RINGSKIDDY PORT REDEVELOPMENT

ENVIRONMENTAL IMPACT STATEMENT
VOLUME III b: TRAFFIC AND TRANSPORTATION APPENDICES

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ENVIRONMENTAL IMPACT STATEMENT
VOLUME III b: TRAFFIC AND TRANSPORTATION
APPENDICES

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Purpose of this Report

The Port of Cork Company is intending to prepare a planning application to An Bord Pleanála (ABP) under the Planning & Development (Strategic Infrastructure) Act 2006 (2006 Act) for an expansion of its port facilities at Ringaskiddy, Co. Cork. The expanded facilities at Ringaskiddy will facilitate, on a phased basis, the Port of Cork in transferring container handling out of Tivoli and the bulk goods handling from Tivoli and the City Quays in Cork Docklands in due course. This will provide significant opportunity for sustainable development of non-industrial activity in the heart of Cork City. The key advantage of the Ringaskiddy site is its ability to handle deep water shipping and thus accommodate larger vessels into the future in line with current trends in vessel size growth.

This report represents the first stage of the traffic and transport assessment of the Port of Cork’s development proposals at Ringaskiddy. It is necessary for the Port of Cork to submit a planning application through An Bord Pleanála for this development as it is likely to be deemed to be strategic infrastructure. This report presents a detailed discussion of the transport issues surrounding this pending application and includes traffic modelling analysis extracted from the NRA Dunkettle Traffic Model. It is intended that this report will form part of an overall package of analysis that will provide An Bord Pleanála (ABP) with a complete view of the impacts of the Ringaskiddy development proposals. The analysis included in this report is based on surveys of port and strategic network traffic on the N28 in April and May, 2012. This provides a basis for assessing the likely impact and thus the viability of the proposed port development at Ringaskiddy. The subsequent application will include further detailed modelling analyses, also based on the Dunkettle Model, with specific refinements in the Ringaskiddy area.

Background

In November 2007 an application was made to An Bord Pleanála, as required under the 2006 Act, for the development of a container terminal and multi-purpose Ro-Ro berth at Ringaskiddy Deep-water port and ferry terminal (Ringaskiddy Oyster Bank development). ABP refused the application on the grounds that the expansion of Ringaskiddy would generate adverse impacts on the strategic road network and the lack of a rail connection to the Ringaskiddy site was not consistent with sustainable planning.

The Oyster Bank application was submitted against the background of the planned upgrade of the N28 between Ringaskiddy and Bloomfield Interchange to dual carriage way, but this scheme has subsequently been postponed by the NRA. No issues were generally raised regarding the operation of the upgraded N28 itself, however, a significant proportion of port traffic would require passage via Kinsale Road Interchange, Bloomfield Interchange, Jack Lynch Tunnel and the Dunkettle Interchange. These locations on the road network were considered by ABP to be operating at or approaching capacity and therefore would be adversely affected by the level of additional port related traffic anticipated to be generated by the Ringaskiddy (Oyster Bank) development.

Following the 2008 decision by ABP to refuse the Oyster Bank development, the Port of Cork undertook a fundamental review, from first principles, of its Strategic Development Plan to facilitate future growth of its activities. Part of this review process included the identification of options for relocating activities from its upper harbour locations at Tivoli and City Quays, taking full account of ABP’s cited reasons of refusal.
Focus of Report

This report reviews many of the assumptions and development proposals of the 2008 Oyster Bank application when compared to the current development proposal and assesses the impact of a reduced level of activity being expanded into Ringaskiddy. The reduced level of development over the Oyster Bank application will result in lower levels of additional traffic being generated by the site. Furthermore, a Ringaskiddy specific Mobility Management Plan will be implemented to restrict traffic generation out of the Port during the peak times on the strategic road network.

It is planned that the Ringaskiddy site will expand in a modular fashion, with new phases of the overall facility being developed as economic and commercial market conditions permit. The modular approach proposed allows for analysis and assessment of the distinct traffic impacts of each element of the development, including:

- ongoing development of existing port activities which are already consented under previous Harbour Works Orders;
- the additional port infrastructure and port activities which are now proposed under the different modules for which strategic infrastructure development approval will be sought; and
- the potential development of adjacent lands within the port complex which may be the subject of future applications for planning permission.

Conclusions

Preliminary analysis of the expected level of traffic generation from the Port of Cork development proposals at Ringaskiddy suggests that:

- the level of port generated traffic is not high enough to produce adverse impacts on the strategic road network during peak periods, particularly in the context of demand management measures being implemented on the N28 corridor by Cork County Council and the NTA and by the Port of Cork itself as part of their mobility management strategy in relation to their site at Ringaskiddy. Demand management will include policy measures implemented by the Port of Cork to suppress HGV movement out of the site during peak times when there is minimal spare capacity on the network;
- the proposed development will not give rise to significant levels of additional traffic on the existing road network;
- local junction improvements on the N28 at Shanbally and Shannonpark will relieve existing congestion and provide sufficient future capacity to cater for additional traffic from Ringaskiddy;
- as a result of the transfer of operations to Ringaskiddy there will be a reduction in traffic from the Cork Docklands on the city centre road network;
- negligible traffic flow changes will be experienced at Dunkettle, Bloomfield Interchanges and the Jack Lynch Tunnel as a result of the port development at Ringaskiddy;
- the levels of additional traffic that will result from this development can be accommodated within the capacity of the existing road network including proposed local junction upgrades above; and
- the traffic data shows that the contribution of the Port to traffic at the Jack Lynch tunnel to be 1% in 2012, rising to 2% in 2030 which is insignificant in terms of average daily traffic at this location.
1 Introduction

1.1 Port of Cork Strategy Review

1.1.1 In 2007, the Port of Cork submitted a Strategic Infrastructure Development application to An Bord Pleanála for a container terminal and multi-purpose berth at Ringaskiddy – Oyster Bank in order cater for future expansion of the total handling capacity of the Port of Cork facilities, as part of its Strategic Development Plan.

1.1.2 An Bord Pleanála refused the application on the two grounds. Firstly it was considered that the expansion of Ringaskiddy would generate adverse impacts on the strategic road network in and around Cork City, and specifically at Bloomfield, Dunkettle and Kinsale Road Interchange, and the Jack Lynch Tunnel. The lack of a rail option/connection to transport freight from the site was the second reason for refusing the application.

1.1.3 Following the 2008 decision by An Bord Pleanála, the Port of Cork undertook a fundamental review of its Strategic Development Plan and completely re-examined the future growth of its activities. As a consequence of this strategic review, which took full account of the ABP’s reasons for refusal, proposals have been developed for a smaller scale development at Ringaskiddy. The development is composed of a number of distinct modules that can be phased in, if required, in response to economic and commercial market conditions.

1.1.4 The Port expansion at Ringaskiddy is intended to complement a reduction of Port operations at the existing Tivoli and Cork Docklands, now being rebranded as Cork City Harbour, sites, which cannot handle large vessels due to physical constraints. The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (Docklands being within 750m and Tivoli, on the commuter Railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal / non-industrial use. These are mutually supportive objectives and are part of the CASP Strategy and the local Cork City Development Plan, which target future population and growth to the Cork Metropolitan area, with a strong reliance on the redevelopment of Cork City Harbour to achieve the projected growth. Furthermore, the removal of container handling facilities from the Tivoli site would also have the benefit of reducing the number of HGVs which pass through the City Centre road network. The relocation of bulk goods handling facilities from City Quay areas and the containers from Tivoli, to Ringaskiddy are thus a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in well located City areas.

1.1.5 The Port of Cork is also actively developing a Mobility Management Plan to minimise the impact of port generated traffic on the strategic interchanges of the National Road network around Cork City, during peak hours, which would take account of the revised Strategic Plan.

1.2 Report Overview

1.2.1 In response to the reasons for refusal of the Oyster Bank application, and the revision of their Strategic Plan, the Port of Cork has commissioned this report which investigates how port traffic will be affected by the revised proposed development at Ringaskiddy. This report presents analysis of future traffic volume forecasts generated by the port and their impact on the wider road network. The main difference in the present proposals from the Oyster Bank application is that the scale of development is now lower, and therefore, the impacts are considered to be manageable and in line with local, regional, and national policy on...
sustainable development and sustainable transport.

1.2.2 The main objective of this report is to present the findings of the preliminary analysis of the traffic and transport impacts of the revised proposals. The key finding is that the future traffic generated by the Port of Cork proposal at Ringaskiddy will not adversely impact the road network as a result of:

- the scale of development being proposed resulting in lower amounts of HGVs being generated on the road network than previously envisaged in the 2008 Oyster Bank application;
- the implementation of a mobility management plan by the Port of Cork. This will entail policy measures implemented by the Port of Cork to suppress HGV movement out of the site during peak times when there is limited spare capacity on the network; and
- the changing policy context regarding how growth should be managed in future on the national network, particularly Smarter Travel objectives to prioritise strategic traffic growth—such as from key ports—over growth in unsustainable car travel. This new strategy is reflected in the Cork County Council N28 Corridor Sustainability Travel Strategy (N28 STS).

1.2.3 This report reviews many of the assumptions and development proposals of the Oyster Bank application and envisages a reduced level of activity being expanded into the Ringaskiddy site. The gradual migration of activities from Tivoli and the Docklands will be balanced against the lower level of redevelopment envisaged in the revised strategy in order to maintain overall port handling capacity in line with the revised demand forecasts and market conditions. A key advantage of the Ringaskiddy site in terms of the relocation of these facilities is its commercial sustainability, in particular its ability to handle deep water shipping and thus accommodate the large vessels into the future in line with current trends in vessel size growth. This is a key objective to future proof the strategic role of the Port of Cork both regionally and nationally.

1.2.4 A separate report has been prepared to consider the potential of a rail connection and use of rail freight for Port traffic. This report prepared by Booz & Co has been submitted to the Board for its consideration.

**Importance of Port of Cork to the Region**

1.2.5 The value of the Port of Cork to the wider Irish economy is considerable. It is the second largest multi-modal port in the Republic, and its aggregate contribution is estimated to be €289.7m supporting approximately 1800 full time equivalent (FTE) jobs. Port activities directly contribute €46.7m and approximately 250 FTE jobs and trade through the port is estimated to be linked to 325,000 FTE jobs. It provides strategic access to the Irish economy and is recognised as one of three pillars supporting the critical Gateway centre of Cork (along with the Airport and the University).

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1.3 Ringaskiddy Strategy Review – Key Differences since 2008

1.3.1 The key differences between the Oyster Bank application and current proposals in relation to traffic and transport in the Port of Cork Strategy review are as follows:

- lower development levels;
- lower traffic generation;
- accompaniment of a Mobility Management Plan;
- significantly changed national and regional policy context; and
- lower forecast growth in traffic levels on the strategic network;

1.3.2 These are each described in turn below.

Lower Development Levels

1.3.3 The Port of Cork’s strategic review does not envisage a requirement for the previous levels of growth in port facilities. The review is based on lower economic growth forecasts, which foresee a tonnage rise of only 40% to 2025/2030 across all sites, increasing from 8.5mt in 2010 to 12mt in 2025/2030. In the revised strategy, Ringaskiddy will generate 52% less additional traffic than that forecast in the previous application, which involved a considerably greater extent of works. In particular, the Oyster Bank application included the reclamation of 18 hectares of land and a container terminal with a capacity of 400,000 TEU by 2026, compared to the current proposal which includes a terminal size of only 200,000 TEU².

Lower Traffic Generation

1.3.4 It was estimated that the Oyster Bank proposal would generate 7,284 vehicle movements per day, of which approximately 50% or 3642 would be HGVs. By comparison, for the current Ringaskiddy proposal it is estimated that, at full capacity, it would generate a total of 3,550 vehicle movements per day, of which approximately 38% or 1370 will be HGVs. The lower estimate, with less than half the number of HGVs generated by 2030 includes assumptions related to implementation of a Mobility Management Plan.

Mobility Management Planning

1.3.5 The use of demand management is another important difference pertaining to the Port of Cork’s strategy review. A Mobility Management Plan will be produced by the Port of Cork that will outline policies for limiting the amount of HGVs generated by the port when critical points in the network are at their busiest. The plan will also include objectives on vehicle routing, and outline measures to limit port traffic on ancillary (non-national) routes.

1.3.6 Measures put forward in the plan will include ways of suppressing HGV movement from the site when there is limited spare capacity on the network at peak commuting times. These measures will further decrease the risk of port related traffic from Ringaskiddy adversely impacting sensitive points in the network during peak times. These measures will complement an area wide mobility management plan for Ringaskiddy which will be implemented by Cork County Council as part of the N28 Corridor Sustainable Travel Strategy and it is expected to include similar undertakings concerning commuter travel among the approximate 7,000 employees and students within the major employers and educational facilities in the area as part of their Smarter Travel Workplace Programme.

² Source: Port of Cork Planning Statement
Policy Context

1.3.7 Transport policy in relation to the use of strategic road infrastructure has changed since the Oyster Bank application. The next sections outline those policies which are relevant to the planned application at Ringaskiddy.

- Smarter Travel

1.3.8 Smarter Travel is government policy which has come into effect since the 2008 ABP refusal. This policy seeks to reduce the share of travel demand growth which is car dependant. Its main objective is to promote a significant modal shift from private transport to public transport and sustainable transport modes for commuters over the period up to 2020. Controlling development so that it is sustainable/ public transport oriented is an objective of this policy and a mechanism by which this can be achieved.

1.3.9 Smarter Travel Policy recognises the role of the strategic national road network in providing for the efficient movement of interurban traffic and specifically mentions port traffic. Therefore, using the strategic road network for port traffic is consistent with the Smarter Travel Policy objectives. Capacity headroom can be used for strategic economic activity (i.e., HGVs from the port) according to the policy, while the management of commuter trips will reduce the use of this infrastructure by cars and contribute to provision of additional capacity headroom which is particularly relevant to the N28.

