands should not be overly cumbersome or look too heavy. “It should be possible to park a bicycle in a stable position next to a stand or frame, and lock both the frame and wheel(s) securely to it. The stand itself should be well anchored to the ground. Mobile systems (not fixed to the ground and easily removable) can serve as temporary parking facilities, for meetings or events” (Bicy).

Outlining the key considerations for the implementation of cycle parking infrastructure is a critical component of this strategy. Of particular importance is ensuring that the facilities provided are efficiently utilised and meet the needs of their intended patrons. Choosing appropriate locations which account for the likely journey purpose and duration of parking is key to this, as is the selection of suitable stands and facility designs which prioritise accessibility and usability.

7.4

Cycle Parking - International Case Studies

A key focus of the development of cycle parking in Dublin is the investment in larger scale cycle parking facilities which can cater for a high volume of bicycles. It has been demonstrated throughout this report that there is an immediate demand for the expansion of cycle parking throughout the city centre and that this demand will only increase, particularly if mode share targets are achieved.

There are a wide variety of cycle parking concepts which have been developed around the world, some of which have been more successful than others. Typical service offerings include pay for use or free of charge cycle parking spaces, security provision through staffing or CCTV, and the incorporation of some level of ancillary services such as bike repair or bike rental. Example of various international cycle parking facilities are explored further in section 7.4.1 following.

7.4.1

Case Studies

Some of the most prominent European examples of successful cycle parking measures include The Fietspoint model developed by Abellio (a subsidiary of the Dutch national rail company Nederlandse Spoorwegen); the Münster Radstation (Bike Station) Hbf in Germany, which is referenced specifically in the National Cycle Parking Framework (NCPF) 2009; and the Biceberg concept, which is an alternative fully automated cycle parking solution.

Fietspoint/Cycle Point Facilities

The Fietspoint concept, also known as Cycle Point in English speaking countries, is arguably the most successful example of a cycle parking facility solution in Europe, particularly given the expansion of Abellio who pioneered the scheme.

Abellio have implemented numerous Cycle Point scheme in the Netherlands and the UK, and parking solutions provided in Switzerland, Belgium and Germany are based on the Fietspoint concept, including the Münster Radstation described below.

The bicycle station is considered an integral part of the train station and prices for use of bicycle stations are kept to a minimum in order to maximise use. In the Netherlands, bicycle dealers operate the stations (“Fietspoints”) as a franchise, while in Belgium the “Fietspunten” are managed by smaller operators and municipalities as part of a programme for social integration.

Facilities in the Netherlands are generally subsidised when first implemented. They are not expected to make a profit, however, they are ultimately expected to cover their operational costs.



Figure 7.2: Cycle parking at Groningen Central Station, Netherlands.



Figure 7.3: Cycle parking at Groningen Central Station, Netherlands.

In the Netherlands the largest Fietspoint stations include Groningen, Leiden, and Utrecht, each of which supplies approximately 5,000 spaces. Many of the high volume parking locations have resulted from the expansion of smaller facilities and factoring in future growth at the design stage is essential to ensure that this future demand can be catered for. One of the most prominent examples of this type of expansion is associated with the Leiden Fietspoint which has increased service provision by 60% from 3,000 to 5,000 spaces.

In the UK the most prominent example of this solution is the Cycle Point in Leeds which opened in 2010. The station is owned by Network Rail, managed by Northern Rail

and operated by Evans Cycles. Prior to implementation Northern Rail estimated through detailed financial and demand appraisal that by 2012 operating costs would be covered by the revenue generated. Although the details relating to this have not been determined as part of this report, anecdotal evidence suggests that the scheme has been quite successful, but that large profits are not being generated, nor is there any expectation that they should be.

The Cycle Point is located adjacent to Leeds Train Station and provides spaces for 300 bicycles. The facility is open from 06:00 to 00:00 but only staffed from 07:00 until 19:00. Access to parking bays is provided via a

swipe-card and during unstaffed hours only registered monthly and annual season ticket holders are allowed to use the facility. CCTV is also in place to ensure security and it is linked to Northern Rail's control room. Ancillary services include: Repair services, a bike shop, a bicycle hire service and maps/travel information.

Restricted staffing hours at the Leeds facility assists in minimising costs, but the relatively high fees show that compromises must be made in certain situations. It is important that the purpose of delivering the scheme is clearly defined at the outset of the design phase of the project. Although there are clear financial goals in the case of Leeds Cycle Point, the primary intention is to make a positive step towards improving cycling infrastructure with the objective of attracting more people towards bicycle use.

In respect to this aspect, BMVI state that a significant "problem is the cost of employing staff for sufficient opening hours, as bicycle stations only become financially viable when there is a demand for at least a thousand spots. A combination with other bicycle service provision (repair, bicycle sale and rental) helps, in ideal situations, to increase the profitability of the station" (BMVI 2011).

A related aspect which has been cited as contributing to the low profitability of the Leeds scheme is that there is very limited retail space on-site. As ancillary facilities are considered to be an essential component in maintaining the balance between cheap parking rates and financial sustainability, this is likely to be a significant contributing factor. Referring to another Cycle Point example in Basel, Switzerland, strict limitations on the number of personnel and a large degree of automation have been targeted measures seen as important ways to keep operating costs to a minimum.

The facility in Leeds represents the first Cycle Point in the UK and others are in the process of being developed. Abellio Greater Anglia recently launched a scheme with a capacity of 1,000 spaces at Chelmsford Train Station, and there are plans for further facilities in Cambridge, Colchester, Ely and Norwich. Abellio also operates its Cycle Park Plus across 18 UK train stations. These facilities are smaller scale than the Cycle Point solutions and provide a lesser service offering, for example, Ipswich Train Station provides 16 bicycle lockers on the platform and a further 85 spaces in a cycle compound adjacent to the station car park. A cycle hire scheme is also provided.

The scale of the service provision is dependent on the footfall at the station, passenger footfall figures for each location mentioned highlight this. These show that the annual footfall for Chelmsford and Cambridge

was 8 million and 9.1 million respectively in 2011/2012, whereas the footfalls for Ipswich and Norwich in the same year were 3.3 million and 4.1 million (Footfall figures based on annual ticket sales, Abellio Greater Anglia).

The capital cost associated with the Leeds station was in the region of £500,000 (theguardian.com) for the 300 capacity facility, whereas the Chelmsford development has a capital cost of around £680,000²² (Chelmsford City Council 2013) for 1,000 spaces, and the proposed Cambridge Cycle Point is estimated at a capital cost of £2.5 million (road.cc 2013) for the provision of 3,000 spaces.

Münster Radstation Hbf

Münster has a population of roughly 300,000 and according to 2008 government figures boasts a cycling mode share of 40% (BMVI 2012). This is far above the German national average of 11% as well as the national cycling mode share target of 16% by 2020 (BMVI 2012), making it one of the most bicycle oriented cities in Europe.

The main bike station in Münster was built in 1999 to cater to the growing demand for cycle parking amongst commuters. Unfortunately the operating costs associated with the facility have not been determined, however, the Deutsche Mark equivalent of roughly 6.5 to 7 million Euro (BMVI 2011) was invested in constructing the facility and research has indicated that the operation is profitable.

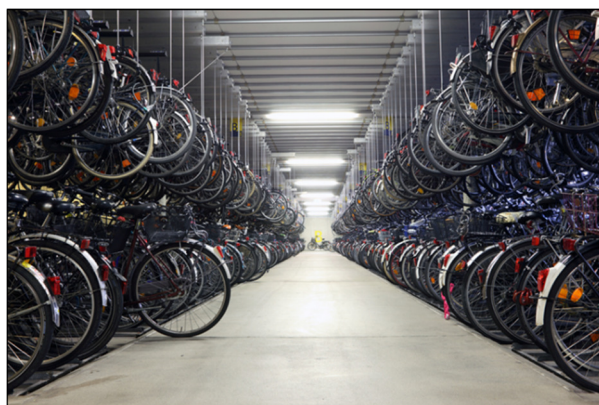


Figure 7.4: Cycle parking facilities in Münster, Germany.

The construction cost is associated with the initial provision of around 3,000 spaces and this equates to around €2,200²³ per bike. Half of the investment was paid by the city and the other half by the Nordrhein-Westfalen state government. According to research two thirds of the funding by the city was paid with tax revenue from builders who are unable to create car parking spaces as part of their developments. This is stated to be

²² The capital cost provided does not necessarily represent the full amount paid to provide the total current parking provision. Some literature suggests that Chelmsford has expanded on previous provision by approximately 40% and it is not known if any of the original provision was retained as part of this development.

²³ Cost per bicycle is a rough estimate and does not necessarily represent the actual amount.

“€12,000 per space, which is used by the city to create car spaces (at less than €12,000 per space) and, as a bonus, bike spaces” (Inexia).

When introduced the scheme led to a modal shift of approximately 2,000 people from other transport modes to cycling. The bicycle station is an underground multi-story structure located adjacent to the central train station. There is parking provision for around 3,500 bicycles and these are predominantly delivered through easy to use double-decked bicycle racks. Most of the top tier racks are based on a hook/hangar system which allow anyone to move their bicycle into position with very little effort.

The facility is divided into sections for daily, monthly, annual and long-term parking and opening hours are from 05:30 to 23:00 daily Monday to Friday, and 07:00 to 23:00 at weekends. Users are allowed to leave their bicycles parked on-site overnight and over the weekend. Security is in part provided through comprehensive CCTV coverage, but there is also on-site staff to manage the operation and personnel associated with the ancillary facilities provided. Ancillary services include an automated bicycle washing facility, a bicycle repair service, lockers and a bicycle rental service.

Access to the facility is permitted using an electronic card and parking fees are €0.70 per day, €4.00 per 7 days, €7.00 per month, and €70.00 per year. Personal parking spaces are also provided and these are available for a fee of €50.00 for 6 months and €90.00 For 12 months. The Radstation Hbf facility has been remarkably successful in terms of patronage but as mentioned, it is also a profitable operation.

Characteristics such as favourable geography, a comprehensive cycle network, and a very high mode share for cycling have clearly contributed greatly to the popularity of this scheme. However, it is the clear demand associated with this mode share; the location of the facility; and the delivery of an appropriate, simple to use and affordable solution that are the key success factors this case.