- N28 Corridor Sustainable Travel Strategy

1.3.10 The National Transport Authority (NTA) Smarter Travel Workplace Programme and the complimentary Cork County Council N28 Corridor Sustainable Travel Strategy initiative will seek to reduce N28 commuter trips by at least 5% over the first five years and by 10% over 10 years. The NTA have reported an average nationwide reduction of 18% through their Smarter Travel Workplaces Programme through incentivising car share schemes for large employers and the promotion of alternative travel modes. However, given the current provision of public transport and other modes in the Ringaskiddy area, it is considered that a more modest proposed medium term target of 10% is achievable and would significantly benefit the available capacity on the N28 corridor at peak times.

1.3.11 As part of the N28 Corridor STS initiative a significant number of major employers in the area have signed up to the NTA Smarter Travel workplaces programme. Furthermore Cork County Council have established a technical group who will implement the management and monitoring processes required to support the achievement of these reduced commuter trip targets in partnership with these key employer stakeholders including the Port of Cork. An N28 Corridor Travel Model is being prepared which will test the benefit of the various mode shift travel proposals and these forecasts will be validated and monitored by means of an ongoing programme of monitoring on the N28 corridor. It is also intended that all significant new development within the Ringaskiddy area will be required to prepare and implement mobility management plans as part of their development and their traffic impact will be tested using the N28 Corridor Travel Model.

1.3.12 In addition to the N28 demand management processes, Cork County Council have, with the support of the NTA, proposed to extend the existing Mahon to Monkstown cycleway, to Carrigaline with an extension eastwards to Ringaskiddy village as part of the Cork Cycle Strategy.
Introduction

1.3.13 The Douglas Land Use and Transport Strategy is currently being prepared by Cork County Council. Among its objectives are targets to reduce car dependency for commuting from Douglas and achieve a mode shift towards walking, cycling, and public transport.

1.3.14 Similar objectives are contained in the Carrigaline LAP, and it will also be included in the objectives of Phase 2 of the N28 Corridor Sustainable Travel Strategy. Carrigaline is a significant contributor of car trips on the N28 especially during peak times and has a very high rate of car use for this journey purpose.

1.3.15 The combined effects of the strategies for Douglas, Carrigaline and Ringaskiddy will be to restrain traffic growth on the N28 and maintain capacity on the infrastructure for strategic traffic such as the freight from the Port and the major “pharma chem” and medical devices manufacturing facilities at Ringaskiddy.

1.3.16 The imminent publication of the National Ports Policy is expected to indicate that Cork will be one of three Irish core ports in the Connecting Europe Network. The Ringaskiddy site is the primary deep water facility in Cork at present, and expansion of its deep water facilities is essential for the commercial viability and development of the port. The expansion of the deep water facility at Ringaskiddy will be in alignment with this national policy objective, will maintain the competitive advantage of the region and meet the needs of Ireland inc for the foreseeable future. This national policy focus on the strategic deep water role of Port of Cork at Ringaskiddy supersedes the ports policy context at the time of the 2008 ABP refusal.

1.3.17 A number of significant upgrades to strategic infrastructure are currently proposed. This includes upgrades on the N28 at the Shannon Park and Shanbally junctions. The NRA also have advanced proposals to upgrade Dunkettle Interchange to free-flow and thus remove one of the main bottlenecks cited in the 2008 decision to refuse by An Bord Pleanála. The proposed upgrade of the Dunkettle Interchange which was recently presented to ABP at Oral Hearing will be a major enhancement to the regional road network.

1.3.18 In addition the Kinsale Road grade separated interchange has been constructed on the M40 Cork Ring Road since it was cited as a critically affected junction in the 2008 ABP refusal and the proposed grade separated interchanges at Sarsfield Road and Bandon Road are also currently under construction.
1.3.19 From a sustainable transport perspective there are a number of very important differences relating to the strategic road network between the current situation and the assumptions made at the time of the assessment of the Oyster Bank application. Lower existing traffic levels, a reduced development scenario for Ringaskiddy Port, the implementation of a port Mobility Management plan and the implementation of a strategy for transport on the N28 are the principal differences. These factors significantly improve the feasibility of the proposed development. The following bullets outline the key changes since the previous application:

- the original proposals for the N28 (to which the Oyster Bank application was linked in terms of growth potential) for the upgrade of the N28 to dual-carriageway from Bloomfield to Ringaskiddy have been postponed indefinitely due to cutbacks in the national roads programme;
- there have been reductions in traffic levels on the national road network in the Cork region since 2008 which reflect the economic downturn and national trends. The AADT has fallen by over 6% since 2008 on the N25 at Little Island and by over 12% on the N8 at Dunkettle. As such the strategic road network has more capacity currently available to handle future growth than it did in 2008;
- in line with the current economic downturn, the NRA have revised the traffic growth forecasts for the future and these reduced growth rates are incorporated in the NRA National Traffic model. This model was the basis of the traffic growth forecasts presented to ABP by the NRA for the Dunkettle Interchange SID application in
1 Introduction

November 2012. It is intended that Port of Cork will use these traffic forecasts and this model as the basis of their traffic assessment for the Ringaskiddy application. This will provide consistency for the ABP and address their concerns in relation to traffic impact on the National road network around Cork City; and

- Smarter Travel policy has objectives to prioritise strategic traffic growth on national routes (which includes Port traffic) over commuter traffic growth. Therefore it is reasonable to aspire to utilise the headroom available for traffic growth on the relevant parts of the Cork road network for port expansion within a managed transport context.

1.4 Discussions to Date with An Bord Pleanála (ABP)

1.4.1 The discussions to date with ABP in relation to the present application are as follows:

- November 2011: Pre-planning consultation with An Bord Pleanála – Planning Statement
- 20th December 2011: Ringaskiddy Harbour Development Presentation to An Bord Pleanála
- 24th January 2012: An Bord Pleanála response to pre-application planning request
- 10th February 2012 Rail Report for An Bord Pleanála
- 8th March 2012: Port of Cork response to An Bord Pleanála
- 18th April 2012: Port of Cork second meeting with An Bord Pleanála
- 14th May 2012: ABP Written Record of second meeting.

1.5 Overview of the Assessment

1.5.1 The general process followed for this stage of assessment (and the following more detailed stage) is presented in Figure 1.2 overleaf. In outline, the methodology is as follows:

- undertake a policy review to identify how local, regional, and national transport policy will influence travel demand growth on the relevant network;
- undertake a review of the strategic road network:
  - identify the national network that will be used by port traffic from Ringaskiddy;
  - identify the issues on this network and transport interventions planned;
- assess the level of traffic to be generated by the revised development at Ringaskiddy; and
- estimate the impact.

1.5.2 It should be noted that traffic modelling has not been undertaken in the present assessment. This detailed phase of analysis will follow at a later stage in the SID planning process in order to completely quantify the effects of port related traffic on the strategic road network. However in the preparation of the estimated traffic forecasts indicated in this report we have used the underlying traffic forecasts included in the NRA’s Dunkettle Traffic model which is the latest forecast model available. This model was presented to ABP as part of the Dunkettle Interchange application in Nov 2012. We have also used forecast traffic information from the Cork County Council Douglas LUTS Traffic model in the compilation of our traffic forecasts.
1.6 Key Assessment Terminology

1.6.1 Presented below are some of the key terms that are used throughout this report to describe the traffic situation and impacts associated with the development at Ringaskiddy.

- **Reference Flow Capacity (RFC)** is the parameter used by the Arcady traffic software programme to measure the capacity of each approach road to a junction. An RFC below 0.85 implies an approach road is operating satisfactorily within capacity; between 0.85 and 1.0 RFC implies the approach road is operating within capacity but at less than optimal efficiency; above 1.0 RFC the approach road is deemed to be above capacity which leads to disproportionate queuing and delays corresponding to a modest increase in traffic.

- **Heavy Goods Vehicle (HGV)** Articulated and Rigid Trucks and vehicles pulling trailers are classified as HGVs.

- **Passenger Car Unit (PCU)** This is a unit of traffic volume, with 1 car = 1 PCU and 1 HGV = 2.5 PCUs.
**Introduction**

- **Annual Average Daily Traffic (AADT)** This is an estimate of the mean daily traffic volume at a location over the course of a year. Calculation of AADT involves dividing the total traffic volume in the year by the number of days in the year. The AADT is a measure of the total traffic over a road and thus is useful for pavement and base design. However, it fails to take account of seasonal, monthly, daily and hourly variations in traffic flow and so of itself is not typically an indication of total capacity.

- **Twenty Foot Equivalent Units (TEU)** Is the unit of port container traffic.

- **Degree of (Junction) Saturation (DoS)** is the parameter used by the LinSig traffic software programme to measure the capacity of each approach road to a junction. A DoS below 90% implies an approach road is operating satisfactorily within capacity; between 90% and 100% DoS implies the approach road is operating within capacity but at less than optimal efficiency; above 100% DoS the approach road is deemed to be above capacity which leads to disproportionate queuing and delays in response to a modest increase in traffic.

1.6.2 Figure 1.3 overleaf provides an explanation of key traffic engineering concepts used in the report. These are as follows:

- Capacity;
- Volume / Capacity;
- Level of Service;
- Peak Period;
- Link Capacity; and
- Junction Capacity.

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3 Source: NRA Automatic Traffic Counter Statistics, Explanatory Notes
**Figure 1.3 Traffic Flow Concepts**

- **Capacity**: The maximum hourly rate at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a given time period under prevailing conditions.

- **Volume / Capacity (v/c)**: The volume capacity ratio indicates the proportion of the facility’s capacity being utilized by current or projected traffic. v/c is usually less than or equal to 1.0. A v/c ratio above 1.0 predicts that a facility will fail. Reference Flow Capacity (RFC) is equivalent.

- **Level of Service**: Is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

- **Peak Period**: This is associated with the peak in demand during the day; demand is independent of highway capacity. Congestion occurs when the demand exceeds the capacity, i.e., v/c > 1.

- **Link Capacity**: Traffic Flow Characteristics
  - Intensity
  - Density
  - Mean speed

- **Junction Capacity**: Traffic Flow Characteristics
  - Arrival Rate
  - Queues from other intersections

- **Capacity Table**:

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Free Flow Speed (mph)</th>
<th>Capacity (Cars per hour per lane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway: ffs = 70 mph</td>
<td>2400 pcphpl</td>
<td></td>
</tr>
<tr>
<td>ffs = 65 mph</td>
<td>2350 pcphpl</td>
<td></td>
</tr>
<tr>
<td>ffs = 60 mph</td>
<td>2300 pcphpl</td>
<td></td>
</tr>
<tr>
<td>ffs = 55 mph</td>
<td>2250 pcphpl</td>
<td></td>
</tr>
<tr>
<td>Multilane: ffs = 60 mph</td>
<td>2200 pcphpl</td>
<td></td>
</tr>
<tr>
<td>ffs = 55 mph</td>
<td>2100 pcphpl</td>
<td></td>
</tr>
<tr>
<td>ffs = 50 mph</td>
<td>2000 pcphpl</td>
<td></td>
</tr>
<tr>
<td>ffs = 45 mph</td>
<td>1900 pcphpl</td>
<td></td>
</tr>
</tbody>
</table>

- **Graphs**:
  - Traffic Volume: The area under the graph above the capacity line is equal to the area to the right of the graph below the capacity line resulting in the extension of the congestion period until the excess traffic dissipates.
  - Demand: Area A = Area B
  - Road Capacity: Peak Period
  - Time: Volume

- **Figure Legend**:
  - A: Free flow
  - B: Reasonably free flow
  - C: Stable flow
  - D: Approaching unstable flow
  - E: Unstable flow
  - F: Forced flow

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1.7 The Structure of this Report

1.7.1 This report is structured as follows:

- **Chapter 2 Background**
  - This chapter presents an overview of the application of 2008, how the future situation was expected to develop and the implications for this on the impact of port traffic. The ABP decision to refuse is then briefly discussed. Finally, an overview of the revised Port development strategy is presented.

- **Chapter 3 Assessment Approach**
  - This chapter outlines the approach adopted in determining the revised traffic forecasts generated by the current proposals and demonstrates the lower levels of traffic generated as compared to the Oyster Bank application.

- **Chapter 4 Policy Assessment**
  - In this section relevant national policies are examined which will contribute to the transport impact of the port development and have a bearing on the growth of commuter traffic on the Port Access Corridor. These include Smarter and other local policies such as the Douglas Land Use and Transport Strategy.

- **Chapter 5 Transport Conditions**
  - This chapter presents a review of the current traffic conditions and any future upgrade proposals on the road network of relevance to port traffic.

- **Chapter 6 Port Traffic Assessment**
  - This chapter provides an estimate of the level of port traffic generated, investigates the daily profile of port traffic, shows the influence of mobility management and determines additional daily and peak port traffic on the network, and outlines the expected impact.

- **Chapter 7 Conclusions and Recommendations**
  - The final chapter summarises the main discussion in the report and draws some conclusions.
2 Background

2.1 Introduction

2.1.1 This chapter presents an overview of the Port application in 2008, how the future situation was expected to develop and the implications for this on the impact of port traffic. The ABP decision to refuse is then discussed briefly including the implications for future Port development and for other developments at the strategic Employment Zone at Ringaskiddy. Finally, the revised strategy is presented briefly.

2.2 Ringaskiddy to Cork: 2008 Perspective

2.2.1 For the Ringaskiddy - Oyster Bank application, the upgrading of the N28 was considered to be critical for further large-scale port development, particularly in the context of the existing roundabouts at Shannon Park and Shanbally experiencing significant congestion. As such, it was envisaged the Port development was to be either dovetailed in parallel with the upgrade of the N28 or commenced afterwards. However, this did not resolve issues which may have arisen due to additional peak hour demand at Dunkettle or through the Jack Lynch Tunnel in the view of An Bord Pleanála.

2.2.2 Within the Oyster Bank application, growth in Ringaskiddy traffic was anticipated to be 7,284 daily vehicle movements, of which approximately 50% were HGVs. This is equivalent to 3,600 heavy goods vehicles or 9,000 Passenger Car Units (assuming the equivalence of 1 HGV to 2.5 PCUs).

2.2.3 Further growth in AADT on the N28 was anticipated due to new development in the corridor. It was accepted at the time of the application that an upgraded N28 road would need the capacity to cater for traffic generated by the Port and other anticipated development. It was also acknowledged that if the N28 was not upgraded construction related activity would add to congestion and delay at the overcapacity junctions at Shannon Park and Shanbally.

2.2.4 The assumed underlying traffic growth rates were also much higher (in line with economic forecasts at the time) and it was argued that adverse impacts on performance would occur at Bloomfield and Dunkettle Interchanges due to capacity limitations at the junctions compared to the high projected traffic flows.

2.2.5 Essentially, the Ringaskiddy (Oyster Bank) development was considered by the ABP inspector to “rate poorly in terms of access in the wider road network and will require a large proportion of port related traffic to utilise a road network which is already congested at peak hour times”.

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2.3 An Bord Pleanála Decision to Refuse Previous Application

2.3.1 In 2008 An Bord Pleanála refused permission to the Port of Cork for their port development at Ringaskiddy - Oyster Bank application on the grounds that the development would:

(a) result in much of the port related traffic traversing the city road network which would adversely impact on the carrying capacity of the strategic road network in and around Cork city and in particular the carrying capacity of the strategic interchanges at Bloomfield, Dunkettle and Kinsale Road and the Jack Lynch Tunnel which it is necessary to preserve; the proposed development would exacerbate serious traffic congestion at these strategic interchanges; and

(b) be unable to make use of rail freight carrying facilities in the future and would therefore, represent a retrograde step in terms of sustainable transport planning (noting reference to the potential for rail freight in the Regional Planning Guidelines for the South West Region 2004-2020 and the Cork Area Strategic Plan 2001-2020).

2.3.2 Following this refusal, the Port of Cork in 2009/2010 undertook a fundamental review from first principles of its Strategic Development Plan including a review of its future growth projections of its activities, while maintaining the objective of relocating services from its upper harbour locations at Tivoli and City Quays to the lower Harbour area.

2.3.3 As a consequence of this strategic review - which took full account of the Board’s reasons for refusal - future growth projections were much reduced in line with the international and local economic downturn. As a result the future Port development at Ringaskiddy will be at a smaller scale and is to be phased in modules of development, depending on market conditions. The revised strategy will also include the preparation and implementation of a Mobility Management Plan to minimise the impact of port generated traffic on strategic interchanges during peak hours.

2.4 Existing Development at Ringaskiddy

2.4.1 The Port of Cork has existing consent to expand the current scale of port activities and traffic at Ringaskiddy, in accordance with previous Harbour Works Orders governing the provision of the existing port infrastructure at Ringaskiddy. The 2010 Port of Cork Strategic review includes further expansion and development of the port facilities at Ringaskiddy, in addition to the ‘headroom’ capacity available under previous Harbour Works Orders.

2.4.2 The natural growth of activity at the existing port facilities does not form part of the proposed SID application but it has been taken into account in the estimation of the traffic impact of the proposed new facilities forming the SID application as set out in this report.
2.5 Revised Development at Ringaskiddy

2.5.1 The current Port development at Ringaskiddy, as proposed by the 2010 Strategic Review, is segmented into distinct development modules. The modules are outlined below in Table 2.1

Table 2.1 Ringaskiddy Development Modules

<table>
<thead>
<tr>
<th>Module Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Proposed New Road Access</td>
</tr>
<tr>
<td>2</td>
<td>Proposed Ringaskiddy East Phase 1a</td>
</tr>
<tr>
<td>3</td>
<td>Proposed Ringaskiddy East Phase 2</td>
</tr>
<tr>
<td>4</td>
<td>Proposed Ringaskiddy East Phase 1b</td>
</tr>
<tr>
<td>5</td>
<td>Proposed Ringaskiddy West Extension</td>
</tr>
<tr>
<td>6</td>
<td>Proposed Ringaskiddy West Landbank</td>
</tr>
<tr>
<td>7</td>
<td>RoRo/Ferry Terminal Approved Growth</td>
</tr>
<tr>
<td>8</td>
<td>Deepwater Berth Approved Growth</td>
</tr>
<tr>
<td>9</td>
<td>Separate Future Development of Adjacent Lands</td>
</tr>
</tbody>
</table>

2.5.2 It is important to note that:

- Modules 1 to 6 comprise the present Strategic Infrastructure Development application;
- Modules 7 and 8 comprise the ongoing implementation of the previously consented existing port facilities; and
- Module 9 comprises the development of adjacent lands.

2.5.3 The layout of these modules is shown in Figure 2.1 (Aerial Photomontage).

2.5.4 The modules have also been organised into Scenarios for the purpose of traffic analysis. Table 2.2 below shows which modules are included in each of the scenarios considered, e.g., Scenario A includes Modules 1 and 2. Scenario E includes modules 1 to 6, i.e., the SID application.
### Table 2.2  Scenario Composition in Terms of Module Numbers

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Module 1</th>
<th>Module 2</th>
<th>Module 3</th>
<th>Module 4</th>
<th>Module 5</th>
<th>Module 6</th>
<th>Module 7</th>
<th>Module 8</th>
<th>Module 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>New Road Access</td>
<td>+</td>
<td>Ringaskiddy East Phase 1a</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>New Road Access</td>
<td>+</td>
<td>Ringaskiddy East Phase 1a</td>
<td>+</td>
<td>Ringaskiddy East Phase 2</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>New Road Access</td>
<td>+</td>
<td>Ringaskiddy East Phase 1a</td>
<td>+</td>
<td>Ringaskiddy East Phase 2</td>
<td>+</td>
<td>Ringaskiddy East Phase 1b</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>New Road Access</td>
<td>+</td>
<td>Ringaskiddy East Phase 1a</td>
<td>+</td>
<td>Ringaskiddy East Phase 2</td>
<td>+</td>
<td>Ringaskiddy East Phase 1b</td>
<td>+</td>
<td>Ringaskiddy West Extension</td>
</tr>
<tr>
<td>E</td>
<td>New Road Access</td>
<td>+</td>
<td>Ringaskiddy East Phase 1a</td>
<td>+</td>
<td>Ringaskiddy East Phase 2</td>
<td>+</td>
<td>Ringaskiddy West Extension</td>
<td>+</td>
<td>Ringaskiddy West Landback</td>
</tr>
<tr>
<td>F</td>
<td>New Road Access</td>
<td>+</td>
<td>Ringaskiddy East Phase 1a</td>
<td>+</td>
<td>Ringaskiddy East Phase 2</td>
<td>+</td>
<td>Ringaskiddy West Extension</td>
<td>+</td>
<td>Ringaskiddy West Landback</td>
</tr>
<tr>
<td>G</td>
<td>New Road Access</td>
<td>+</td>
<td>Ringaskiddy East Phase 1a</td>
<td>+</td>
<td>Ringaskiddy East Phase 2</td>
<td>+</td>
<td>Ringaskiddy West Extension</td>
<td>+</td>
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</tr>
<tr>
<td>H</td>
<td>New Road Access</td>
<td>+</td>
<td>Ringaskiddy East Phase 1a</td>
<td>+</td>
<td>Ringaskiddy East Phase 2</td>
<td>+</td>
<td>Ringaskiddy East Phase 1b</td>
<td>+</td>
<td>Ringaskiddy West Landbank</td>
</tr>
</tbody>
</table>
Figure 2.1 Proposed Ringaskiddy Development Modules
Assessment Approach

3.1 Introduction

3.1.1 The assessment approach is described in this chapter.

3.2 Approach

3.2.1 A flowchart is presented below in Figure 3.1 that outlines the process involved in performing the assessment in terms of Transport Conditions and Port Traffic. It should be noted that detailed traffic modelling has not been used in the present assessment; this would entail peak hour modelling under a range of port traffic scenarios and will be undertaken at a later stage once the analysis presented in this report is disseminated.

3.2.2 The approach outlined in Figure 3.1 results in separate chapters for each of Policy Assessment, Transport Conditions, and Port Traffic Review. In Chapter 4 Policy Assessment the following is presented:

- **Identify Local, Regional, and National Policy of Relevance:** In this section relevant national policies such as Smarter Travel in addition to other local policies such as the Douglas Land Use and Transport Strategy which will have a bearing on the growth of commuter traffic on the Corridor are considered;
- **Interpret Policies in Context of Port Application:** In this section the above policies are discussed in terms of relevance to the application; and
- **Estimate Impact of Policy on Traffic Growth:** This section draws specific assumptions from the above policies that are used to estimate eventual traffic impacts due to port traffic.

3.2.3 In Chapter 5 Transport Conditions the following is presented:

- **Identify Transport Corridor for Review:** In this section the distribution of traffic from Ringaskiddy is used to identify the main routes likely to be used by traffic using the Ringaskiddy site in the future;
- **Identify Key Points on Corridor:** The critical points on the parts of the network that provide access to the Port at Ringaskiddy are identified;
- **Perform Issues Assessment of Key Points:** This section presents a discussion of the main issues and proposed interventions;
- **Investigate Traffic Levels on Corridor:** This section presents an analysis of traffic survey data;
- **Provide Analysis of Junction Capacities:** This section presents an analysis of key junctions on the corridor and how the planned upgrades will mitigate any congestion; and
- **Outline Level of Service Prevailing on Corridor:** This section provides a summary with a discussion of the level of service which may be operating when the port development at Ringaskiddy is operational.
3.2.4 In Chapter 6 Port Review the following are presented:

- **Estimate Level of Port Traffic Generated by the Development Modules**: This section presents estimates on traffic generation according to each module;

- **Investigate the Daily Profile of Port Traffic**: This section presents the departure profile of port traffic which has been observed at Tivoli and Ringaskiddy and discusses the potential implications of this on the strategic road network;

- **Show Influence of Mobility Management**: This section presents assumptions on demand management policies which will limit the generation of HGV trips on the strategic road network during peak periods.

- **Determine Additional Daily and Peak Port Traffic on the Network**: This section combines the above analysis on traffic generation, daily profile, and mobility management in order to determine the ultimate level of traffic estimated to be generated by the port; and

- **Outline Impact of Port Traffic in terms of Level of Service**: This section discusses the potential impact on the network of the level of traffic estimated above.
Figure 3.1  Assessment Flowchart

Transport Conditions

- Strategic Network Transport Review
  - Identify Transport Corridor for Review
  - Identify Key Points on Corridor
  - Perform Issues Assessment of Key Points
  - Investigate Traffic Levels on Corridor
  - Provide Analysis of Junction Capacities
  - Overall Assessment of Corridor Conditions

Port Traffic

- Port Traffic Assessment
  - Investigate Daily Profile of Port Traffic
  - Investigate Impact of Mobility Management
  - Estimate Level of Port Traffic Generated by Module
  - Determine Additional Daily and Peak Port Traffic on Network
  - Port of Cork Ringaskiddy Traffic Impact

Policy Assessment

- Transport Policy Review
  - Identify Local, Regional, and National Policies of Relevance
  - Interpret Policies in Context of Port of Cork Application
  - Estimate Impact of Policy on Traffic Growth
4 Policy Assessment

4.1 Introduction

4.1.1 In this Chapter the local, regional, and national policy of relevance are identified, including Smarter Travel and other local policies such as the Douglas Land Use and Transport Strategy. The measures proposed in these will have a bearing on the growth of commuter traffic on the Port Access Corridor. These policies are then discussed in the context of the Ringaskiddy application. Finally the estimated Impact on traffic growth is discussed.

4.2 Policies of Relevance

4.2.1 This section describes the national and regional transport policy that will have an affected on the transport situation on the Port Access Corridor. The policies identified are as follows:

- Smarter Travel Policy
- N28 Corridor Sustainable Travel Strategy – Cork County Council
- Smarter Travel Workplace Programme – NTA (National Transport Authority)
- Mobility Management Plan - Ringaskiddy Port – Port of Cork
- Douglas Land and Transport Strategy – Cork County Council
- National Ports Policy – Department of Transport Tourism and Sport
- N40 Demand Management

4.3 Policy Interpretation

Smarter Travel

4.3.1 Smarter Travel is government policy which seeks to reduce the share of travel demand growth which is car dependant. Its main objective is to promote a significant modal shift from private transport to public transport and sustainable transport modes over the period up to 2020. Controlling development so that it is sustainable/public transport oriented, is a mechanism by which this can be achieved.