Biceberg-Up

The Biceberg concept originated in the Basque region of Spain where it has been implemented in a number of cities. The design was developed in 1994 in Aragon with the first facility being introduced in 1999 in Zaragoza. It has been most successfully implemented in Japan under the name Eco-Cycle and is often considered to have originated there.

Traditionally the Biceberg concept is designed as underground storage with a loading and retrieval kiosk positioned at ground level acting as the interface for customers. Biceberg-up is an alternative design which effectively acts in reverse storing bicycles above ground level. These

facilities are designed as lower density solutions with a storage capacity of between 23 and 120 bicycles, although multiple units can potentially be positioned together, with shared ancillary services provided to take advantage of the increased economy of scale.

Biceberg and Eco-Cycle operate as a system of segregated rotating lift units, each with a capacity for one bicycle. They allow users to store other items with their bicycle and can double up as a left luggage facility. Their primary advantage is that they are fully automated and guarantee security for bicycles without the need for staff or CCTV. They represent an ideal solution where lower volume parking is required or as a complimentary measure implemented in key points of urban areas to support larger parking stations positioned elsewhere.

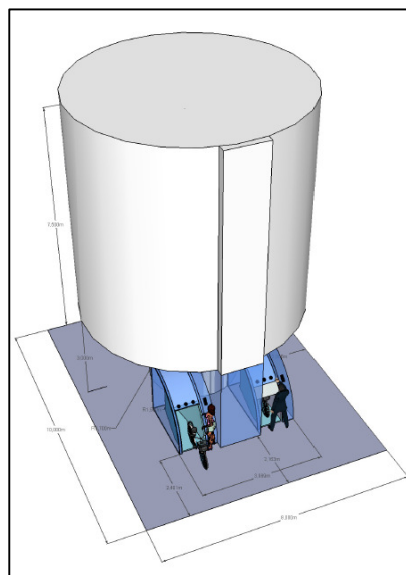


Figure 7.5: Concept Biceberg cycle parking design

The maximum capacity per unit is still low compared to bicycle stations at approximately 200 bicycles, however, in many cases multiple units are positioned together. Giken advertise 15 Eco-Cycle locations spread throughout Japan and the largest site, Suzukake Underground Bicycle Parking in Tokyo, has a total of 8 units in close proximity. These hold a maximum of 1,440 bicycles and demonstrate the potential to scale up the level of provision as demand increases.

Biceberg operates using a smartcard and pin code system which provides secure access. The smartcard retains information about the user and the

parking place on an embedded microchip and on-screen instructions at the user kiosk inform the customer how to use the system. Vehicle deposit and retrieval time is guaranteed to be no longer than 30 seconds although 20 seconds is the standard.

7.4.2

Bicycle Lockers

An alternative measure to the automated Biceberg and Eco-Cycle solution is the provision of bicycle lockers. These are advantageous in specific situations in that they are also secure and do not require staff or full-time management. However, bicycle lockers are generally intended to be delivered on a smaller scale than the Biceberg solution. They are typically implemented at public transport stations or offered as a more secure storage option at cycle parking facilities where theft or damage is a concern. The main drawback of these lockers is the level of space that

they occupy and their relatively high cost for the level of service that is provided. The San Francisco Municipal Transportation Agency in their Strategy for Long-Term Bicycle Parking in San Francisco 2013 provides cost estimates for 68 bicycle lockers²⁴, stating a capital cost of \$334,800 and an annual operating cost of \$19,600. Per unit this equates to a capital cost of approximately \$4,900 and an annual operating cost of around \$290. The Euro equivalent capital cost per bicycle locker is in the region of €4,000²⁵.



Figure 7.6: Sample Bicycle Lockers at Heuston Station

Another form of bicycle locker is the bicycle hanger. The bicycle hanger is a larger form of bicycle storage usually found in residential areas. Bicycle hangers are placed on the side of the road usually taking up one car parking space and can hold from 6-8 bicycles.



Figure 7.7: Sample Dublin City Council Beta Project Bicycle Hanger

Dublin City Beta Projects have begun to trial the bicycle hangers in Dublin city. The hanger costs just under €5000 and has a 10-year warranty²⁶. Beta Projects would look to charge €50 per annum/€80 per 2 years for the permit to use a bicycle parking space.

7.4.3

Smart Card Integration & Access Control

A number of the solutions assessed in the previous sections employ some form of card based access system. Both the technical specifications required to implement an integrated smart card system and the technological details of the existing Leap Card system in Dublin are

²⁴ Each bicycle locker is intended to hold 1 bicycle.

²⁵ Indicative cost estimate based on exchange rates at the time of writing according to xe.com.

²⁶ Source: Dublin City Council Beta Projects Trial

beyond the scope of this study. As such, it is impossible at this time to supply reasonable cost estimates for the application of such a system to any proposed cycle parking facilities. However, it is possible to outline some of the associated considerations.

Some of the key issues for smart card integration are the compatibility with the existing system and the coordination of passenger transaction information between agencies. Broadly speaking, integration depends on the technological capabilities of the existing system and the adoption of a common data format between users of the technology. The 2006 Transit Cooperative Research Program (TCRP) Report 115: Smartcard Interoperability Issues for the Transit Industry highlights the key considerations and elements required for interoperability of smart card systems. These are as follows:

1. Smartcard readers provided must be able to read and write cards;
2. The type of data that needs to be transferred between cards and readers;
3. Transfer of transaction data from the transaction point (fare gate etc.) to the central processing unit; and
4. Exchange of transaction data between any participating entities to allow settlement for value load or use of the card in the respective systems (TCRP 2006).

To provide accurate guidance regarding the potential for implementing an integrated smart card system between future cycle parking facilities and the existing Leap Card system, further analysis of the capabilities of the existing system is required and factors such as fare structures, data requirements and financial procedures need to be outlined.

As an 'access control' type measure, a Leap Card could be used to identify and perhaps provide access, based on the unique chip ID (UID) on the Leap Card. The car park would have to introduce the right software to allow a leap cards open a locked door. However the UID is not visible / displayed to customers, so problems arise on how the cards could be registered against a customer in the first instance. It should be noted that this is not very secure as the UID is one piece of data that is not encrypted on the Leap Card (whereas all the rest of the data on a leap card such as tickets and travel credit is encrypted). The Leap Card could be introduced for once off payments would require software development by the car park equipment providers, which may be costly and unfeasible.

Whether or not access to cycle parking facilities in Dublin can be integrated within the existing Leap Card system, at the very least it should be ensured that access to all facilities is standardised. Similarly, standardisation usage procedures should be a priority. Forcing users to

carry multiple cards or to use different access methods would undermine the usability and convenience of such a network.

7.5

Cycle Parking User Fees and Willingness to Pay

The low cost of cycling is one of the many factors which encourage people to cycle. However, large scale cycle parking infrastructure and facilities have a high capital cost. This leads to some cities charging for cycle parking, both successfully and unsuccessfully. The Presto Cycling Policy Guide: Give Cycling a Push which is produced by Intelligent Energy Europe in 2010, defines three broad categories of cycle parking and highlights their use in the Netherlands, these are as follows:

- Unsupervised Storage 44% - typically racks and stands in streets and squares;
- Free Parking 38% - outside of any facility; and
- Supervised storage facilities 18% - either manned, automated, equipped with CCTV or any combination of these (Intelligent Energy Europe 2010).

Having supervised storage cycle parking has the greatest chance to entice people to use facilities. However, this level of service is expensive to provide and not all cyclists are willing to pay for it. The Presto report give an example of this, showing that in Apeldoorn, Netherlands, when parking charges were removed from a cycle parking storage facility, the number of users doubled. Additionally, this measure successfully generated a significant volume of new cycling trips as 20% of the facility's new users did not cycle into town before (Intelligent Energy Europe 2010). There are many different factors which would influence the willingness of cyclists to pay for cycle parking storage. These include:

- Level of service provided;
- Proximity of facility to the cyclist's destination;
- The cycle parking alternatives available; and
- The cycling parking culture in the city.

Figure 7.7 below gives an example of several cycling storage locations including those detailed in Section 7.4 previous. The table includes the indicative construction costs associated with these facilities and the charges for facility users. From the analysis of these cycle parking facilities it is clear that cycle storage locations which charge users, have an increased ability to provide added value services. This includes guards and staff, which can improve facility safety in real terms and in terms of user perceptions. Most of the facilities assessed which are operating

through user charging also provide services such as bicycle servicing, bicycle rental, and restrooms.

<u>Location</u>	<u>Construction Costs</u>	<u>Bicycle Spaces</u>	<u>Const. Cost /Bike</u>	<u>Fares</u>	<u>Comments</u>
Leeds (UK) Cycle Point	€650,000	300	€2,166	€1.3 daily, €155 annually	Operating costs covered
City of Malmö's (Sweden) Bike&Ride	/	1,500	/	Unprotected free/ Protected €9 monthly	Operating costs covered
Groningen (Netherlands)	~€10 million	6,500	€1,539	Free	Free parking. No revenue.
Utrecht (Netherlands)	€48 million	12,500	€3,840	24 hours: free -Following 24 hours: €1.25	Small revenue from late fees (€1.25)
Zutphen rail station bicycle	£4.82 million	3,000	€1,606	Free	Free parking.
The "Bicycle Apple" Alphen	€2.5 million	1,000	€2,500	Free	Free parking. No revenue.
Bikestation: Washington DC	€3.4 million	200	€17,000	€81 annually	Operating costs covered by subscriptions.
Cycle Centre Queensland	€4.85 million	420	€11,547	6 Month Membership €420 (AUS)	Showers, lockers, towels and bicycle services available.
RBWH Cycle Centre in Brisbane	€5.54 million	750	€7,387	€360 annual membership	Showers, lockers, towels and bicycle services available.
Chicago Cycle Centre:	€3.2 million	300	€10,666	€126 annual membership	Showers, lockers, shops and bicycle services.
Amsterdam Zuid	€3.73 million	2000	€1,865	€55 annual membership	Operating costs covered by rental/services profit.

Figure 7.8: International Comparison of Bicycle Parking Facilities and Associated Construction Costs and User Charges (Halcrow Barry)²⁷.