4.3.2 Smarter Travel Policy recognises the role of the strategic national road network in providing for the efficient movement of interurban traffic and specifically mentions the port traffic. Therefore using the strategic road network for port traffic is consistent with the Smarter Travel Policy objectives. Capacity headroom can be used for strategic economic activity (i.e., HGVs from the port) according to the policy, while management of commuter trips will reduce the use of this infrastructure by cars and release headroom capacity (particularly on the N28).
4.3.3 It is understood that the N28 Corridor Sustainable Travel Strategy being developed by Cork County Council in association with the NTA has among its objectives the following:

- To reduce the number of single occupancy car commuter trips on the N28 through the promotion of Smarter Travel policies.
- To ensure adequate access to and sustain the long term viability of the Ringaskiddy Strategic (Industrial) Employment Centre and Port Facility.
- To establish a long term Mobility Monitoring Framework and Measurement Process for the management of traffic and travel demand on the N28.
- To prepare an Area Wide Mobility Management Plan for Ringaskiddy to be adopted as Council policy and incorporated into the Cork County Development Plan 2009 as an amendment to the Carrigaline LAP to ensure that appropriate sustainable travel measures are incorporated into the planning control process governing future development in the area.
- To identify a suite of Sustainable Travel low cost infrastructure measures to enhance the availability and accessibility of alternative travel mode choices for N28 Commuters.
- To Identify and deliver localised road infrastructure capacity improvements to the N28 route in the short term.
- To support the NTA’s Smarter Travel Workplaces scheme among the key employers in Ringaskiddy and promote awareness of Sustainable Travel choices among N28 commuters.

4.3.4 Phase 1 of the N28 Corridor STS relates to the Ringaskiddy Strategic Employment Area and will focus on the implementation of measures that support sustainable travel alternatives for the N28 commuters who are employed or attend education in the Ringaskiddy area. It will include a travel monitoring and management system for the N28 Corridor which will be implemented by Cork County Council and it will incorporate the proposals and synergies that emerge from the Smarter Travel Workplace Plans developed by the various local companies as part of the NTA’s Smarter Travel Workplace Programme.

4.3.5 The objectives of the N28 Corridor STS will include the promotion of sustainable travel objectives including a choice of alternative modes of transport to work among the estimated 7,000 employees and students in the Ringaskiddy area, the vast majority of whom use the N28 to travel to work or college. This will include car sharing, public transport, walking and cycling and the objective of phase 1 of the N28 Corridor STS initiative will be the reduction of single occupancy car based commuter trips in the Ringaskiddy area for existing and future developments.

4.3.6 The N28 Corridor Sustainable Travel Strategy initiative will seek to reduce N28 commuter trips by at least 5% over the first five years and by 10% over 10 years. The NTA Nationwide average reduction achieved through the Smarter Travel Workplace Programme is 18% for large employers but it is considered that this result relates generally to areas which are better served by public transport than Ringaskiddy is currently.
4.3.7 As a participant in the Cork County Council N28 Sustainable Travel Strategy the Port of Cork has signed up to the NTA Smarter Travel Workplaces Programme. In addition seven other major employers have already signed or indicated their intention to sign up to the programme. As part of the N28 Corridor STS initiative, the NTA have confirmed that they will allocate two facilitators to promote and support their Smarter Travel Workplace Programme in the Ringaskiddy area.

4.3.8 Cork County Council have established an N28 management framework including a technical group, who will implement the management and monitoring processes required to support the achievement of these reduced commuter trip targets in partnership with the key employer stakeholders.

4.3.9 It is envisaged that a Ringaskiddy employer transport forum / consultative group comprising representatives from the local employer stakeholders, Cork County Council and the NTA will be established as part of the N28 Corridor STS implementation plan. This group will provide a consultation and feedback role and support an integrated partnership approach to the achievement of the N28 STS travel targets. It is also envisaged that significant synergies will emerge from the various individual local workplace travel plans which will contribute to the development of alternative travel mode initiatives on an area wide scale in Ringaskiddy which will be developed, implemented and monitored under the N28 STS framework.

4.3.10 In addition a comprehensive multi modal N28 Corridor Travel Model is being prepared which will test the benefit of the various mode shift travel proposals and these forecasts will be validated and monitored by means of an ongoing programme of monitoring of travel in the N28 corridor.

4.3.11 Furthermore a variation to the Carrigaline Local Area Plan (as part of the Cork County Development Plan) will be put in place requiring all significant new development within the Ringaskiddy area to prepare and implement mobility management plans as part of their development proposals and their traffic impact will be tested using the N28 Corridor Travel Model.

4.3.12 As part of the N28 STS Cork County Council, with the support of the NTA, propose to extend the Mahon to Passagewest cycleway as far as Carrigaline with a further spur to Ringaskiddy. This proposal would enable mixed mode travel to Ringaskiddy, permitting park and cycle or set-down and cycle to work from a large catchment area.

4.3.13 In addition Cork County Council is proposing to upgrade the capacity of the junctions at Shannonpark and Shanbally as part of the N28 Corridor STS in conjunction with the NRA and is also proposing improvements to Ringaskiddy village including the provision of a pedestrian crossing, an initiative which would be supported by the Port of Cork.

**NTA Smarter Travel Work Place Programme**

4.3.14 The NTA Smarter Travel workplaces programme which is being taken up by the majority of major employers in Ringaskiddy will result in a series of plans being developed for each of the sites with the support of a dedicated NTA facilitator. These workplace travel Plans will aim to reduce non-essential car-based work trips and promote public transport, walking and cycling among the employees and customers of the participating companies.
4.3.15 The implementation of these workplace Travel Plans will be reviewed and monitored (on a voluntary participation basis) by Cork County Council as part of the N28 STS and the Smarter Travel proposals and corresponding synergies that emerge will be tested and assessed for incorporation into the N28 STS.

**POC Mobility Management Plan – Ringaskiddy**

4.3.16 In addition to the above the Port of Cork has confirmed that it intends to prepare a full mobility management plan for all its operations at Ringaskiddy.

4.3.17 The Port of Cork Mobility Management Plan will seek to develop and implement a HGV management system which will mitigate the impact of HGV trips at critical locations on the network during the peak hours. It will seek to include all freight haulage companies using the Port at Ringaskiddy and to optimise the timing and routing of HGV trips on the Port access corridor to mitigate their relatively limited impact on the N28 peak hour traffic flows. It will include a system for monitoring and feedback of HGV traffic information to the Cork County Council N28 Corridor STS - Ringaskiddy Area-wide mobility management system.

**Douglas Land Use and Transport Strategy**

4.3.18 The Douglas Land Use and Transport Strategy and the Carrigaline LAP both envisage mode shift away from car use for commuters as per the objectives of Smarter Travel. The emerging indications from the Douglas LUTS model and the junction improvements are that there will be a modest reduction in traffic on the N28 and the N40 if and when the Douglas LUTS proposals are implemented. The strategy is currently estimated to be implemented by 2022 but could be sooner depending on funding.

**National Ports Policy**

4.3.19 The imminent publication of a revised National Ports Policy is expected to endorse the European Commission’s designation of Cork as one of three core Irish Ports which will form part of the Core Trans European Transport Network. The Ringaskiddy site is the primary deep water facility in Cork at present, and expansion of its deep water facilities will align with this European and National policy.

**N40 Demand Management**

4.3.20 Cork County Council and Cork City Council, with the support of the NTA and NRA, have a key role to play in managing demand on the N40 Cork South Ring Road through the implementation of effective land use and transportation policies and the implementation of initiatives which serve to achieve the Smarter Travel mode shift targets in the Cork Area including the N28 Mobility Management Framework.

4.4 Impact of Policy on Traffic Growth

4.4.1 Taken together, the above policies create favourable conditions in which to provide for a modest net increase in port generated traffic. Smarter Travel and the N28 STS will seek to reduce the use of the Port Access Corridor by car based trips, and require sustainable travel measures to be incorporated in any future development. The achievement of the targets for the reduction in work based commuter trips will release additional capacity on the N28 to facilitate strategic traffic including Port traffic.
4.4.2 The National Ports Policy includes Port of Cork as one of three strategic core ports and a nationally strategic deep water facility. According to Smarter Travel, the national road network should support policies relating to the development of these strategic facilities.

4.4.3 Other local strategies such as DLUTS and Carrigaline LAP follow the objectives set down in Smarter Travel and set out specific measures by which commuter traffic growth will be restrained on the Port Access Corridor. This creates a lower risk of background traffic growth competing for limited road space with growth in traffic from the expansion of major Pharma/Chem and medical devices facilities, the Maritime College and the Port at Ringaskiddy.
5 Transport Conditions

5.1 Introduction

5.1.1 This chapter presents an analysis of transport conditions on the relevant corridor serving the port at Ringaskiddy. Firstly, the transport corridor is identified by analysing the distribution of traffic from Ringaskiddy based on a destination survey. Following this, the key points on the corridor are assessed in order to identify areas which may be affected by port traffic.

5.1.2 This is followed by an investigation of traffic levels on the corridor and analysis of junction capacities. The chapter concludes with an assessment of the overall performance of the corridor road network as it currently exists.

5.2 Ringaskiddy to Cork Corridor

Overview

5.2.1 Port of Cork has undertaken extensive surveys in order to determine the geographic spread of its main customer base. Surveys were carried out at both Tivoli Container Terminal and Ringaskiddy Deepwater Port. The surveys showed that 94% of all trips from Tivoli and 82% of all freight trips from Ringaskiddy are within the Munster Region. Table 5.1 below highlights the key results in terms of the major destinations for traffic from Tivoli. Only destinations where the proportion is above 5% are shown.

Table 5.1 Tivoli Customers Distribution

<table>
<thead>
<tr>
<th>Destination</th>
<th>Avg Daily HGV Trips: Tivoli</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cork NE</td>
<td>149</td>
<td>19</td>
</tr>
<tr>
<td>Little Island &amp; Glounthaune</td>
<td>100</td>
<td>13</td>
</tr>
<tr>
<td>Limerick</td>
<td>68</td>
<td>9</td>
</tr>
<tr>
<td>South Tipperary</td>
<td>53</td>
<td>7</td>
</tr>
<tr>
<td>Waterford</td>
<td>35</td>
<td>5</td>
</tr>
</tbody>
</table>

5.2.2 The future distribution of traffic destinations from Ringaskiddy is assumed to match the observed distribution from Tivoli due to the relocated activities from Tivoli maintaining the same customer base. This assumed distribution will result in the majority of Port generated traffic using the N28 and then either the N40 for north and east traffic or the N40 South Ring Road for traffic bound for the west. However only the sections of road that serve the north and east areas were cited by ABP in refusing the previous application. Therefore the key corridor in question is comprised of the N28, the N40, Jack Lynch Tunnel, and Dunkettle Interchange. With respect to westbound port traffic it is worth noting that the interchanges on the M40 at Kinsale Road, Sarsfield Road and Bandon Road have been upgraded since the 2008 application. In addition the capacity of the N25 / Silversprings overpass interchange for all Northbound (including port) traffic will be enhanced as a consequence of the relocation of container traffic from Tivoli.

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Corridor Definition

5.2.3 The N28 is a national route and is the principal access route between the Port of Cork facilities at Ringaskiddy and the N40 Cork South Ring Road. The N28 is a single carriageway road with at-grade roundabouts and priority junctions.

5.2.4 Figure 5.1 below shows the key points on the N28 / N40 corridor which links Ringaskiddy to the M8 and to most of the onward port traffic destinations. This will be part of the road network used by the majority of Ringaskiddy related port traffic, and was specifically referred to in the decision to refuse the previous application due to its critical importance for movement through Cork City.

5.2.5 Based on the above, it is reasonable to define the road network of interest for the assessment of port traffic from Ringaskiddy as the N28, the N40 South Ring Road, Bloomfield Interchange, the Jack Lynch Tunnel, and the Dunkettle Interchange. This will be termed the Ringaskiddy Port Access Corridor for the purpose of the discussion in this report.

5.2.6 The N28 road between the Port of Cork at Ringaskiddy and the roundabout junction at Shannonpark is for the most part a wide 2 lane section of road with hard shoulders.

Figure 5.1 Key Network Points on Ringaskiddy Port Access Corridor
5.2.7 On the N28 just north of Shannon Park the capacity of the carriageway is constrained by its narrow layout and the traffic demand in the morning peak hour is approaching its capacity leading to reduced travel speeds and increased journey times on the section of the road between Shannonpark and Bloomfield. The travel time between these points can be up to 11 minutes in the AM peak hour compared to a journey time of 6 minutes or less in the off peak period.

5.3 Issues Assessment of Key Points on Port Access Corridor

5.3.1 Traffic flows vary along the length of the N28 Port Access Corridor as one travels between Haulbowline at the southern end of the N28 to the Dunkettle Interchange. Daily traffic on the N28 show strong AM and PM peaks associated journeys to work from the Carrigaline and Ringaskiddy area.

5.3.2 Independent survey data indicates that there has been a significant reduction in the traffic flow on the N28 since 2009. The number of vehicles on the N28 South of Bloomfield Interchange was 23,968 (average daily traffic between 21/09/09 and 04/10/09). A year 2011 estimate of traffic for the same location derived from several other nearby counters, amounted to 19,248 average daily traffic (i.e. -19% relative to 2009). Furthermore, surveys at the N28 north of Shannonpark Roundabout recorded peak hour flows of 2,945 and 2,581 for the years 2005 and 2011 respectively. There have also been reductions in traffic flows in the Jack Lynch Tunnel and generally on the national road network in the Cork Area.

5.3.3 In addition the current NRA growth rates for future traffic are significantly less than those used in the traffic forecasting for the 2008 Ringaskiddy – Oyster Bank development.

5.3.4 The trend shown in Figure 5.2 below indicates that average daily traffic has fallen by nearly 10% since 2007. This fall in traffic should allay concerns over congestion of the network at the key locations of Dunkettle and the Jack Lynch Tunnel.

![Annual Average Daily Traffic - N8 at Dunkettle](image_url)

Figure 5.2 Trend in Average Daily Traffic at Dunkettle

---

5.3.5 Table 5.2 below presents a tabulated assessment of the current traffic issues experienced on the Port Access Corridor. These locations are shown on the map in Figure 5.1 above.

**Table 5.2  N28 Issues Summary**

<table>
<thead>
<tr>
<th>Map Ref</th>
<th>Location</th>
<th>Description</th>
<th>Issues</th>
<th>Proposed Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Port of Cork Ringaskiddy</td>
<td>There are two junctions within the village of Ringaskiddy which provide access to major employers in Loughbeg and Ringaskiddy and Carrigaline as well as to the Port of Cork facilities.</td>
<td>Relatively little congestion Local residents have expressed concern about the absence of a controlled pedestrian crossing in the village.</td>
<td>Cork Co. Co. have recently proposed plans for a pedestrian crossing In addition the proposed revised Port entrance layout will remove much of the Port HGV traffic from Ringaskiddy village</td>
</tr>
<tr>
<td>2</td>
<td>Shanbally Roundabout (further analysis in next section)</td>
<td>Small three arm roundabout in semi built up area. Traffic approaching from Ringaskiddy gives way to southbound traffic onto Marian Terrace</td>
<td>Queuing within the AM and PM peak hours</td>
<td>Signalisation of the roundabout is expected to increase capacity to above current and forecast levels of demand</td>
</tr>
<tr>
<td>3</td>
<td>N28 East of Shannonpark</td>
<td>Single lane with numerous at-grade priority junctions for access to housing or employment premises fronting onto the road</td>
<td>Travel time between Shanbally and Shannon Park impacted by queuing during the peak periods.</td>
<td>Signalisation of these junctions will significantly enhance the safety of vulnerable road users including pedestrians and cyclists and manage traffic queuing during peak hours</td>
</tr>
<tr>
<td>4</td>
<td>Shannonpark Roundabout (further analysis in next section)</td>
<td>Large three arm roundabout in rural area.</td>
<td>Queuing within the AM and PM peak hours</td>
<td>Signalisation of the roundabout is expected to increase capacity to above current and forecast levels of demand</td>
</tr>
<tr>
<td>5 and 6</td>
<td>Section of N28 North of Shannonpark to Bloomfield</td>
<td>Single lane with numerous at-grade priority junctions for access to housing or employment premises fronting onto the road</td>
<td>Slow moving peak hour traffic</td>
<td>Mobility management plan will ensure that this is not significantly impacted and efforts will be made to reduce level of Port traffic at peak times.</td>
</tr>
<tr>
<td>Map Ref</td>
<td>Location</td>
<td>Description</td>
<td>Issues</td>
<td>Proposed Intervention</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Bloomfield Interchange</td>
<td>The N28 joins with the N40 South Ring Road at the Bloomfield Interchange, some 10km north of Ringaskiddy. Bloomfield is a high capacity grade separated free-flow junction and the South Ring Road is an Urban Dual Carriageway.</td>
<td>Traffic flows through the Bloomfield Interchange are impacted by heavy traffic flows emerging from the Rochestown Road interchange and by the traffic conditions on the N40 South Ring Road.</td>
<td>The signalisation of Clarke's Hill / Rochestown Road and the signalisation of the St Patrick's roundabout on the Rochestown Rd will significantly benefit the operation of the Bloomfield Interchange.</td>
</tr>
<tr>
<td>9</td>
<td>N40 South Ringroad</td>
<td></td>
<td>reduced travel speeds including the route from the N40 Eastbound to the N28 Southbound and the slip road onto the Rochestown Road.</td>
<td>the provision of a grade separated interchange at Kinsale Road opened in 2006 and the provision of grade separated interchanges at Sarsfield Road and at Bandon Road now currently under construction and due for opening in 2013</td>
</tr>
<tr>
<td>10</td>
<td>Jack Lynch Tunnel</td>
<td>2 lanes each direction submerged tunnel.</td>
<td>Insufficient capacity for demand at peak times.</td>
<td>No additional tunnels are being considered. Port traffic will be timed to avoid peak demand at the tunnel.</td>
</tr>
<tr>
<td>11</td>
<td>Dunkettle Interchange</td>
<td>Dunkettle Interchange exceeds 90,000 AADT</td>
<td>Interchange is working above capacity at peak times on a daily basis</td>
<td>NRA proposal for free flow movement on all approaches to the Dunkettle Interchange and this will have the effect of removing all congestion from this location, arising from the capacity constraints of the existing Dunkettle Interchange, for the future. In addition there is significant capacity available during interpeak and off peak times which can more than accommodate the port generated traffic. Oral hearing held and a decision by An Bord Pleanála is awaited.</td>
</tr>
</tbody>
</table>
5.4 **Traffic Levels on Port Access Corridor**

5.4.1 Figure 5.3 below shows the AADT values along the corridor in April / May 2011. Specific detail on the amount of this traffic that is generated by the port is presented in Chapter 6. The volume on the section of the N28 between Carrigaline and Ringaskiddy is between 5k and 10k on average per day. While this is a relatively low flow, some junctions on this section of the road experience congestion in the peak periods (as is noted in Section 5.5 below).

![Figure 5.3 Ringaskiddy to Cork AADTs](attachment:image)

5.5 **Analysis of Junction Capacities**

**Shanbally and Shannonpark**

5.5.1 There are two junctions on the N28 which currently experience significant congestion at peak times and represent a constraint on capacity through the Port Access Corridor. Cork County Council/NRA have developed options to upgrade the capacity of these junctions by adding traffic signalling.

5.5.2 Analysis of these junctions was prepared by RPS in August 2012. Arcady junction modelling software was used for present day and future levels of traffic (based on NRA growth factors) in order to obtain efficiency estimates of junction operation. The growth in traffic was derived from NRA growth factors up to 2030.

5.5.3 The outputs of the modelling are presented below in Tables 5.3 (PM Peak 2011), 5.4 (PM Peak 2030), and 5.5 (PM Peak 2030 with junction upgrades). The results of the analysis illustrate the issues associated with the current configuration in terms of RFC, and how the planned upgrades are expected to mitigate congestion problems at the junctions.
Table 5.3  PM Peak Junction Capacity Assessment, 2011 – Present Configuration

<table>
<thead>
<tr>
<th></th>
<th>AM Peak Hour</th>
<th>Max RFC</th>
<th>PM Peak Hour</th>
<th>Max RFC</th>
<th>% Port of Cork Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shannonpark</td>
<td>✓</td>
<td>0.81</td>
<td>✓</td>
<td>0.52</td>
<td>3%</td>
</tr>
<tr>
<td>Shanbally</td>
<td>✗</td>
<td>1.07</td>
<td>✓</td>
<td>0.72</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table 5.4  PM Peak Junction Capacity Assessment, 2030 – Present Configuration

<table>
<thead>
<tr>
<th></th>
<th>AM Peak Hour</th>
<th>Max RFC</th>
<th>PM Peak Hour</th>
<th>Max RFC</th>
<th>% Traffic Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shannonpark</td>
<td>✗</td>
<td>0.96</td>
<td>✓</td>
<td>0.60</td>
<td>+14.25%</td>
</tr>
<tr>
<td>Shanbally</td>
<td>✗</td>
<td>1.22</td>
<td>✓</td>
<td>0.84</td>
<td>+14.25%</td>
</tr>
</tbody>
</table>

✓ Operates within Capacity (RFC < 0.85) (see note 5).
✗ Demand exceeds capacity for one or more arms (RFC > 0.85).

Table 5.5  PM Peak Junction Capacity Assessment, 2030 – Upgraded Configurations

<table>
<thead>
<tr>
<th></th>
<th>AM Peak Hour</th>
<th>DoS</th>
<th>PM Peak Hour</th>
<th>DoS</th>
<th>% Traffic Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shannonpark</td>
<td>✓</td>
<td>89%</td>
<td>✓</td>
<td>86%</td>
<td>+14.25%</td>
</tr>
<tr>
<td>Shanbally</td>
<td>✓</td>
<td>80%</td>
<td>✓</td>
<td>89%</td>
<td>+14.25%</td>
</tr>
</tbody>
</table>

✓ Operates within Capacity (RFC < 0.85) (see note 5).
✗ Demand exceeds capacity for one or more arms (RFC > 0.85).

5.5.4 The assessment confirms that the Shannonpark junctions currently operate within its traffic capacity at peak hours and that the Shanbally junction operates within its capacity in the PM peak hour but that capacity is currently exceeded during the AM peak hour. Without upgrades to the junction layouts, both the Shannonpark and Shanbally junctions would not have sufficient capacity in the AM peak hour to accommodate forecast traffic volumes in 2030, as shown in Table 5.4. Analysis is shown in Table 5.5 for the Shannon Park and Shanbally junctions with the signalisation upgrades included.

5.5.5 The modelling of traffic forecasts, details of which are presented in Chapter 6, indicates that these upgrades would provide significant additional capacity to accommodate the underlying traffic growth forecast by the (NRA) model and the projected additional traffic generated by the proposed Ringaskiddy development. The model confirms that these junctions will operate within capacity in the future with the upgrades in place.

5.5.6 In summary, the proposed upgrades to the junctions on the N28 at Shannonpark and Shanbally will significantly improve traffic conditions on the N28 between Ringaskiddy and Bloomfield, and thus provide a more efficient network for the transport of freight from Ringaskiddy in addition to the use of the road for other strategic uses.

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**Bloomfield**

5.5.7 The Dunkettle Model and a similar model for the Douglas area\(^6\) have recently been separately developed for Cork and both contain a representation of the network around Bloomfield Interchange. These models are calibrated to a high standard to take account of 2010/2012 traffic conditions in the area and the latest growth forecasts for traffic on the national and local networks.

5.5.8 Figures 5.4 and 5.5 below show Bloomfield interchange. The link annotation in the figures represents average delay per vehicle per hour. Bloomfield Interchange is shown in the top-centre area of the images. These models are for the AM peak period in 2022 (DLUTS Model Figure 5.4) and 2016 (Dunkettle Model Figure 5.5).

5.5.9 The models show delays in the range of only 3 to 21 seconds on the various approaches and movements through the interchange. These are relatively low values and indicate that the junction is operating well during the peak AM period.

---

\(^6\) developed for the Douglas Land Use and Transport Study (DLUTS)
Figure 5.4  Delay (secs) Bloomfield (DLUTS Model, AM 2022)

Figure 5.5  Delay (secs) Bloomfield (Dunkettle Model, AM 2016)
5.6 Impact of Mobility Management in Ringaskiddy

5.6.1 As part of the N28 Corridor Sustainable Travel Strategy study, Cork County Council have commissioned preliminary traffic modelling (by MVA) into the potential impact of Workplace Travel Planning at key employment locations around Ringaskiddy and various other measures to attract people towards commuting by sustainable travel modes. The modelling focusses on the associated reduction in traffic levels on the N28.

![Figure 5.6 Major Employers' Locations in Ringaskiddy]

5.6.2 The full set of measures modelled to examine the impact on the level of car commuting into the area are:

- Workplace Travel Planning focusing on employers in Ringaskiddy;
- improved cycle facilities from Carrigaline to Ringaskiddy;
- improved links to Cobh via a coordinated ferry/bus service that could attract passengers using the Cobh rail line; and
- other public transport measures targeting commuters who originate their trip along the N28 corridor.
5.6.3 To model the impact of these measures, assumed car travel reductions of 5% and 10% were applied to the appropriate origin-destination movements in the demand matrices for the 2010 Dunkettle model. For example, only trips between Carrigaline and Ringaskiddy were reduced to account for the Carrigaline-Ringaskiddy cycling improvements. The traffic destined for zones that correspond to the employers shown above were also reduced to account for the impact of Workplace Travel Planning, assuming a 5% and 10% reduction in car trips could be achieved.

5.6.4 Analysis of the results is presented in Figure 5.7 below. Figure 5.8 shows the traffic flow reductions resulting from the various mobility management measures above for a forecast year 2016. The blue bars indicate the 2016 traffic volumes on the N28 according to the Dunkettle Traffic Model. The red bars indicate the traffic when a 5% reduction is applied according to each of the measures listed above in 5.6.2. The green bars indicate the same but with a 10% reduction. All volumes shown are southbound / eastbound (which is the direction of dominant traffic flow in the AM peak between Carrigaline and Ringaskiddy).

5.6.5 The results show that a reduction in traffic volumes on the N28 can be achieved if various demand management / mobility management plans are put in place. These have the effect of reducing the number of commuter trips on the route and free up capacity for strategic port traffic and other freight traffic.

5.7 Overall Assessment of Port Access Corridor Conditions

5.7.1 There are a number of significant improvements planned that will greatly enhance the efficiency and reliability of the N28 section of the Port Access Corridor, in addition to the planned upgrade of the Dunkettle Interchange. As shown in Figure 5.2, traffic volumes have been falling at Dunkettle. These conditions are favourable to the expansion of port activities at Ringaskiddy, particularly in the context of recent updates to national and regional policy referred to previously.

5.7.2 The future level of traffic growth on the corridor can be influenced by the implementation of mobility management of commuter trips towards the large employers in Ringaskiddy. Traffic modelling was used to estimate the effect of a 5% impact and a 10% impact according to various demand management strategies. The result indicate that the section of the N28 between Carrigaline and Ringaskiddy would benefit the most in terms of car trip reduction in the AM peak, with total hourly peak volumes estimated to drop by about 15%.

5.7.3 Cork County Council have undertaken a detailed assessment of the proposed upgrades to the Shannon Park and Shanbally junctions in May 2011 which have been used in assessing the traffic impact of the port development on these junctions. The assessment of those junctions shows that in the future congestion does not occur when the upgrades are in place. In addition the assessment of the Bloomfield interchange is based on the analysis taken from the recent Dunkettle and DLUTS models prepared independently by the NRA and Cork County Council which is presented in Section 5.5 of this report and indicates that delay is quite low at Bloomfield.
Figure 5.7  N28 Junctions for Mobility Management Results
Figure 5.8 2016 Traffic Flow N28 Southbound
6 Port Traffic Assessment

6.1 Introduction

6.1.1 This chapter presents an overview of current Ringaskiddy traffic in the context of the strategic road network. Following this, the future expected level of trip generation from Ringaskiddy is presented. This is then placed in the context of the future road network to show that the network has the capacity to allow for growth.