²⁷ International example references: Leeds (UK) Cycle Point: Leeds Cycle Point Brochure, A New Way of Continuing the Journey; City of Malmö's (Sweden) Bike&Ride: Copenhagenize.com; Groningen (Netherlands) railway station cycle parking: Eltis, The Urban

From the international comparison it is clear that the quality of cycle parking facilities varies widely. Generally, the more additional services provided, the higher the user charges. The decision of whether or not to implement user charges rests heavily on the quality of facilities that are desired, and the willingness of the provider to pay the costs associated with that desired level of service.

A stakeholder's workshop was conducted at the early stages of this project, with 20 stakeholders who possessed a high level of expertise in city centre transport and cycling. These stakeholders were asked their opinions on charging for cycle parking. The results demonstrated that there was a reluctance in paying for cycle parking, no matter the facility quality.

7.5.1

National review of charging for cycle parking:

In Dublin, only a small number of locations offer secure cycle parking. Park Rite operates the Irish Life and IFSC car parks. The Irish Life car park provides two secure bicycle parking cages with a capacity of 32 bicycles each. Access to these facilities is through an annual membership of roughly €100 a year. Each member receives a key in order to get access to the secure cage. At Park Rite's IFSC car park one secure bicycle parking cage is provided with a capacity of 16 bicycles. However, access to the caged cycle parking facility is exclusively for the staff of DEPFA Bank. Additional uncaged public cycle parking space are also provided and these are offered on a first come first served basis.

Bicycle Locker systems have also been implemented at many transport stations around the city. Typically these are available to rent on an annual basis for €75 and an additional €25 is charged as a deposit. The popularity of this system is mixed. Lockers have been especially popular at Heuston station and Booterstown DART station where there are long waiting lists for access to these facilities, whereas facilities at Dundrum Luas stop and Connolly Train station are less popular.

To determine whether or not cyclists are willing to pay for cycle parking in Dublin a trial period is recommended. Drury Street car park is an ideal location for this where facilities such as bicycle lockers could be introduced on a temporary basis for a subscription fee. If deemed a

mobility observatory Groningen railway station; Utrecht (Netherlands) Indoor bicycle parking: NL Cycling, Bicycle Dutch; Zutphen rail station bicycle parking: www.bikeoff.org; The "Bicycle Apple" Alphen: NL Cycling, Bicycle Dutch; Bikestation: Washington DC: www.bikestation.com; King George Square Cycle Centre, Queensland: Healthy Spaces and Places, King George Square Cycle Centre; RBWH Cycle Centre in Brisbane: RBWH Cycle Centre details, brochure; McDonald's Cycle Centre, Chicago: www.chicagobikestation.com; Amsterdam Zuid: Railway Station: www.iamsterdam.com

success, additional lockers can be implemented or alternative charging techniques adopted.

7.6

Dublin City Bicycle Parking Standards

Figure 7.8 below compares Dublin City Council's established cycle parking requirements for various development types to Wokingham Council in the UK and the recommendations laid out in the Danish Cyclists Federation's Bicycle Parking Manual 2008 guidance document. The Danish Manual is considered the best practice "benchmark" in terms of cycle parking. Wokingham was selected for comparison purposes as it was considered typical of a UK city.

Location	Dublin City Development Plan	Wokingham Council, UK	Danish Cycle Manual
Retail Trade and Shops	1 space per 150m ²	1 space per 125m ²	2 spaces per 100m ²
Restaurants and Cafes	1 space per 150m ²	2 space per 125m ²	1 space per 15 guests and 0.4 spaces per employee
Residential Flats	1 space per unit	1 space per unit	2 to 2.5 spaces per 100m ²
Second/Third Level Education	1 space per 3 students	1 space per 3 students	0.4 to 0.8 spaces per students
Hotels	1 space per 10 bedrooms	1 space per 10 bedrooms	1 space per 15 guests

Figure 7.9: Comparison of Cycle Parking Requirements for Various Development Types (Halcrow Barry)

It can be seen from the table above that Dublin City Council has not established as stringent cycle parking provision requirements as are recommended by the Danish Cyclists Federation. Although DCC's requirements are identical to Wokingham Council in relation to residential flats, second and third level education developments, and hotels, the requirements for retail trade and shops, as well as restaurants and cafes, are lower.

To meet the increasing demand of cycling in Dublin City it is recommended that Dublin City Council increase residential and student accommodation cycle parking standards line with the current international best practice to provide a minimum of 2 secure cycle parking spaces per residential unit and one space per student resident. Dublin City Council have indicated that the cycle parking requirement standards for enterprise and employment are satisfactory and should therefore remain unchanged.

7.6.1

Temporary Cycle Parking

It has been highlighted that large scale/one-off events can attract high volumes of people at a single time. This can result in significant pressures transport infrastructure. Encouraging visitors to these events to adopt cycling can assist in relieving some of this pressure but this presents difficulties in catering to their parking requirements. Temporary cycle parking solutions can provide an ideal means to resolve these difficulties where permanent cycle parking structures are not feasible or practical.

Transport for London (TfL) have released guidance for temporary cycle parking provision in their document *'How to Provide Temporary Cycle Parking at Events?'* In the background for this guidance it is noted that the provision of this type of parking not only assists in solving congestion issues associated with large events but also acts as a cycling promotion tool by helping to encourage people who would not normally cycle to adopt the mode. Event goers represent another group of potential cyclists who can assist in achieving mode share targets if they can be successfully encouraged.

The report states that “cycle parking usage should be observed to adjust the provision of cycle parking in-line with the current growth in cycling” (TfL) with this adjustment being dependant on the event type. In relation to the practicalities of temporary cycle parking provision, several recommendations are included in the document, these are paraphrased as follows:

- It should always be made clear that the cycle parking is temporary;
- The closing time of cycle parking should be clearly displayed;
- The legal situation between the bicycle owner and the operator should be researched and the relevant insurances required should be checked;
- Cycling and cycle parking should be promoted on event webpages, tickets and invites;
- It should be clearly stated that cyclists should bring their own locks; and
- The location of temporary cycle parking facilities is a critical consideration and this should be agreed with key stakeholders including event organisers, local authorities and police agencies.

It is recommended that temporary cycle parking commensurate with the target modal split be required for events.

8 Cycle Parking Costs & Outline Business Cases

8.1 Rate of Provision and Associated Costs

As noted previously the maximum total demand for cycle parking spaces at any one time has been assumed to be equivalent to the volume of traffic travelling through the canal cordon inbound during the morning peak plus the total volume of cyclists living within the project area.

Considering the mode share targets set out by DCC and the NTA for 2020 and 2030, the peak-time cycle volumes have been projected to give the totals listed in figure 8.1 below. These figures also account for estimated population growth rates.

Year / Mode Share	Morning Peak Cycle Traffic		
	Canal Cordon Cyclists Inbound	Resident Cyclists	Total
Existing 2014 Traffic	9,100	5,400	14,500
2020 (Cycling at 15% Mode Share)	34,101	13,453	47,554
2030 (Cycling at 25% Mode Share)	67,627	26,525	94,153

Figure 8.1: Mode Share and Cycle Traffic Volumes Projected in Line with Established Targets

A supply and installation rate cost of €350 per stand has been provided by Dublin City Council as a value to be used to inform the estimation of capital costs to install the required volume of stands.

The 2030 total cycle parking demand is approximately 94,000 if cycling represents a 25% mode share. It should be noted however, that in line with current best estimates, private cycle parking is assumed to continue provide in the order of 85% of demand. The 85% private parking figure is provided as a “best guesstimate” whilst acknowledging that further surveys are required to accurately assess this figure. However, it is considered through the implementation of specific objectives in the Development Plan in terms of private cycle parking provision that this estimate is reasonable.

Figure 8.2 below outlines the mode share targets set out by DCC and the NTA for 2020 and 2030 broken down to show the actual year-on-year growth and the associated increase in required cycle parking spaces as well as an estimate of the total year-on-year implementation costs.

Year	Maximum Total Demand For Cycle Parking	Total Required Parking to meet targeted Growth	15%* of Total Required Parking to Meet Targeted Growth	15%* of Total Required Parking to Meet Targeted Growth (Cumulative Totals)	Indicative Construction Cost Estimate for Required Parking Provision
2015	18,323	13,697	2,055	2,055	€359,545
2016	23,773	5,450	818	2,872	€143,075
2017	29,431	5,657	849	3,721	€148,504
2018	35,295	5,864	880	4,600	€153,932
2019	41,366	6,071	911	5,511	€159,361
2020	47,554	6,188	928	6,439	€162,436
2021	51,678	4,124	619	7,058	€108,254
2022	55,921	4,243	636	7,694	€111,383
2023	60,283	4,362	654	8,349	€114,513
2024	64,765	4,482	672	9,021	€117,642
2025	69,366	4,601	690	9,711	€120,772
2026	74,086	4,720	708	10,419	€123,901
2027	78,925	4,839	726	11,145	€127,030
2028	83,879	4,954	743	11,888	€130,031
2029	88,956	5,077	762	12,650	€133,284
2030	94,153	5,197	780	13,429	€136,413
Projections are based on an increase of 2.24% per annum of the base year total and account for mode share targets for 2020 and 2030 put forward in DCC and NTA Literature					
It is estimated that private cycle parking supply will account for 85% of total parking supply					

Figure 8.2: Indicative year-on-year construction costs associated with rate of growth in cycling demand factoring in projected population growth and targeted mode share increases (Estimated construction cost is indicative only and based on €350²⁸ cost per stand as provided by Dublin City Council), and accounting for estimated private parking supply. Figures quoted do not allow for inflation.

As noted, assuming that “private” cycle parking continues to supply the existing proportion of overall total cycle parking in the city, i.e. 85%, an additional 13,429 public cycle parking spaces will be required to meet mode share targets. This roughly equates to an additional 840 spaces per annum over the period 2015-2030. At an average cost of €350 per cycle stand (i.e. to hold two bicycles) this equates to an annual cost in the order of €146,000.

This cost is indicative of providing “on-street” cycle parking spaces. However, based on the figures identified previously for existing

²⁸ This cost is based on Sheffield stands on-street. Some parking provision will be provided in specific high density sites and the cost associated with this will vary from the figure quoted here.

international high density facilities a more reasonable cost of €2,500²⁹ per space is anticipated. Assuming that approximately 3,000 of the spaces required will be high density, provided at a total cost of €7.5m, this results in a total capital cost in the order of €10m, or approximately €620,000 per annum for the 16 year period 2015-2030.

8.2

High Density Cycle Parking in Dublin

A number of potential high density cycle parking sites have been identified, assessed and ranked as part of the Dublin City Centre Cycle Parking Locations Report. A summary of the priority sites included in Chapter 9 herein.

The tailored nature of cycle parking facility implementation means that the costs and revenues associated with one facility are not necessarily applicable to another. Detailed cost estimates therefore are site dependent and need to be undertaken on a case-by-case basis.

The Transport Canada (TC) document Bicycle End-of-Trip Facilities: A guide for Canadian municipalities and employers 2010 describes the main categories of capital costs and operational costs linked with the development of cycle parking facilities. These categories can inform future costing activities and are listed as follows:

Capital Costs

- “The cost of bicycle stands or racks, including material and labour for installation;
- The cost of the enclosure, if one is provided, including material and labour costs for construction; and
- The cost of land” (TC 2010).

Operating Costs

- Human resources for maintenance and cleaning
- Human resources for customer service and security;
- Utility costs; and
- Forgone revenues if bicycle parking replaces paid automobile parking” (TC 2010) although these can be recouped through cycle parking user fees and other revenue streams such as advertising and ancillary services.

Establishing the willingness of people to pay for parking is of major importance in deciding to implement user charging and as recommended in previous sections, a trial period in select locations should be implemented to accurately gauge this aspect. The implementation of bicycle lockers could be seen as a useful forerunner to the development

²⁹ This cost estimate is based on provision of a new build “cycle point” style facility in line with UK data and in reference to the business case scenario detailed in this chapter.

of paid high density cycle parking facilities, and would provide useful indicators of willingness to pay.

8.2.1

Outline Business Cases

A number of outline sample business cases are presented following. These are based on 4 varying scenarios, namely:

- (a) “CyclePoint”, i.e. provision of a new purpose built building on a stand-alone site which includes for secure cycle parking facilities and also provision for additional on-site services such as bicycle repair shop;
- (b) Provision of a “Biceberg-up” unit. This is a free standing unit which could be replicated across the city if deemed suitable; and
- (c) Retro-fitting a multi-storey car park or similar. The figures included are based on provisional cost estimates for Drury Street, and could be applied to similar sites.
- (d) Multi-storey car park/retro-fit – smaller scale cycle parking. This considers two alternative scenarios relating to ongoing maintenance costs.

The individual outline business cases are detailed hereunder. Note that all figures provided herein are initial broad estimates, as detailed costings will vary depending on site specifics.

(a) “CyclePoint” style facility

Facility	CyclePoint
Capacity	300 spaces
Capital (structure supply & install) costs	€750,000 ³⁰
Other site development capital costs (e.g. utility diversions etc.)	Included above
Capital cost/space	€2,500
Maintenance/Operation Costs/annum	€50,000 ³¹
Security/monitoring costs	€10,000 ³²
Revenue/annum from spaces	€78,840 ³³
Revenue from ancillary services	€67,000 ³⁴
Estimated Return Period	c.10yrs

Figure 8.3: CyclePoint Business Case

(b) “Biceberg-Up”

In assessing the potential cycle parking solutions identified for Dublin city centre Halcrow Barry has consulted with Biceberg regarding the potential costs and revenues associated with delivering a “Biceberg-up” unit in Dublin. These are indicative and do not necessarily represent the final costs, but give an approximation of what these might be. On the basis of a unit with a capacity of 120 bicycles and storage starting at three metres off the ground the indicative capital cost is €275,000, or roughly €2,300 per bicycle excluding site development costs. Revenue estimates are approximately €35,000 per annum based on a charge of €1 per day, at 60% occupancy, yielding €100 per day. Indicative proactive maintenance fees are

³⁰ Based on construction cost estimates for Leeds Cyclepoint

³¹ Based on average hourly labour cost of €24.26/hr (CSO Q3 32014) for 40hrs per week.

³² Estimated proportional cost based on off-site monitoring of a number of sites

³³ Based on charge of €1/day with 60% occupancy

³⁴ Based on leasing 500sqft/45m2 for bicycle shop based on average retail rent of €1,500/m2 for “other shopping centres in the city centre”. Source CBRE Retail market View Q1 2015).

estimated to be in the region €9,000/annum, and accounting for estimated design and other associated costs, the investment return is estimated to be in the order of 10 years.

A summary of the cost model is included hereunder:

Facility	Biceberg-Up
Capacity	120 spaces
Capital (structure supply & install) costs	€275,000
Other site development capital costs (eg utility diversions etc)	€100,000
Capital cost/space	€3,125
Maintenance/Operation Costs/annum	€9,000 ³⁵
Security/monitoring costs	n/a
Revenue/annum from spaces	€35,000
Revenue from ancillary services	€22,000 ³⁶
Estimated Return Period³⁷	c.10yrs

Figure 8.4: Biceberg-Up business case.

(c) Multi-storey car park/retro-fit

A sample cost model has been provided following for the retro-fitting a multi-storey car park or similar. This assumes that the main structure is in place, and that only minor, mainly cosmetic changes are required. The figures included are based on provisional cost estimates for

³⁵ According to information provided by Biceberg maintenance includes:

- Preventive maintenance of the installation, with monthly site visit and reviewing all relevant points;
- Support 24/7 online for incidence and alarms, responding to and resolving;
- Corrective maintenance assistance; and updating software for the control, management and license to use.

³⁶ Based on ½ the “Zone A” average retail rent of €5,500/m². Source CBRE Retail market View Q1 2015). Half average rent assumed due to relatively small space of c.8m² and therefore limited use and diminished returns.

³⁷ It is considered that additional maintenance costs will be accrued as maintenance figure provided only includes for preventative maintenance. As with most mechanically/electronically operated systems breakdowns are anticipated, however no further details are available at time of writing regarding these.

upgrading and expanding the Drury Street car park facility, but could be applied to similar sites.

Facility	Retro-fitting multi-storey car park
Capacity	400 spaces
Capital (structure supply & install) costs	€500,000 ³⁸
Other site development capital costs (eg utility diversions etc)	Included above
Capital cost/space	€1,250
Maintenance/Operation Costs/annum	€12,500 ³⁹
Opportunity cost of “lost” car parking revenue/annum	€50,000 ⁴⁰
Security/monitoring costs	n/a ⁴¹
Revenue/annum from spaces	€4,380 ⁴²
Revenue from ancillary services	n/a
Estimated Return Period	n/a

Figure 8.5: Multi-storey car park/retro-fit business case.

It is demonstrated above that whilst the capital cost per space is relatively low (roughly 1/3 that of Biceberg-up) the revenue generated is also low, with high opportunity costs associated with the foregone car parking revenue. Figure 8.6 following illustrates a schematic model of Drury Street following retrofit.

³⁸ Based on Drury Street at 670m²

³⁹ Based on average hourly labour cost of €24.26/hr (CSO Q3 32014) for 10hrs per week

⁴⁰ Based on 30 car parking spaces, at €12/day with an annual occupancy of 40%. Note this cost would be related to “other” similar sited and not Drury Street, where the proposed retrofit/expansion results in no loss of car parking spaces.

⁴¹ It is considered that existing car park operating staff could monitor cycle parking space without requiring additional resources.

⁴² Based on rental charge of €1/day for secure lockers. Assumed 20 lockers provided, with 60% occupancy. All other cycle parking free of charge.



Figure 8.6: Drury Street Conceptual Design

A more detailed breakdown of the preliminary costs associated with Drury Street are included in Appendix D.

(d) Multi-storey car park/retro-fit – smaller scale cycle parking

A sample cost model has been provided following for the retro-fitting a multi-storey car park for a smaller scale cycle parking facility. This is based on reallocating c.10 car parking space to allow for c. 60 cycle parking spaces in a secure/caged location. Given the relatively low volumes it is likely that these cycle parking spaces would be leased/rented on a daily basis. Two variations of the business case are presented:

- Case 1: Capital costs funded by NTA/DCC, with revenues generated set against operational costs. In this case it is assumed that an annual fee would be incurred for the “opportunity loss” of the car parking revenue to the operator, and;
- Case 2: Capital costs funded by NTA/DCC, along with provision of additional signage in the locality which would have an economic benefit to the car park operator, with any cycle parking revenues retained by the operator. In this case it is assumed that the operator would be responsible for the supply and maintenance of the facility

Facility	Case 1	Case 2
Capacity	60 spaces	60 spaces
Capital (structure supply & install) costs⁴³	€45,000	€45,000
Other site development capital costs (eg utility diversions etc)	Included above	Included above
Capital cost/space	€750	€750
Maintenance/Operation Costs/annum	€12,500 ⁴⁴	n/a
Opportunity cost of “lost” car parking revenue/annum	€17,520 ⁴⁵	n/a
Security/monitoring costs⁴⁶	n/a	n/a
Revenue/annum from spaces	€13,140 ⁴⁷	n/a ⁴⁸
Revenue from ancillary services	n/a	n/a
Annual operating profit/loss (excluding capital investment)	(-) €16,880	€0
Estimated Return Period	n/a	n/a

Figure 8.7: Multi-storey car park/retro-fit business case.

The capital costs for both cases examined are relatively low, at c. €750/stand, however the scale of facility is also small. It is anticipated that these types of facilities would be more suitable to long term commuters who lease the space on a yearly basis. It's unlikely that the off-street location, combined with the relatively small scale and hence increased chance of limited free spaces, would attract more casual cyclists. These facilities would however “free-up” casual on-street cycle spaces in the

⁴³ Based on estimated fit out cost based on Clerys Car Park. Refer to Appendix for further details.

⁴⁴ Based on average hourly labour cost of €24.26/hr (CSO Q3 32014) for 10hrs per week

⁴⁵ Estimated cost for leasing the spaces based on 10 car parking spaces, at €12/day with an annual occupancy of 40%.