6.2 Daily Profile of Port Traffic

6.2.1 The Port of Cork carries out its operations at a number of locations around Cork Harbour and the traffic flows related to its main activities are summarised in Figure 6.1 below. The current estimated traffic demand generated by all Port of Cork activities across all its principal locations around Cork Harbour, have a combined total of 4936 vehicle movements per day (AADT) of which some 27% or 1332 are HGV movements.

<table>
<thead>
<tr>
<th></th>
<th>AADT - HGV Only</th>
<th>AADT - All Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Quays</td>
<td>195</td>
<td>378</td>
</tr>
<tr>
<td>Tivoli Bulks</td>
<td>208</td>
<td>1325</td>
</tr>
<tr>
<td>Tivoli LoLo</td>
<td>389</td>
<td>927</td>
</tr>
<tr>
<td>Ringaskiddy</td>
<td>278</td>
<td>434</td>
</tr>
<tr>
<td>Whitegate (Private)</td>
<td>389</td>
<td>1259</td>
</tr>
</tbody>
</table>

**Figure 6.1 Traffic Totals All Port of Cork Sites**

6.2.1 The Port of Cork currently generates traffic flows from its existing operations at Ringaskiddy as follows:

Table 6.1 Ringaskiddy Existing Traffic Levels

<table>
<thead>
<tr>
<th></th>
<th>Port of Cork Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>AADT (est)</td>
<td>1259</td>
</tr>
<tr>
<td>% HGV</td>
<td>30.4</td>
</tr>
<tr>
<td>HGV Nos.</td>
<td>383</td>
</tr>
</tbody>
</table>

Source: Independent Traffic Surveys April/May 2012
6.2.2 The traffic generated by the Port of Cork varies depending on levels of activities by customers including shipping related movements and by employees and related service providers. The Port of Cork facilities at Ringaskiddy currently operate from 7am to 7pm, 5.5 days per week all year round.

6.2.3 Based on the current pattern of arrival and departures of HGVs carrying Unitised Cargo (Containers) from the existing Container Terminal at Tivoli, approximately 8% of HGVs movements occur during the morning and evening peak hours.

6.2.4 Figures 6.2 and 6.3 below show the average number of HGVs using the Tivoli container terminal and the Ringaskiddy site respectively, for weekdays recorded over a two week period in May 2012. It can be seen in both cases that port traffic is reasonably steady during the day. However, there is a peak in the evening at Tivoli that is not observed at Ringaskiddy. This data was used to calculate the peak hour estimates of port traffic later in this report.

6.2.5 The proportion of HGV traffic is greater in Tivoli (between 40 and 50% from 8am to 5pm) than in Ringaskiddy (between 30 and 40% from 8am to 5pm). In addition approximately 95% of the traffic is currently between 7am and 7pm.

![Figure 6.2 Tivoli Average Daily HGV Traffic Profile](image-url)
6.2.6 Table 6.2 and Figure 6.4 below highlight the proportional contribution and impact of the Port Traffic using Ringaskiddy at various locations along the Port Access Corridor. The figures suggest that Ringaskiddy is not a significant contributor to traffic flow volumes on the Port Access Corridor. For example, the average daily total of 1,259 vehicles from Ringaskiddy results in approximately less than 1% of all daily traffic movements in the Jack Lynch Tunnel.

Table 6.2  Contribution of Existing Ringaskiddy Port Traffic on the Port Access Corridor

<table>
<thead>
<tr>
<th>Route Section</th>
<th>Total AADT</th>
<th>PoC AADT</th>
<th>% Port of Cork Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Entrance</td>
<td>1,259</td>
<td>1,259</td>
<td>100%</td>
</tr>
<tr>
<td>N28 West of Ringaskiddy</td>
<td>5,313</td>
<td>1,169</td>
<td>22%</td>
</tr>
<tr>
<td>N28 East of Shannonpark</td>
<td>9,831</td>
<td>1,169</td>
<td>12%</td>
</tr>
<tr>
<td>N28 North of Shannonpark</td>
<td>23,713</td>
<td>852</td>
<td>4%</td>
</tr>
<tr>
<td>N28 at Bloomfield Interchange</td>
<td>44,392</td>
<td>852</td>
<td>2%</td>
</tr>
<tr>
<td>N40 SRR at Jack Lynch Tunnel</td>
<td>56,411</td>
<td>564</td>
<td>1%</td>
</tr>
</tbody>
</table>
6.2.7 The data shown above in Figure 6.4 demonstrates the very minor proportion of Port traffic along the route.

6.2.8 It is clear that the greatest improvement to capacity can be achieved by targeting the underlying commuter based traffic. The Port of Cork is committed to contributing more than its proportional share of this effort by undertaking and implementing its MMP proposals and by supporting the initiatives of its employer neighbours in the Ringaskiddy Strategic Employment zone and the efforts of the NTA and Cork CC through the N28 STS.

6.3 Estimated Future Port Traffic by Module

6.3.1 Table 6.3 below outlines the traffic generation assumptions for each module. The modules are described in Section 2.5 and Figure 2.2. Table 6.4 shows the resulting traffic generated for each scenario which are described in Table 2.2 (i.e., the cumulative amount due to modules being successively added).

6.3.2 Based on the NRA Dunkettle Traffic Model a cumulative growth rate of 15% over the period 2012 -2030 has been used for this traffic assessment. Adjusting this for the effect of the N28 Sustainable Travel Strategy the assumed growth rate is 14.25% cumulatively over the period 2012-2030.

6.3.3 Assumptions are also incorporated into the traffic generation numbers in Table 6.4 to represent the effect of Mobility Management on Ringaskiddy Port traffic. These assumptions are as follows.

- Future AADT reduced by 5% due to N28 MMP measures; no reduction to HGVs for general N28 MMP measures;
- No reduction in existing Port HGV overall daily traffic due to Port of Cork MMP;
- Future HGV traffic reduced at peak hour by 10% as per Port MMP at Ringaskiddy;
- Existing non-HGV Port Traffic reduced by 30% as per Port of Cork MMP.
### Table 6.3 Ringaskiddy Traffic Generation Assumptions

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>AADT (est)</th>
<th>Daily HGVs</th>
<th>HGV % Vehicles</th>
<th>Additional Peak Vehicles</th>
<th>Additional Peak HGVs</th>
<th>AADT Assumptions</th>
<th>HGV Estimation Assumptions / Source</th>
<th>Peak Hour Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Traffic</td>
<td></td>
<td>1,259 383</td>
<td>30.4%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Based on Independent Surveys in May 2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>New Road Access</td>
<td>0 0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>No Change to trip generation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ringaskiddy East Phase 1a</td>
<td>328 183</td>
<td>55.8%</td>
<td>33</td>
<td>18</td>
<td>HGVs based on Tivoli trip rates and profiles. Ancillary traffic based on Tivoli rates but with a 40% reduction due to relocation efficiencies and due to MMP measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ringaskiddy East Phase 2</td>
<td>815 455</td>
<td>55.8%</td>
<td>82</td>
<td>46</td>
<td>HGVs based on Tivoli trip rates and profiles. Ancillary traffic based on Tivoli rates but with a 40% reduction due relocation efficiencies and to MMP measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ringaskiddy East Phase 1b</td>
<td>166 166</td>
<td>100.0%</td>
<td>83</td>
<td>83</td>
<td>HGV rates based on 2011 Profile at Ferry Terminal (4 ferries per week). No additional ancillary traffic assumed. Assumed worst case that a ferry arrives and discharges in AM peak, based on 2011 Profile at Ferry Terminal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ringaskiddy West Extension</td>
<td>140 54</td>
<td>38.6%</td>
<td>14</td>
<td>5</td>
<td>Existing Traffic at DWB increased by a further 25%. Incremental ancillary traffic reduced by 30% by MMP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ringaskiddy West Landbank</td>
<td>237 95</td>
<td>40.1%</td>
<td>24</td>
<td>10</td>
<td>Module 8 Traffic at DWB increased by a further 35%. Incremental ancillary traffic reduced by 30% by MMP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>RoRo/Ferry Terminal approved growth</td>
<td>161 27</td>
<td>16.8%</td>
<td>5</td>
<td>2</td>
<td>Existing traffic levels at Ferry Terminal increased by 40%. Incremental ancillary traffic reduced by 30% by MMP measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module</td>
<td>Description</td>
<td>AADT (est)</td>
<td>Daily HGVs</td>
<td>HGV % Vehicles</td>
<td>Additional Peak Vehicles</td>
<td>Additional Peak HGVs</td>
<td>AADT Assumptions</td>
<td>HGV Estimation Assumptions / Source</td>
<td>Peak Hour Assumptions</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------------</td>
<td>------------</td>
<td>------------</td>
<td>----------------</td>
<td>-------------------------</td>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Deepwater Berth approved growth</td>
<td>56</td>
<td>22</td>
<td>39.3%</td>
<td>6</td>
<td>5</td>
<td>Existing Traffic at DWB increased by 10% Incremental ancillary traffic reduced by 30% by MMP</td>
<td>Peak Hour Assumptions</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Port-related development of Adjacent Lands</td>
<td>340</td>
<td>51</td>
<td>15.0%</td>
<td>68</td>
<td>5</td>
<td>Assumed lands would generate 100 ancillary jobs. Travel to work would be 15% by alternative modes</td>
<td>80% of employees arrive in peak hour.</td>
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**Table 6.4 Ringaskiddy Cumulative Traffic Generation**

<table>
<thead>
<tr>
<th>Scenario: Modules Included:</th>
<th>Existing</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<tr>
<td>Daily:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AADT (Vehicles)</td>
<td>1,259</td>
<td>1,587</td>
<td>2,402</td>
<td>2,568</td>
<td>2,708</td>
<td>2,945</td>
<td>3,106</td>
<td>3,162</td>
<td>3,502</td>
</tr>
<tr>
<td>Non HGV Traffic (Vehicles)</td>
<td>876</td>
<td>1,021</td>
<td>1,381</td>
<td>1,381</td>
<td>1,467</td>
<td>1,609</td>
<td>1,743</td>
<td>1,777</td>
<td>2,066</td>
</tr>
<tr>
<td>Daily HGVs</td>
<td>383</td>
<td>566</td>
<td>1,021</td>
<td>1,187</td>
<td>1,241</td>
<td>1,336</td>
<td>1,363</td>
<td>1,385</td>
<td>1,436</td>
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<tr>
<td>AM Peak Hour:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM Peak Total Vehicles</td>
<td>79</td>
<td>112</td>
<td>194</td>
<td>277</td>
<td>291</td>
<td>315</td>
<td>320</td>
<td>326</td>
<td>394</td>
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<tr>
<td>AM Peak Total HGVs</td>
<td>54</td>
<td>72</td>
<td>118</td>
<td>201</td>
<td>206</td>
<td>216</td>
<td>218</td>
<td>223</td>
<td>228</td>
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<tr>
<td>Peak Hour Percent of Total HGV</td>
<td>14%</td>
<td>13%</td>
<td>12%</td>
<td>17%</td>
<td>17%</td>
<td>16%</td>
<td>16%</td>
<td>16%</td>
<td>16%</td>
</tr>
</tbody>
</table>
6.4 **Future Estimated Traffic Levels on Network**

6.4.1 The data below in Table 6.5 represent the **2030 situation**. The future estimated traffic levels are based on **Scenario E**, which corresponds to all the modules included in the SID application.

6.4.2 Junction analysis at Shannonpark and Shanbally for Scenario E shows both junctions operate within the capacity threshold of 0.85 RFC, indicating that all SID modules (Scenario E) can be developed without compromising the operation of these junctions subject to hem being upgraded as proposed. Scenario E takes into account:

- New access road (no additional traffic generation is associated with this);
- The implementation of Phase 1a at Ringaskiddy East;
- The implementation of Phase 2 at Ringaskiddy East;
- The implementation of Phase 1b at Ringaskiddy East;
- The implementation of Ringaskiddy West Extension; and
- The implementation of Ringaskiddy West Land bank.

6.4.3 The vast majority of the volumes of HGVs indicated in the above figure will travel on the N28. The junction assessments at Shanbally and Shannonpark have confirmed that this level of additional traffic can be accommodated. To place the numbers in context Figure 6.6 below superimposes Port of Cork traffic onto the general non-Port traffic for both 2012 and 2030. The data show that the contribution of the Port to traffic at the Jack Lynch tunnel as 1% in 2012, rising to 2% in 2030.

**Table 6.5 Port of Cork 2012 and 2030 AADT Traffic Estimates on N28**

<table>
<thead>
<tr>
<th>Route Section</th>
<th>Existing (2012) Estimates</th>
<th>2030 Estimates</th>
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<tr>
<td></td>
<td>Existing AADT</td>
<td>Existing PoC AADT</td>
</tr>
<tr>
<td>Port Entrance</td>
<td>1,259</td>
<td>1,259</td>
</tr>
<tr>
<td>N28 West of Ringaskiddy</td>
<td>5,313</td>
<td>1,169</td>
</tr>
<tr>
<td>N28 East of Shannonpark</td>
<td>9,831</td>
<td>1,169</td>
</tr>
<tr>
<td>N28 North of Shannonpark</td>
<td>23,713</td>
<td>852</td>
</tr>
<tr>
<td>N28 at Bloomfield Interchange</td>
<td>44,392</td>
<td>852</td>
</tr>
<tr>
<td>N40 SRR at Jack Lynch Tunnel</td>
<td>56,411</td>
<td>564</td>
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</table>
6.4.4 Figure 6.5 presents the estimated traffic flows for key points on the Port Access Corridor using the data presented above in Table 6.5.