⁴⁶ It is considered that existing car park operating staff could monitor cycle parking space without requiring additional resources.

⁴⁷ Based on rental charge of €1/day for secure/caged bike space, based on 60 spaces with 60% occupancy.

⁴⁸ Revenue collected by car park operator

immediate locality however thus contributing significantly both to total cycle parking supply and quality of provision.

8.3

Holistic Benefits of Cycling

It is well known that cycling has many benefits for both individuals and a city as a whole. Improved health, reduced traffic congestion, and cost effectiveness are amongst the most significant of these. The European Cyclist Federation (ECF), an umbrella federation for national cycling organizations throughout Europe, investigate and research these benefits. The ECF calculate that the internal and external benefits of cycling in the European Union (EU) are in excess of €200 billion annually. This figure is based on the 7.4% of Europeans who cycle regularly.

In Dublin city, and Ireland as a whole, cycling can bring about many benefits to society. Ireland's National cycling lobby group cyclist.ie and the voluntary cycling group the Dublin Cycling Campaign, have also undertaken research on the economic benefits of cycling and produced a factsheet detailing their findings. A summary of the main points discussed in this factsheet include the following:

- **Energy efficient transport:** Compared to private vehicles and public transport, cycling is by far, the most energy efficient form of non-polluting transport.
- **Health:** Cycling is an aerobic exercise and so combats obesity/over-weight, diabetes, heart-attack, stroke and absenteeism from work.
- **Mobility and Congestion:** Enhances personal mobility and reduces traffic congestion: According the cyclist.ie research Ireland is the EU's 3rd most car-dependent country. It is quicker to travel by bicycle in congested urban areas over distances up to 6km. Bicycles occupy about one sixth of the road space of a car and one tenth for parking.
- **Financial benefits:** The National Cycling Policy Framework (2009) predict a return of €400 million, which could be obtained for every €100 million invested in cycling in Ireland. Key financial gains include reduced expenditure on health, on cars, on road surfaces, on polluting fossil fuels, on traffic congestion and increased tourism revenue from eco-tourists.
- **Environmental benefits:** Pollution caused by cycling is negligible. This benefits health while helping Ireland comply with

EU air quality regulations and targets for reducing transport Greenhouse Gas emissions.

- **Quality of life:** Cycling contributes to a better quality of life. Bicycle-friendly towns are cleaner, healthier, quieter, safer and more liveable.
- **Saving lives:** Reductions in motor vehicle traffic and a calmer road environment, potentially associated with increased cycling could save lives (cyclist.ie Factsheets: The Benefits of Cycling, 2013).

Although the financial returns associated with the provision of cycle parking infrastructure may not be readily apparent, the reality is that greater provision of high quality fit-for-purpose infrastructure enables and encourages a greater mode shift towards cycling. It has been demonstrated that cycling, as an active travel mode, has numerous benefits for the individual and society as a whole and the highlighted health, mobility, traffic and environmental benefits all imply associated financial gains. As a key facilitating measure to increase bicycle use, continued investment in appropriate cycle parking infrastructure will assist in maximising these benefits and the inherent financial rewards.

8.4

Summary findings of business case

In terms of financing the capital and operational costs of cycle parking it is considered that any potential revenue generated from pay-for-use will be relatively low. In this regard, and when considering the holistic benefits of cycling, it is recommended that cycle parking in the city is largely provided free of charge, with only limited charging applied for additional facilities.

9 **Cycle Parking Locations & Wayfinding Strategy**

9.1 **Dublin City Centre Cycle Parking Locations Report Summary Findings, Locations and Recommendations**

In the context of the cycle parking feasibility study as a whole, this cycle parking Strategy Report supports a cycle parking Locations Report which identifies and rates potential cycle parking locations throughout Dublin city centre. The locations are both high density and smaller cycle parking sites. The high density locations are defined as sites with a potential capacity for over 100 bicycles. A maximum potential capacity for an individual site has been capped at 200 bicycles. However a number of these sites will have a potential capacity of above 200 bicycles.

Although high density locations are the focus of this report, the identified requirement for a mix of small, medium and large scale cycle parking facilities to meet the growing demand for cycle parking has been considered and the scope of the study is not constrained to high density sites alone. Based on initial desktop studies and site inspections to identify potential new cycle parking locations, a total of 163 potential cycle parking locations are summarised in the locations report and the top ranked 50 are assessed in detail. From the 163 sites, 50 sites are considered to be high density cycle parking locations.

This assessment builds on the initial survey of the existing 387 on-street public cycle parking sites spread throughout the project area and accounts for existing haphazard cycle parking which has been identified as part of the survey, site inspection and research process. Provisional estimates show that the top 50 potential locations will provide a potential for up to 4,800 to 6,000 bicycle parking spaces. The remaining 113 sites will provide an additional 8,000 to 11,400 potential bicycle parking spaces. This gives a total additional 12,800 to 17,400 spaces. These figures are estimates only subject to detailed design of the specific site and it is envisaged that a number of the potential sites will have room for expansion if implemented and deemed a success, whereas other sites may have to reduce the estimated capacity due to unforeseen problems such as utilities and public realm issues.

The Dublin City Centre Cycle Parking Locations Report reflects the findings of the strategy report which shows that the largest demand for cycle parking is in areas close to retail centres, recreational developments and transport hubs. Figure 9.1 below shows the top 10 ranked potential high density cycle parking locations and the associated potential parking capacity.

No.	Location	Potential Size (Bicycles)	Total score (x/110)
1	Drury Street Car Park	400*	96.9
2	41 and 46A O'Connell Street	200*	95
3	Connolly Station sites	200*	93
4	BusAras (underground bicycle parking, Amiens Street)	190	92.9
5	No.11 Burgh Quay/Tara Street	200*	92
6	Luke street (Tara Station)	200*	91
7	Pearse Train Station	160	91
8	No.163, 164 & 164a Capel Street	200*	89.9
9	48/50, Cuffe Street	200*	89.8
10	34 Camden Street Lower	150	89.8

Figure 9.1 List of top 10 ranked potential high density cycle parking locations and associated potential parking capacity.

*Potential to Expand Further

Within the Dublin City Centre Cycle Parking Locations Report, sites such as the “The Mercantile” (South Great Georges Street), St Stephens Green Luas, Dame Street Square and O’Connell Street pedestrian median have also been identified as high demand locations. All of these scored highly in the assessments and have reasonable potential capacities, but they do not meet the required high density criteria (100 + bicycles). As such they are not included in the list of high density sites herein, but merit inclusion in overall development strategy as they provide a good mix of cycle parking facilities. The top 10 ranked high density locations highlighted in the figure above are summarised as follows:

- Drury Street Car Park – At present there is 196 bicycle parking spaces at Drury Street Car Park. Utilising the current footprint more efficiently and moving into the basement area the future capacity is expected to be in the order of 400 spaces. The site would be cordoned off from the rest of the car park and improved CCTV security can be implemented. Additional features such as bicycle pumps, water fountains and changing rooms can be implemented. If deemed appropriate a trial annual subscription charge can be implemented in order to raise funds to cover maintenance.

- 41 and 46A O'Connell Street – At present 41 and 46A O'Connell Street are vacant brownfield sites at the north end of O'Connell Street. The sites are surrounded by wooden hoarding and no. 46A is also covered by a tarpaulin designed to mimic a building. One of the two sites or a portion of one of the sites can be converted into a large scale high density cycle parking facility. The site can be fenced off and a roof can be installed. Security (CCTV) and secure access arrangements can also be applied. The site is located right in the centre of Dublin City beside many employment, retail and recreational developments. A large amount of haphazard cycle parking has been observed in the area.
- Connolly Station Sites - The location of the proposed high density cycle parking site is one of the three different vacant brownfield lands all in close proximity to Connolly Station. All three sites are within 200-300 meters from the entrance to Connolly Station. The demand for all of the sites are high as they are situated beside the busiest train station in Ireland, Connolly Station. The site also lies beside another transport development in BusAras. Improved access arrangements can be introduced to shorten the distance to Connolly Station. Improved wayfinding and advertising can be introduced to increase awareness of the sites as they are not easily visible from Connolly Station.
- BusAras (underground bicycle parking, Amiens Street) – At present private cycle parking for BusAras employees is available in the underground basement. A separate public cycle parking scheme can be implemented if the space is better utilised. The demand of this site is high as it is situated underneath the largest central bus station in Ireland. A subscription membership only access could be utilised in order to increase security.
- No.11 Burgh Quay/Tara Street – At present the site is a vacant brownfield area at the Tara Street and Burgh Quay. The site is surrounded by wooden hoarding and advertising boards. The site is located less than 50 meters to the entrance of Tara Street Station. The site has potential to be converted into a large scale high density cycle parking location. The site can be fenced off and a roof can be installed. Security (CCTV) and safety measures can also be applied. These measures would see a large increase in numbers, in particular cater for the long term cycle parking from users of Tara Street station.
- Luke Street (Tara Station) – Similarly to Burgh Quay/Tara Street above, the site on Luke Street is a vacant brownfield area located 150 meters away from Tara Street Station. A large scale high density cycle parking facility can be constructed in the area.
- Pearse Station – At present there is a very small number of bicycle parking spaces available at Pearse station. Two potential locations have been identified there. The first site is located in the open area of the Pearse Street entrance to the station which is surrounded by retail units. The site will be two long rows of 30 stands in the middle or either side of

the open area in front of the shops. The second site is located at the south end of the station in the staff car park, in close proximity to the current cycle parking spaces at the station. This site will be 20 stands against the wall in the car park. It will require access arrangements where the current stands are to the new proposed location. Expansion will be possible in the future if deemed a success.

- No.163, 164 & 164a Capel Street - Similarly to 41 and 46A O'Connell Street, the site on Capel Street is a vacant brownfield area covered by wooden hoarding. The site is located beside a busy retail and recreational district. The demand for a high density cycle parking facility would be very high in this area.
- 48/50, Cuffe Street - At present the site is a vacant brownfield area on the east side of Cuffe Street. A high density cycle parking facility in this location would cater for the retail and employment developments on Wexford Street and Aungier Street. Also the site is a five minute walk from St Stephens Green Luas stop, a future Transport hub for Dublin City (Luas, Dart Underground and Metro North).
- 34 Camden Street Lower - Similarly to O'Connell Street and Capel Street, the site on Camden Street is a vacant brownfield area covered by wooden hoarding. The site is located beside a busy retail and recreational district. For a smaller location like Camden Street, initial temporary cycle parking can be introduced in order to gauge demand before moving onto a larger facility.

Although the established definition of high density locations within this study is a potential capacity for over 100 bicycles, a number of sites have been recommended in the Locations Report with a lesser capacity. These sites have been noted in the analysis where a recommended base figure has been given with the option to expand further. The base figure has been provided as an initial estimate of future capacity which can be expanded if deemed successful, therefore turning this site into a high density cycle parking location. This partly reflects the understanding that not all sites will immediately achieve full capacity as soon as they are implemented. These sites are part of the long-term solution to meeting cycle parking demand as it continues to increase in line with established mode share targets and establishing monitoring the initial uptake of increased capacity will inform further capacity increases.

9.2

Way-finding Strategy

As outlined previously key to achieving cycle modal split targets is the provision of safe, secure cycle parking facilities at convenient locations throughout the city. The absence of appropriate parking cycle facilities has been shown to deter people from cycling in the first place. However if people

do not know where the bicycle parking facility is, and if it is not immediately visible, it will not be used.

Ideally cycle parking facilities should be easily visible and readily apparent to cyclists. They should be located on the cyclist's route, and the attractive, visible and inviting design of the facility should make signs unnecessary.

However, cycle parking facilities, particularly medium to long term facilities (such as High Density Cycle Parking Facilities) may be located out of the way in relation to the flow of bicycle traffic, and may not be readily apparent to cyclists. This has been demonstrated at the existing Drury Street facility, where short "vox-pop" surveys of cyclists observed parking in the vicinity indicated they were unaware of the facility. Indeed, the generally low occupancy levels observed, combined with the frequency of "haphazard" cycle parking in the immediate environment, suggests that at least some cyclists are unaware of the facility.

9.2.1

Existing Pedestrian Way Finding Signage

An extensive way finding signage scheme is currently in place in Dublin City Centre. The Way Finding scheme is provided to Dublin city as part of the public realm contract between Dublin City Council and JC Decaux©. This contract has included the hugely successful Dublin Bikes and also the development of a civic information network for Dublin City Council, funded through advertising.

The Dublin way finding system provides a comprehensive network of directional signage for pedestrians, particularly visitors to the city. Fingerpost destinations are listed in both Irish and English. The signs and accompanying map panels guide pedestrians to key destinations including civic amenity centres, cultural centres, tourist information centres, transport hubs, locations of interest, and also Dublin Bikes locations.

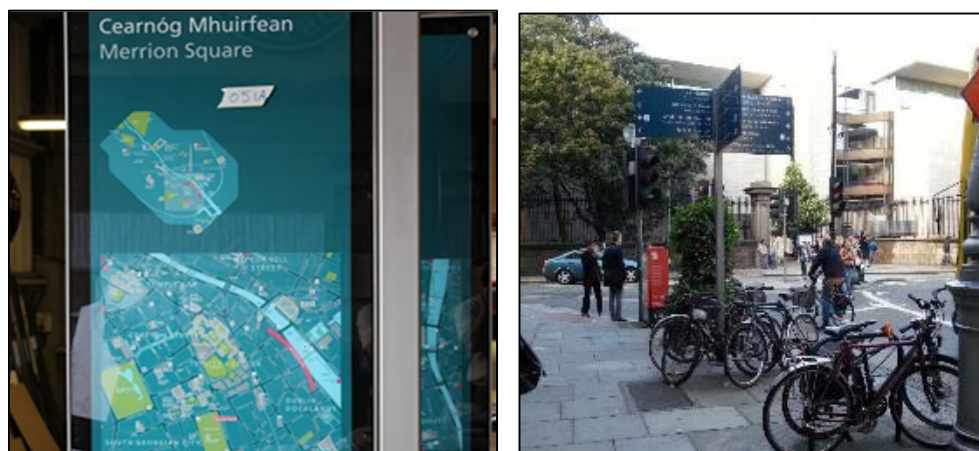


Figure 9.2: Examples of pedestrian wayfinding panel and signage in the City Centre

9.2.2

Existing Road Directional Signage

(a) Dublin City Inner Orbital Route

The Dublin City Inner Orbital Route is designed to enable motorists find their way from one side of the city centre to another whilst avoiding the busiest traffic in the core of the city. It can also be used to locate car parks within the city centre.

Road signs along this route are light blue in colour.



Figure 9.3: Examples of Inner Orbital Route Signage

Signage associated with the Inner Orbital Route is provided at, or on the approach to, 43 key junctions in the city centre.

(b) Dublin City Outer Orbital Route

The Dublin City Outer Orbital Route is designed to enable motorists find their way from one side of the city to another and avoid city centre traffic, for example to travel from the North side to the South side of the city or to travel between major National or Regional roads.

Road signs along this route are **purple** in colour. Examples of Outer Orbital route signage are provided in Figures 9.5 and 9.6 following.



Figure 9.5 and 9.6: Examples of Outer Orbital route signage.

Signage associated with the Outer Orbital Route is provided at, or on the approach to, 30 key junctions. This route is often called the ‘Canal Ring’ because it matches the routes of the Grand (south) and Royal (north) canals. It therefore generally borders the extents of the cycle parking study area.

9.2.3

Existing Wayfinding Mobile Applications

(a) Walk Dublin

The “Walk Dublin” Wayfinding Application was launched in November 2012 and has been developed to compliment the wayfinding signage system that was introduced throughout the city in 2011.

The function of the wayfinding app is to assist people in successfully navigating their way around the city and to obtain information about the key cultural and institutional attractions in the city. The app provides for one hundred points of interest ranging from the smaller cultural destinations to the city’s national cultural destinations.

(b) NTA Cycle Planner

The Transport for Ireland/NTA Cycle Planner Application was launched in December 2013. The cycle planner allows cyclists to plan their route from A to B anywhere in the Dublin region. They can store the route in their smartphone and use it when they’re offline. It allows different categories of cyclists to plan their route, for example family with you children looking for a quiet route, to commuters looking for the quickest route to work. It also illustrates Dublin Bikes locations as well as detailing various route factors such as level of traffic, gradients and calories burned.

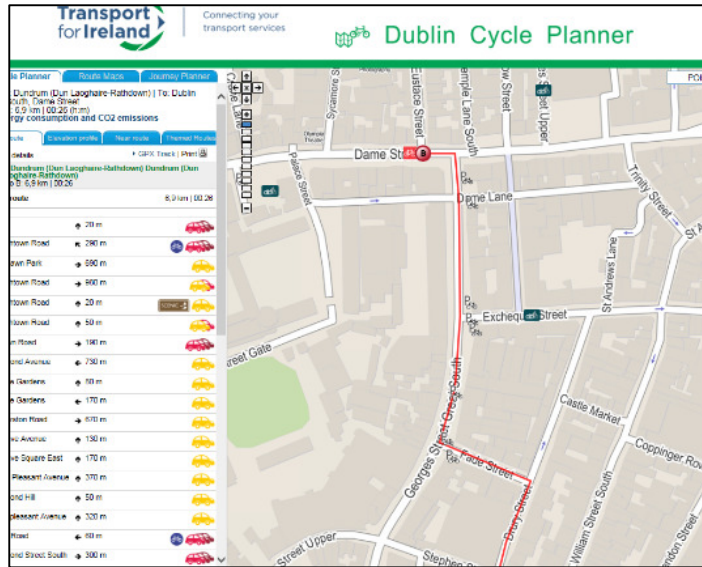


Figure 9.7: Transport for Ireland: Dublin City Route Planner

The Planner also has pre-set maps installed for some of the more popular Themed Leisure Routes in the region including the Dodder River Cycle Way, the Dublin Bay Coastal Route and the Canal Cycle Ways.

In terms of this study the application is particularly useful as it provides locations of existing cycle parking facilities, however it does not cycle parking detail cycle parking capacity at each location.

(c) Coca Cola Zero Dublin Bikes

The Coca Cola Zero Dublin Bikes application details Dublin bikes locations, number of bikes available and number of stands free. It also enables the user to plan their journey to the nearest Dublin Bikes stands, as well as journeys between stands.

The applications enables users to receive alerts when particular stands are full or empty. The application only details Dublin Bikes stands and does not provide information relation to other cycle parking facilities.

9.2.4

Way Finding Recommendations

The following recommendations are made in relation to wayfinding information for High Density and smaller cycle parking locations.

(a) High Density Cycle Parking Locations

Taking “High Density” as any facility that provides greater than 200 cycle parking spaces the following recommendations are made:

- Indicate High Density Cycle Parking facility on existing pedestrian way finding signage and panels. This could simply mean including a unique symbol or an additional sign plate identifying the specific site and including the symbol.
- Incorporate unique High Density cycle parking symbols on existing Outer Orbital Route Signage, or provide supplementary fingerpost

signage where the route intersects any Primary, Secondary or Greenway cycle route.

- Incorporate unique High Density cycle parking symbols on existing Inner Orbital Route Signage, or provide supplementary fingerpost signage where the route intersects any Primary, Secondary or Greenway cycle route.
- Include High Density Cycle Parking locations on existing way finding and route planning applications, in particular the “Walk Dublin” and “Cycle Planner” applications. Real time capacity information at these High Density locations should also be included. Other facilities provided at the High Density facility should also be indicated, such as security, covered/uncovered, access controlled, CCTV etc.
- The provision of VMS signage should also be considered at High Density Locations. This could take the form of “Real Time” signage at, or on the route to the facility, to advise of parking occupancy, and in particular the number of available spaces. For much larger facilities a bicycle activated red/green light could be provided to direct patrons to the nearest available space. It should be noted however that this would generally only be beneficial in very large sites where patrons would otherwise have to search for a space.

(b) Other Cycle Parking Locations

Taking “Other” cycle parking locations as any facility that provides less than 200 cycle parking spaces the following recommendations are made:

- Include High Density Cycle Parking locations on existing way finding and route planning applications, in particular the “Walk Dublin” and “Cycle Planner” applications. Real time capacity information at these High Density locations should also be included.
- The size and scale of the cycle stand and level of service provided should also be indicated. An example of a cycle plan which indicates this information is illustrated in figure 9.8 following.