![Figure 6.5 Present PoC AADT Vs 2030 PoC AADT Including Ringaskiddy Scenario E](image1)

6.4.5 Figure 6.6 below presents the peak hour traffic (general traffic and HGVs) generated by the port at Ringaskiddy, including assumptions on mobility management.

![Figure 6.6 Present Vs Future Peak Hour Ringaskiddy Traffic](image2)
6.5 Analysis of Port of Cork Ringaskiddy Traffic Impact

6.5.1 The Port of Cork’s MMP will identify the scope of measures that can be implemented to promote and improve sustainable travel practices including heavy goods traffic movement to and from the Port at Ringaskiddy. This traffic assessment has demonstrated that when this proposed development is fully operational the traffic from the Port will not have a significant impact on the volumes of traffic on the N28. The County Council’s proposals for improving the junctions at Shanbally and Shannon Park will improve traffic flow on the N28 and will more than accommodate the additional traffic generated by the Port in the peak hours.

6.5.2 Even when taking into consideration future growth in traffic demand there is considerable available capacity on the N28 outside the peak hours suggesting that if a strong mobility management plan is put in place to reduce the growth of HGVs in the peaks then the port development at Ringaskiddy proposals will not have an adverse affect on the strategic road network.

6.5.3 If the current proposed development were not to proceed (i.e. in the context of a ‘no-project scenario’) Port activities would continue to grow at the existing port locations, albeit at a reduced rate. It is estimated that in a ‘no-project’ scenario the total traffic flow (AADT) in the period to 2032 would increase by from 1259 to 1549 HGV movements per day at Port of Cork’s existing facilities at Ringaskiddy. This projected increase is in line with NRA traffic projections as set out in their Dunkettle Interchange Model which anticipates traffic growth on the N28 South of Bloomfield to be 15% by 2031. Accordingly a significant element of the future port traffic growth emanating from Ringaskiddy already has consent under the existing Harbour Works orders and is accounted for in the growth forecasts of traffic in the NRA Dunkettle Interchange traffic model.

6.5.4 The Port of Cork’s overall projected growth in port operations has been revised downward in light of the recent economic downturn. The present forecast is for a 40% increase in tonnage over the period up to 2025 / 2030, increasing from 8.5mt in 2010 to 11.96 mt.. As indicated previously the proposed development at Ringaskiddy is smaller than the development of Ringaskiddy proposed in 2006 and will 52% have less additional traffic at Ringaskiddy than that forecasted for the 2006 development.

6.5.5 The expanded facilities at Ringaskiddy will facilitate the Port of Cork in moving container handling from Tivoli and the bulk goods handling from Tivoli and the City Quays in Cork City Harbour in due course.. This will result in a reduction in traffic and HGVs in the City Centre.
7 Conclusions and Recommendations

7.1 Overview

7.1.1 The total daily traffic generated by the Port of Cork at all its locations around Cork Harbour is only 1% of traffic through the Jack Lynch Tunnel, but the related trade through the Port is essential to the sustainable functioning of the regional economy and contributes €289m to the economy, linked to 325,000 full time equivalent jobs. The Port’s ability to develop to serve this market is critical to the regional economy, economic growth and the generation of employment prospects.

7.1.2 The Port of Cork is a modest contributor (<3.6%) to traffic flow levels on the N28, Bloomfield Interchange (1.9%) and the Jack Lynch Tunnel (1.0%).

7.1.3 The future estimated traffic levels from the Port do not coincide with the peak commuter flows when mobility management is in place and if it is assumed that the Tivoli average departure profile is maintained when activities are relocated to Ringaskiddy.

7.2 Summary of Issues

- There is significant spare capacity on the existing N28 throughout the day even though there is some congestion at key junctions of Shanbally, Shannon Park and Bloomfield during the AM peak hour and to a lesser extent in the PM peak hour.
- Traffic flows on the N28 are dominated by commuter traffic.
- Off peak traffic is considerably less than the peak traffic flow.
- Traffic volumes on the N28 have reduced since 2008 as well as on other routes.
- The NRA and Cork County Council are preparing proposals to improve capacity at the junctions at Shanbally and Shannon Park on the N28.
- The NRA is also preparing plans for the free flow upgrade of Dunkettle Interchange, which will significantly increase its capacity and reduce peak hour congestion.

7.3 Conclusions

- The proposed development will not give rise to significant levels of additional traffic on the existing road network;
- The levels of additional traffic that will result from this development can be accommodated within the capacity of the existing road network;
- As port-related activities are relocated to Ringaskiddy there will be:- A reduction in HGV traffic in the City Centre, the Quays and the Tivoli area;
- Negligible change at the Dunkettle interchange or the Jack Lynch Tunnel;
- The proposed upgrades to the junctions on the N28 at Shannonpark and Shanbally will significantly improve traffic conditions on the N28 between Ringaskiddy and Bloomfield and thus cater for traffic levels up those estimated for Scenario E. It is recommended that further analysis is performed to consider the effects of area wide mobility management plans on the level of traffic at these critical junctions in the future and thus if further port development could be accommodated; and
- Analysis using the Dunkettle model and Douglas Land Use and Transport Study model show that delays are low on the various approaches and movements through Bloomfield interchange.
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APPENDIX 8.2 BASELINE REVIEW
Port of Cork Strategic Development

Reference number 300100/12

BASELINE REVIEW
PORT OF CORK STRATEGIC DEVELOPMENT

BASELINE REVIEW

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APPROVAL

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<td>Principal Consultant</td>
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<td>Checked by</td>
<td>Jack Sheehan</td>
<td>Independent</td>
<td>10/06/2013</td>
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<td>Ian Byrne</td>
<td>Director</td>
<td>11/06/2013</td>
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1. INTRODUCTION

1.1 Background

1.1.1 SYSTRA was appointed by Port of Cork in March 2013 to assist them with the preparation of a Strategic Infrastructure Development (SID) application to be submitted to An Bord Pleanála (ABP), for the provision of a new container terminal and the expansion and upgrading of Port facilities at Ringaskiddy. This proposed development would accommodate the relocation of port facilities from Tivoli and City Quays to Ringaskiddy. This Baseline Report describes the existing situation at Ringaskiddy, Tivoli and City Quays locations.

1.1.2 In 2007, the Port of Cork (PoC) submitted an SID application to ABP for a container terminal and multi-purpose berth at Ringaskiddy - Oyster Bank in order to cater for future expansion of the total handling capacity of the PoC facilities, as part of its Strategic Development Plan.

1.1.3 ABP refused the application in 2008 on two grounds. Firstly, it was considered that the traffic arising from the level of development proposed would generate adverse impacts on the strategic road network in and around Cork City, and specifically at the Bloomfield, Dunkettle and Kinsale Road Interchanges, and at the Jack Lynch Tunnel. The lack of a rail option/connection to transport freight from the site was the second reason for refusing the application.

1.1.4 Following the 2008 decision by ABP, the PoC undertook a fundamental review of its Strategic Development Plan and completely re-examined the future growth of its activities. As a consequence of this strategic review, which took full account of the ABP's reasons for refusal, proposals have now been developed for a smaller scale development at Ringaskiddy.

1.1.5 The Port expansion at Ringaskiddy is intended to complement a reduction of Port operations at the existing Tivoli and Cork Docklands, now being rebranded as Cork City Harbour sites, which cannot handle large vessels due to physical constraints. The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (Docklands being within 750m, and Tivoli, on the commuter Railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal / non-industrial uses. These are mutually supportive objectives and are part of the Cork Area Strategic Plan (CASP) Strategy and the local Cork City Development Plan, which target future population and growth within the Cork Metropolitan area, with a strong reliance on the redevelopment of Cork City Harbour sites to achieve the projected growth. Furthermore, the removal of container handling facilities from the Cork City Harbour site at Tivoli would also have the benefit of reducing the number of HGVs which pass through the City Centre road network. The relocation of bulk goods handling facilities from City Quay areas and the containers from Tivoli to Ringaskiddy are thus a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in such well-located City areas.
1.2 Preliminary Analysis

1.2.1 In response to the reasons for refusal of the Oyster Bank application, and the revision of their Strategic Plan, the PoC commissioned a preliminary Traffic Impact Assessment Report (February 2013) to investigate how port traffic would be affected by the revised proposed development at Ringaskiddy. The main objective of this report was to present the findings of the preliminary analysis of the traffic and transport impacts of the revised Ringaskiddy proposals. The key finding is that the future traffic generated by the PoC proposal at Ringaskiddy will not adversely impact the road network as a result of:

- The scale of development being proposed results in lower amounts of HGV traffic being generated on the road network than previously envisaged in the 2008 Oyster Bank application;
- The implementation of a Mobility Management Plan by the PoC. This will entail policy measures implemented by the PoC to suppress HGV movement out of the site during peak times when there is limited spare capacity on the network; and
- The changing policy context regarding how growth should be managed in future on the national network, particularly Smarter Travel objectives to prioritise strategic traffic growth (such as from key ports) over growth in unsustainable car travel. This new strategy is reflected in the Cork County Council N28 Corridor Sustainability Travel Strategy (N28 STS).

1.2.2 A separate report has been prepared to consider the potential of a rail connection and use of rail freight for Port traffic. This report prepared by Booz & Co has been submitted to ABP for its consideration. This report found that the only realistic way the Port of Cork's container market could theoretically be served by rail is via a rail-connected Distribution Centre and there are no reasonably expected circumstances under which a rail operation between Marino Point or Ringaskiddy and the Distribution Centre could be viable in socio-economic terms. With the downsizing of the proposed development (in this application), the case for rail is further weakened.

1.3 Report Overview

1.3.1 The focus of this Baseline Report is transport, specifically in terms of providing:

- Information on the travel patterns of PoC related traffic, including vehicles transporting goods to/from port sites and also employees, and understanding their needs and views;
- A detailed summary of current traffic conditions in the study area in terms of infrastructure for each transport mode, utilisation of that infrastructure and conditions experienced; and
- A review of national and regional guidelines and other transport studies relevant to the study area, specifically detailing the relative objectives and outcomes of each.

1.3.2 This Baseline Review will be used to inform the PoC Strategic Traffic Model development process. The model is an extension of the Dunkettle Transport Model, which is a variant
of the CASP Model, and will investigate the extent and level of detail required to include the three PoC sites (Ringaskiddy, Tivoli and City Quays). The Baseline Review will assist in the development of a freight model component that will look at freight generation rates from each Port site in terms of vehicle numbers and distribution. Future trip generation is largely based on existing generation at the three sites.

1.3.3 The study area for the model is shown in Figure 1. It includes the three Port sites being considered, Ringaskiddy, Tivoli and City Quays. It also includes all relevant major connecting roads, including the N28, N40, Jack Lynch Tunnel and Dunkettle Interchange.

1.3.4 The Baseline Review will be used to inform the SID application documents, including the following Reports:

- Port of Cork Strategic Traffic Impact Assessment;
- Ringaskiddy, Tivoli and City Quays Traffic Impact Assessments;
- Port of Cork Strategic Mobility Management Plan; and
- Ringaskiddy, Tivoli and City Quays Mobility Management Plans.

1.3.5 The objective of the Mobility Management Plans is to minimise the impact of port generated traffic during peak hours on the strategic interchanges of the national road network around Cork City.
1.4 Methodology for Developing Transport Baseline

Site Visits

1.4.1 To facilitate an understanding of the transport environment and the general traffic conditions experienced, a series of site visits were undertaken from 10th - 13th April 2013.

1.4.2 During the site visits, the following actions were undertaken:

- Detailed observations of current traffic management arrangements and how they affect each mode of transport;
- An examination of the conditions experienced by each road user type, i.e. pedestrians (including school children), cyclists, cars, buses, heavy goods vehicles and so on;
- An examination of travel behaviours of people travelling within the study area;
- Observations of local land uses and their influence on traffic and transport arrangements; and
- An extensive set of photographic records.
Traffic Surveys

1.4.3 In addition to the site visits detailed above, the following traffic survey information was utilised to develop an understanding of existing traffic conditions:

- Traffic surveys at Tivoli and Ringaskiddy ports, including turning counts at the Ferry Terminal, conducted in May 2012;
- Road Side Interviews at Tivoli and Ringaskiddy and observations at City Quays, conducted in May 2012;
- Journey Time surveys along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- Automatic Traffic Counter (ATC) surveys at Bloomfield Interchange and along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- ATC surveys along the N28 and other roads in the vicinity of Douglas/Rochestown, conducted April 2012;
- Manual Classified Counter (MCC) surveys along roads in the vicinity of Douglas/Rochestown, conducted April 2012;
- MCC surveys near Dunkettle and Cork City undertaken as part of the CASP model update in November 2012;
- National Roads Authority (NRA) traffic counters along the N25; and
- MCC surveys commissioned as part of this study, April 2013, at:
  - Cork Road / Church Road
  - Cork Road Bypass / Church Road

1.4.4 This data is primarily used to inform the development of the PoC Strategic Traffic Model and to provide further information on the current traffic conditions along the corridor.

Assessment of Census Data

1.4.5 Small Area Population Statistics (SAPS) from the CSO 2011 Census of population\(^1\) were used to determine key demographic statistics such as population, car ownership, primary means of travel, etc. to be analysed at the local Electoral District (ED) level.