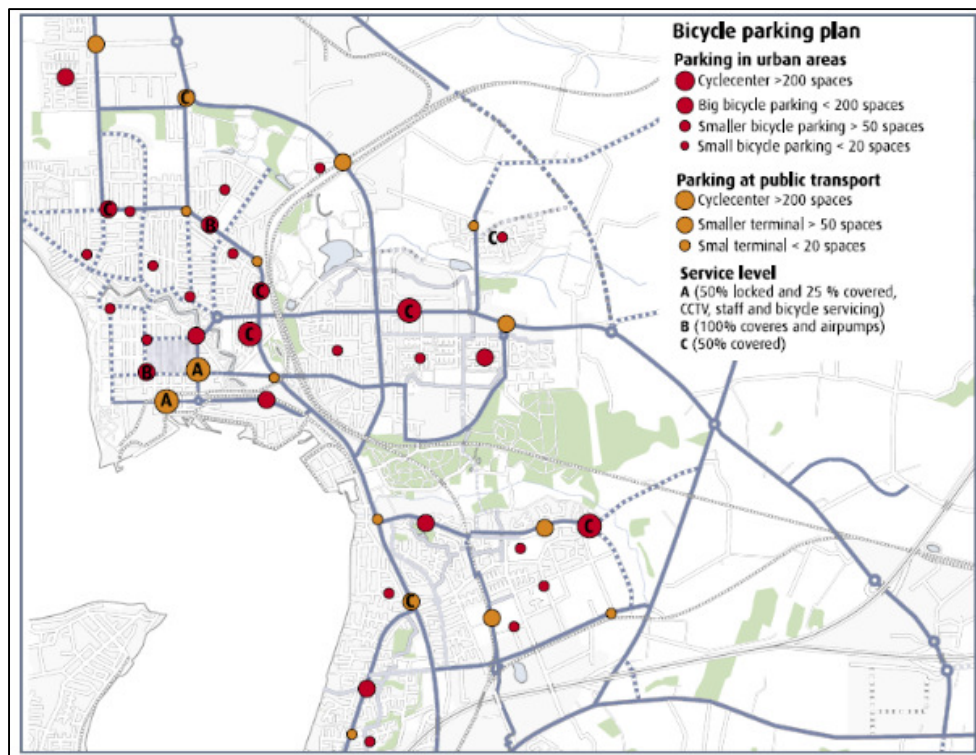


Figure 9.8: Example of cycle parking plan (Source: *The Danish Cyclist Federation 2008*). The scale of cycle parking and level of service provided should be provided on the mobile application.

10 Summary

10.1 **Process Overview**

The key premise of this report is to provide a cycle parking strategy which will assist Dublin City Council (DCC) and the National Transport Authority (NTA) in their aim to significantly increase the mode share of cycling over the coming years, so that within the City 25% to 30% of all new commutes by 2017 will be by bike. The provision of safe and secure cycle parking facilities at convenient locations throughout the city are of paramount importance to this. The purpose of this report was to advise how this can be achieved through detailed analysis and best practice review.

Primarily, this report analyses demand patterns related to cycling behaviour within Dublin City centre and contrasts these results with existing cycle parking provision as identified by Halcrow Barry in our survey and assessment of existing cycle parking within the defined project area. This is undertaken in the context of current DCC and NTA policies and objectives, with a range of other stakeholder research and reports having also been reviewed to inform the project. Established estimates of population growth provided by the NTA have been specifically utilised in combination with Central Statistics Office Means of Travel data and DCC traffic count data to provide an indication of projected current cycling traffic to 2030. These projections account for the most recent mode share targets set out in DCC and NTA literature.

Specific locations across the city have been identified, including: Transport hubs, retail zones, and key trip attractors. These heavily influence the need for cycle parking and represent locations where it is especially important to ensure that the parking requirements of existing and future visiting cyclists are adequately met.

Stakeholder engagement has also formed a vital part of the process. Workshops undertaken by Halcrow Barry and DCC with representatives from various organisations have yielded important insights and recommendations, and these have been included in the assessment.

The conclusions of this analysis of demand, supply, policy objectives, factors contributing to demand, and stakeholder engagement, are brought together to provide recommendations regarding the current and future need for cycle

parking. The findings from these key analysis elements are supplemented with detailed reviews of cycle parking implementation best practice, charging implementation, parking standards, allocation of space, and infrastructure costs.

10.2

Synopsis of Findings

10.2.1

Parking Supply

Halcrow Barry have identified 387 existing cycle parking sites across the project area. Although current capacity amounts to a total of 4,625 cycle parking spaces, survey activities undertaken by Halcrow Barry estimate that existing sites can be expanded to provide an additional 5,000 spaces. This would provide a total parking provision of 9,625 cycle parking spaces. In addition to this, 163 new cycle parking locations were identified in the corresponding locations report. Each of these locations have been assessed and could provide a further 13,000-18,000 spaces.

At present there is little or no information available on private parking supply and it is of critical importance for future investment that a greater understanding of the scale of this provision is achieved.

10.2.2

Parking Demand

Between 2006 and 2013 the volume of cyclists crossing the canal cordon during the morning peak period increased by 87.2%. Cyclists represented 10% of total inbound vehicle traffic between 07:00 and 10:00 in 2013, and this amounts to 9,061 cyclists. However, accounting for occupancy of vehicles, it can be seen that the proportion of cyclists in relation to the total number of people crossing the cordon is 4.7% of the total 192,188 people entering the city centre.

For city centre residents the rate of cycling to work, school or college varies relatively significantly across the 522 small areas which form the project area, from a high of 22% to a low of zero. In 73% of small areas less than 10% of residents commute by bike, and in nine areas there are no commuting cyclists in the populations at all.

10.2.3

Major Attractors

It is important that other factors such as retail destinations, transport hubs, and cycle routes were addressed in this analysis to gain an impression of potential cycle parking requirements associated with these locations

In terms of transport hubs, Connolly Station, Heuston station, and St. Stephen's Green are the busiest within the project area, with 15,383, 14,705, and 13,977 passengers alighting at these locations respectively each day. Bus Aras may also represent a significant hub. Although the volume of passengers arriving/departing at Bus Aras is unknown, it has been included in this assessment as a key transport hub due to its role as the most

Pedestrian flows provides an insight into the footfall characteristics in the principal shopping districts areas, and from this and other sources an estimate of the number of cyclists travelling to these locations can be determined.

10.2.4

Projected demand

In the period up to 2030, all areas of the GDA are expected to see a growth in population, with the fastest rate of growth expected in the city centre and the Metropolitan outer suburbs (NTA Draft Transport Strategy 2011). This expected rate of growth shows that the city centre's share of GDA population is set to increase from the 2006 level of 6%, to 9% by 2030. In terms of employment within this area, growth is expected within the city centre from the 2006 level of 25% of GDA employment to 28% by 2030.

Under the scenario whereby cycling retains a modal share of 7.31%, the number of city centre residents whose primary means of travel is cycling will be 7,636 by 2030. If the mode share were to increase to 25%, as targeted by DCC and the NTA, the result would be 26,525 resident cyclists by 2030. If cycling were to achieve the target of 15% of the mode share through the canal cordon by 2020 the volume of cyclists will grow to 34,101 inbound during the am peak. This will increase to 67,627 if a 25% mode share target is achieved by 2030. It should be noted that a 15% mode share was originally planned to be achieved by 2017, however this was deemed very unlikely, although some areas will experience higher levels of demand by this time. It is anticipated that existing "latent" demand may be realised following provision of cycle parking and that an average mode share of 15% is more likely to be achieved in 2020.

10.2.5

Parking Requirements and Cost

Broadly speaking, approximately 2,000 cycle parking spaces will be required in 2015 and a further 800-900 in each of the next five years for provision to meet an achieved mode share target of 15% for cycling in 2020. It is acknowledged that whilst there is capacity available in some cycle parking sites, others are over capacity as evidenced by haphazard cycle parking.

This initial additional provision of 2,000 spaces in 2015 should therefore be targeted at areas with high existing demand, as identified in the Cycle Parking Locations Report.

From 2021 to 2030 the additional cycle parking requirement is reduced to approximately 600- 800 stands per year to meet the cycle parking needs associated with achieving a mode share of 25%. This level of provision will mean that 13,500 cycle parking spaces will be introduced from 2015 to 2030 based on the noted assumption that private cycle parking provides approximately 85% of demand.

This roughly equates to an additional 840 spaces per annum over the period 2015-2030. At an average cost of €350 per cycle stand this equates to an annual cost in the order of €150,000. This cost is indicative of providing “on-street” cycle parking spaces. However, based on the case studies of international examples, and outline business cases for a range of solutions in Dublin, for high density facilities a more reasonable cost of €2,500 per space is anticipated. Assuming that approximately 3,000 of the spaces required will be high density, provided at a total cost of €7.5m, this results in a total capital cost in the order of €10m, or approximately €620,000 per annum for the 16 year period 2015-2030.

The low cost of cycling is one of the many factors which encourage people to cycle. A review of both national and international case studies reveals that some cyclists are prepared to pay for additional cycle parking services, however, there are many different factors which would influence the willingness of cyclists to pay for cycle parking storage. As such, it is very difficult to predict the take-up of pay-for-use cycle parking. It is recommended therefore that a trial of pay-for-use storage lockers be implemented in Drury Street before any further decisions are made in this regard and to inform the development of business plans for additional sites. This trial can include both short-term daily charges, and long-term (e.g. annual) charges. The potential to incentivise pay-for-use through tax saver rebates should also be examined.

In terms of financing the capital and operational costs of cycle parking it is considered that any potential revenue generated from pay-for-use will be relatively low. In this regard, and when considering the holistic benefits of cycling, it is recommended that cycle parking in the city is largely provided free of charge, with only limited charging applied for additional facilities.

11**Short, Medium and Long Term Recommendations**

Short term plans will concentrate on expanding on-street sites, specifically at high demand locations. Several high density cycle parking sites will also be developed as will a number of new on-street sites. Measures will be introduced to assess real-time cycle parking aspects such as facility occupancy and demand and these will be made available to the public. Testing of a charging scheme for certain cycle parking facilities will also be introduced on a trial basis to assess the effects of such a system on facility use. In the medium to longer term, recommendations are focused on continuing development of on-street sites and developing larger off-street sites.

Additional recommendations include providing specific objectives in the Development Plan for suitable future developments to incorporate publically accessible high density cycle parking, developing policy to encourage reallocation of existing off-street car parking spaces to staff cycle parking spaces, examining possibility of an increase in incentives, relief and aid to current private industries to increase their current cycle parking supply and finally the development of policies to encourage reallocation of state and semi-state car parking to public cycle parking where appropriate.

It has been shown that a substantial increase in cycle parking provision is required to meet existing demand. The total current and planned parking capacity does not account for private cycle parking provision. Provisional research suggests that this could account for a substantial percentage of the cycle parking currently available throughout the project area, particularly for businesses, colleges, and schools.

As the modal shifts changes towards cycling, as further infrastructure is rolled out, and as somewhat inevitably driving becomes less attractive, then the demand for additional commuter cycle parking will increase. Conversely the demand for private car parking spaces will decrease. Private, public and state bodies will therefore come under increasing pressure to provide secure cycle parking, whilst at the same time the opportunity to convert private car parking spaces to cycle parking will present itself. These entities will be expected to help meet the growing shortfall in supply. In this regard however

additional research is required to quantify the percentage of cycle parking supply currently provided, or that could potentially be provided by private, public and state bodies.

It is also recommended that ongoing crowd source suggestions should be utilised to get a "real-time" gauge of parking demand locations into the future. An online survey platform should be created and maintained which would allow for continued participation and contribution from the public.

11.1

Short-term Recommendations

1. Routine and regular surveys should be conducted to establish cycle parking occupancy levels at individual sites throughout the day to enable the development of a more accurate cycle parking demand profile. This should be undertaken at regular intervals, and allow for seasonal variations such as school/college terms and summer tourist peaks, and also demand related variations, e.g. associated with short term retail or longer term commuter parking. The surveys should also include identifying "haphazard" cycle parking to assist in identifying areas of increased demand and emerging demand relating to development or redevelopment of areas. It is estimated that each city wide occupancy survey would take up to 10-12 full man days.
2. A comprehensive survey of private cycle parking provision should be undertaken to enable better estimates of the overall quantum of cycle parking, and also to develop estimates of how much additional private cycle parking could be provided, for example by reallocating existing car parking bays as modal shift occurs and car dependence decreases.
3. A comprehensive survey of state and semi-state car parking provision should be undertaken to establish existing occupancy levels and identify additional sites that could provide private and/or public cycle parking. Factors to be considered when assessing the suitability of these site for public cycle parking would also include access arrangements/building security etc.
4. A general objective should be provided in the Development Plan in support of High Density Cycle Parking. In general Sheffield (U-bar) type cycle stands should be provided as they are the type most familiar to cyclists, and also as they enable bicycles be parked in a stable position with both the frame and wheel(s) locked securely to it.

Other types of stands may be appropriate in some circumstances, however as per the National Cycle Manual units that are designed to grab the front wheel only are not recommended.

5. Policy should be developed with the objective of increasing the provision of cycle parking within public car parks with a view to achieving parity of one cycle parking space for every car parking space.
6. Highly-ranked existing on-street cycle parking sites as identified in the Dublin City Centre Cycle Parking Locations Report should be expanded in order of ranking.
7. New on-street sites as identified in the Dublin City Centre Cycle Parking Locations Report should be provided in order of ranking as funds permit;
8. Drury Street High Density Cycle Parking site should be redeveloped and expanded;
9. Additional High Density Cycle parking sites as identified in the Dublin City Centre Cycle Parking Locations Report should be developed in order of ranking;
10. The low cost of cycling is one of the many factors which encourage people to cycle. A review of both national and international case studies reveals that some cyclists are prepared to pay for additional cycle parking services, however, there are many different factors which would influence the willingness of cyclists to pay for cycle parking storage. As such, it is very difficult to predict the take-up of pay-for-use cycle parking. It is recommended therefore that a trial of pay-for-use storage lockers be implemented in Drury Street before any further decisions are made in this regard and to inform the development of business plans for additional sites. This trial can include both short-term daily charges, and long-term (e.g. annual) charges. The potential to incentivise pay-for-use through tax saver rebates should also be examined.

In terms of financing the capital and operational costs of cycle parking it is considered that any potential revenue generated from pay-for-use will be relatively low. In this regard, and when considering the

holistic benefits of cycling, it is recommended that cycle parking in the city is largely provided free of charge, with only limited charging applied for additional facilities.

11. Consideration should be given to collating “real time” cycle occupancy data for Drury Street, via cycle counters, loops or controlled access. This will facilitate development of additional cycle parking trails and enable more informed decisions be made regarding future high density cycle parking provision., for example a pre-booking system etc. The occupancy information should be publically accessible on online and mobile applications to increase awareness and inform the cyclist’s decision making process.
12. Provide all cycle parking locations and capacities on mobile applications such as NTAs “Cycle Planner” to increase awareness of facilities and inform the cyclist’s decision making process.
13. The following recommendations are made regarding cycle parking wayfinding:
 - Indicate High Density Cycle Parking facility on existing pedestrian way finding signage and panels. This could simply mean including a unique symbol or an additional sign plate identifying the specific site and including the symbol.
 - Incorporate unique High Density cycle parking symbols on existing Outer Orbital Route Signage, or provide supplementary fingerpost signage where the route intersects any Primary, Secondary or Greenway cycle route.
 - Incorporate unique High Density cycle parking symbols on existing Inner Orbital Route Signage, or provide supplementary fingerpost signage where the route intersects any Primary, Secondary or Greenway cycle route.
 - Include High Density Cycle Parking locations on existing way finding and route planning applications, in particular the “Walk Dublin” and “Cycle Planner” applications. Real time capacity information at these High Density locations should also be included. Other facilities provided at the High Density facility

should also be indicated, such as security, covered/uncovered, access controlled, CCTV etc.

- The provision of variable message signage (VMS) should also be considered at High Density Locations. This could take the form of real-time signage at, or in the vicinity of a facility, to advise of parking occupancy and the number of available spaces. For much larger facilities a bicycle activated red/green light could be provided to direct patrons to the nearest available space. However, it should be noted that this would generally only be beneficial in very large sites where patrons would otherwise have to search for a space.
 - Other smaller cycle parking locations should be indicated on existing way finding and route planning applications, in particular the “Walk Dublin” and “Cycle Planner” applications. Real time capacity information at these locations and level of service provided should also be indicated.
14. A crowd sourced cycle parking suggestion facility should be provided, such as an online survey platform which would allow for continued participation and contribution from the public and to gauge demand areas.
 15. In consultation with Stakeholders examine and develop policy measures to encourage reallocation of existing off-street car parking spaces to staff cycle parking spaces. Such measures may include reduction or off-setting of rates, offering specific tax incentives, and increasing awareness of holistic benefits both to employees and employers such as reduced absenteeism and increased health ;
 16. In consultation with Stakeholders examine and develop policy measures to encourage reallocation of state and semi-state car parking to public cycle parking where appropriate. Such measures may include development funding or grants towards capital costs.
 17. A policy should be prepared and communicated in relation to the treatment of haphazardly parked and abandoned bikes. Methods include attaching stickers to apparently abandoned bikes advising of a notice period before the bike is removed. A notice period of between two and four weeks within which the bike must be removed

is generally recommended. Care should be taken not to discourage cycling in the first place, and it is generally considered that sufficient designated cycle parking should be provided in the locality before any such removal policy is implemented.

18. Further assessment should be undertaken in relation to potential “real time” cycle parking data collection for all publically available spaces (for example by incorporating sensors within the cycle parking spaces to provide data relating to frequency of use, duration of use, key demand times etc.). The cost of implanting such measures could be off-set against the costs associated with annual or multi-annual surveys of cycle parking facilities.
19. As the threat of bicycle theft represents a significant deterrent to the use of cycle parking facilities, further assessment should be undertaken with regard to emerging technologies which seek to improve bicycle security, for example integrated locking mechanisms on stands and/or improved bicycle locks.
20. Further consultation should take place with the Railway Procurement Agency (RPA) regarding the provision of cycle parking at proposed Luas Cross City stops.
21. The Development Plan Cycle Parking Standards for residential and student accommodation should be increased in line with the current international best practice to provide a minimum of 2 secure cycle parking spaces per residential unit and one space per student resident.

11.2

Medium and Long-term Recommendations

1. Continue routine and regular surveys to provide updated cycle parking demand profiles and tailor provision of additional cycle parking sites as identified in the Dublin City Centre Cycle Parking Locations Report. It is estimated that each city wide occupancy survey would take up to 10-12 full man days.
2. Develop new and expand existing on-street sites in order of ranking and targeting specific locations based on “real time” demand;
3. Expand sites with latent capacity as demand increases;
4. Additional High Density Cycle parking sites as identified in the Dublin City Centre Cycle Parking Locations Report should be developed in order of ranking;
5. Include a general objective in the Development Plan in relation to HDCP;
6. Include a requirement, via specific event licencing, or Development Plan standards, that public events provide sufficient temporary cycle parking to accommodate a 25% target mode share.

The cycle network when delivered will provide high quality high capacity routes to both Croke Park and Landsdowne Road, as well as serving the general areas of the Point etc. Some key points relating to this aspect include:

- Appropriate Secure Cycle Parking needs to be planned for these major arenas – for pedestrian crowd attenuation reasons, the secure parking is likely to be at a short walk’s remove from the arena itself;
- In the short term, the cycle parking can be of a limited scale, and possibly temporary for particular events; and

- In the medium term, larger permanent cycle parking hubs serving not just the arenas, but also commuters and perhaps linked to cycling retail and maintenance business, could and should be considered.
7. Implement policy changes to encourage reallocation of existing off-street car parking spaces to staff cycle parking spaces;
 8. Implement policy changes to encourage reallocation of state and semi-state car parking to public cycle parking where appropriate;