Key Stakeholder Consultation

1.4.6 Stakeholder consultation is a vital component for the development of PoC Strategic Traffic Model. Meetings were held with the National Transport Authority to devise the detailed methodologies for traffic modelling and consultation also included liaising with the NRA and Cork County Council to discuss the N28 widening, Part 8 schemes, PoC access at Ringaskiddy and so on.

1.4.7 Public consultation is an essential part of the preparation of the Environmental Impact Assessment of the proposed port development at Ringaskiddy. The first public consultation was held in Fota on 11th April 2013 and Carrigaline on 12th and 13th April

2013. The second round of public consultation was held in Cobh on 6th February and Ringaskiddy on 7th and 8th February 2014.

1.5 Structure of Baseline Traffic Report

1.5.1 The remainder of this report is structured as follows:

<table>
<thead>
<tr>
<th>Chapter 2 - Transportation Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter Two presents some of the key findings from Census data assessment, including a presentation of the current modal share for Ringaskiddy, Cork City and Cork County.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 3 - Review of Planning and Policy Documents</th>
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<tbody>
<tr>
<td>Chapter Three provides a summary of relevant planning and policy documents relating to transport issues along the Port Access corridor.</td>
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<table>
<thead>
<tr>
<th>Chapter 4 - Existing Traffic Flows &amp; Traffic Surveys Results</th>
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<tbody>
<tr>
<td>Chapter Four presents the results of the traffic surveys that were undertaken within the study area.</td>
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<table>
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<tr>
<th>Chapter 5 - Summary Baseline Traffic Evaluation</th>
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<tbody>
<tr>
<td>Chapter Five evaluates the current traffic management arrangements and issues experienced within the study area, for all road users. The current public transport facilities in the study area are reviewed along with details of current cycle and pedestrian infrastructure. This chapter also outlines issues faced or caused by Heavy Goods Vehicles (HGV).</td>
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<table>
<thead>
<tr>
<th>Chapter 6 - Existing Port Traffic</th>
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<tbody>
<tr>
<td>Chapter Six describes the existing traffic generation from each of the port sites (Ringaskiddy, Tivoli and City Quays).</td>
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<table>
<thead>
<tr>
<th>Chapter 7 - Public and Key Stakeholder Consultation</th>
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</thead>
<tbody>
<tr>
<td>Chapter Seven outlines the public and stakeholder consultation process carried out and details the responses received.</td>
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</table>

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<tr>
<th>Chapter 8 - Reasons for Refusal</th>
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<tbody>
<tr>
<td>Chapter Eight discusses the ABP reasons for refusing the previous application.</td>
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</tbody>
</table>
Chapter 9 - Previous Planning Application

Chapter Nine highlights the differences between the previous application and the current application. It presents details from the previous SID application for the construction of a new container terminal expansion and upgrading of port facilities at Ringskiddy (including the relocation of port facilities from Tivoli and City Quays to Ringaskiddy).
2. TRANSPORTATION CONTEXT

2.1 Introduction

2.1.1 This chapter considers the Port Access Corridor (i.e. the N28, N40, N8 and N25) in a transportation context and considers the following aspects:

- Overview of the N28 Corridor and its Environs;
- Road Hierarchy; and
- Evaluation of Census Data.

2.2 Overview of the N28 Corridor and its Environs

Population

2.2.1 Figure 2 below shows the extent of the Port Access Corridor study area. The Port Access Corridor includes the N28, and sections of the N40, N8 and N25. Table 2.1 below shows the population of Ringaskiddy, Cork City and Cork County and how this has changed between the 2006 census and the 2011 census.
Figure 2. Study Area EDs

Table 2.1 Study Area Population

<table>
<thead>
<tr>
<th></th>
<th>2006 POPULATION</th>
<th>2011 POPULATION</th>
<th>% CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ringaskiddy (SAPS)</td>
<td>Not available</td>
<td>1,575</td>
<td>n/a</td>
</tr>
<tr>
<td>Ringaskiddy, Carrigaline, Monkstown (EDs)</td>
<td>11,801</td>
<td>12,825</td>
<td>+8.7%</td>
</tr>
<tr>
<td>Cork County</td>
<td>361,877</td>
<td>399,802</td>
<td>+10.5%</td>
</tr>
<tr>
<td>Cork City</td>
<td>119,418</td>
<td>119,230</td>
<td>-0.1%</td>
</tr>
</tbody>
</table>
2.2.2 In the 2011 Census, published by the CSO, information is available at both Electorate Division (ED) and Small Area Population Statistics (SAPS) levels of detail. SAPS give more detail at a local level than do the ED levels. SAPS information was introduced in the 2011 census and therefore there is no corresponding information at SAPS level from the 2006 census.

2.2.3 In 2011, there were seven SAPS that made up Ringaskiddy (47072038, 47072039, 47072040, 47072041, 47072042, 47072002, 47261001). The total population for this area was 1575. The small areas breakdown was not available in 2006 and as such the population in 2006 can only be represented by the EDs that covered the general area.

2.2.4 In 2006 the population for the relevant EDs for Ringaskiddy (18082 Carrigaline and 18098 Monkstown Rural) stood at 11801. In 2011 the population for these two EDs stood at 12825, showing a population increase of 8.7%. It should be noted, however, that these EDs also cover areas outside of Ringaskiddy, such as Carrigaline, and therefore do not give a true reflection of the population change in Ringaskiddy itself. The population of Cork County also increased by about 10% in the same period, while the Cork City population remained largely constant over the five years from 2006 to 2011.

2.2.5 Analysis of Census 2011 figures shows that the Ringaskiddy area has a relatively young population. The largest demographic in the area is the 20-44 year old age group, which accounts for 36% of the population. Those aged 0-19 years account for 27%. The 45 to 64 age group accounts for 26% and those over 65 account for only 11% of the total population.

Land Use

2.2.6 The prime land use of Ringaskiddy is industry/employment with some residential, educational and recreational land uses. The land uses which represent key destinations for trips in the Ringaskiddy area are located outside Ringaskiddy village, which contains 11 large multi-national companies. There are approximately 7,800 people working in Ringaskiddy and Carrigaline.

2.2.7 In addition the large deep water harbour port facility is also located in Ringaskiddy which serves as a hub for international freight and passenger traffic including the weekly continental passenger ferry between Cork and Roscoff which arrives in Cork every Saturday.

2.3 Road Hierarchy

2.3.1 Figure 3 below illustrates the road hierarchy in the study area. A number of national primary roads pass through the study area, namely:

- N28 – Cork City to Ringaskiddy: provides connections from the wider national road network via the N40 to the major employers based in Ringaskiddy and Carrigaline and the national sea freight port and passenger terminal in Ringaskiddy;
N40 – Cork South Ring Road: a major national distributor road allowing access to the wider national road network including the M8/N8 and the N25, via the Dunkettle interchange; the N27 via the Kinsale Rd Interchange; the N20 via the N27 and the City Centre; and the N22 and N71 via the Bandon Road Interchange.

- M8/ N8 – Cork City to Dublin;
- N20 – Cork City to Limerick City;
- N22 – Cork City to Tralee/ Killarney to the west;
- N25 – Cork City to Waterford/ Rosslare Europort to the east; and
- N27 – Cork City to Cork Airport.

2.3.2 There is one secondary route in the study area:

- N71 – Route between Cork City and Bandon and further south/south-west which can be accessed via the N40 South Ring Road or the N22.

2.3.3 There are also a number of regional and third class roads in the study area, including:

- R610 – Cork City through Douglas and Passage West;
- R618 – Iniscarra Road;
- R635 – North Ring Road; and
- R639 – the old N8 primary road.
2.4 Evaluation of Census Data

2.4.1 This section provides the essential demographic context to the study area. For example, who is living in the study area, their primary mode of transport, if they are working or going to school, the distance they travel and where they travel to. This information is an important element in understanding how the transportation system works and why it works in a particular way.

2.4.2 This review of the study area's characteristics has been facilitated by analysis of census data, notably through Small Area Population Statistics (SAPS).

Evaluation of Car Ownership

2.4.3 Car ownership is a key factor in travel pattern behaviour. The availability of a car is a critical input into deciding where to travel and how to travel. Car use is directly related to car ownership unless significant restrictions are enforced. For those who do not have
access to a car, accessibility to education, employment and public facilities is restricted to walking or cycling distance, or to the areas covered by the public transport network.

2.4.4 The level of car ownership in Ringaskiddy is relatively high. Only 9% of households have no car; 34% have one car; and 57% have two or more cars. By comparison, 11% of households in Cork County have no car; 37% have one car and 52% have two or more cars. The rate of car ownership in Cork, and in particularly in Ringaskiddy, demonstrates the reliance on private car transport as the dominant transport mode.

2.4.5 This high level of car ownership is explained by the fact that the need for a car is greater in rural areas where development is more dispersed such that facilities are not within walking or cycling distances. Dispersed populations are also difficult to serve by public transport in a cost-efficient way. The private car is often the only feasible choice of transport in rural areas such as Ringaskiddy.

2.4.6 By comparison, in urban areas, there is generally a greater opportunity to access employment and education by walking, cycling and public transport. Therefore, the need for a car is greatly reduced and it is sometimes more cost-efficient not to own a car. Car parking within urban areas is also more restricted and can limit the number of cars per household. This is illustrated in Figure 4, which shows a much lower car ownership in Cork City than in the surrounding (more rural) EDs.

![Figure 4. Percentage of Households with access to Car](image-url)
Mode Share of travel to Work and Education

2.4.7 An analysis of 2011 Census data shows that the private car is by far the most commonly used mode of transport to work and education in the Ringaskiddy area. Table 2.2 shows that car accounts for 80% of all trips from the study area for work and education. This is well above the City (54%) but in line with County averages (80%). This analysis also shows that travel by more sustainable modes (i.e. walking, cycling and public transport) is much lower in Ringaskiddy than in Cork City and City County.

2.4.8 Table 2.2 shows that the percentage of people walking to work is well below the County (10.3%) and City averages (33.1%). It also shows that cycling is higher than the County (0.7%) averages and in line with the City (2.9%) averages. However the low population in Ringaskiddy must be taken into account because although the 2.4% that cycle to work from Ringaskiddy is in line with the City, it only represents 23 people. The percentage from Ringaskiddy that takes the bus (6.1%) is also lower than the County (8.0%) and City averages(9.3%). 0% travel by train which is in line with both the County (0.7%) and City averages(0.3%). 5.9% is represented by motorcycle/other in Ringaskiddy.

<table>
<thead>
<tr>
<th>MODE</th>
<th>CORK CITY</th>
<th>CORK COUNTY</th>
<th>RINGASKIDDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Foot</td>
<td>33.1%</td>
<td>10.3%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>2.9%</td>
<td>0.7%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Bus</td>
<td>9.3%</td>
<td>8.0%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Train</td>
<td>0.3%</td>
<td>0.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Car or Van Driver</td>
<td>37.8%</td>
<td>56.5%</td>
<td>56.3%</td>
</tr>
<tr>
<td>Car Passenger</td>
<td>16.5%</td>
<td>23.8%</td>
<td>23.4%</td>
</tr>
<tr>
<td>Motorcycle/Other</td>
<td></td>
<td></td>
<td>5.9%</td>
</tr>
</tbody>
</table>

Journey Time to Work and Education

2.4.9 The Small Area Population Statistics (SAPS) from the 2011 Census provides information on the normal journey time to work and education. It is worth noting that the values for journey time are those stated by respondents, and are, therefore, the perceived journey time. Table 2.3 provides details of the stated journey time for those living in Cork County, Cork City and Ringaskiddy.
2.4.10 Journey times to work and education in the county are relatively short, with the majority of trips (69%) taking under 30 minutes. Journey times are even shorter in Cork City with 81% of trips taking under 30 minutes. Journey times for residents in Ringaskiddy are in line with those experienced by residents of Cork County, where 65% of trips take 30 minutes or less.

Table 2.3 Perceived Journey Time by Area – 2011 Census results

<table>
<thead>
<tr>
<th>JOURNEY TIME</th>
<th>CORK CITY</th>
<th>CORK COUNTY</th>
<th>RINGASKIDDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 15 minutes</td>
<td>39.1%</td>
<td>36.8%</td>
<td>34.51%</td>
</tr>
<tr>
<td>15 to 30 minutes</td>
<td>42.4%</td>
<td>32.1%</td>
<td>30.33%</td>
</tr>
<tr>
<td>30 to 60 minutes</td>
<td>16.2%</td>
<td>25.7%</td>
<td>26.69%</td>
</tr>
<tr>
<td>over 60 minutes</td>
<td>2.3%</td>
<td>5.5%</td>
<td>8.47%</td>
</tr>
</tbody>
</table>

2.5 Results of SYSTRA workplace/education travel survey

2.5.1 As part of a separate study, in mid-2012 SYSTRA undertook an online survey of people who use the N28 to travel to work or education. Two public consultations were held in Ringaskiddy and Carrigaline to promote the survey and a link to the survey was circulated among all employees working in the Ringaskiddy / Carrigaline area. In total there were 1014 responses to the survey.

2.5.2 The objective of the survey was to engage with the N28 commuters and identify various improvements which might encourage N28 commuters to consider changing their current mode of commuter travel to include more sustainable travel modes such as car sharing, public transport, cycling, and walking as part of routine commute to work, or place of education, or to Cork City etc.

2.5.3 In total there were 1014 responses to the survey. The key insights gained from this survey include:

- Almost all respondents (99%) either own or have access to a car;
- Most respondents said the main mode of travel used was car driver;
- Those who travelled by car did so because it was more convenient and quicker than the alternatives;
- One third of those surveyed said they travel further than 20km and a similar proportion travel between 10km - 20km;
- Many respondents reported congestion at key junctions on the N28, partly caused by a high volume of cars arriving and departing at the same time;
Almost all respondents stated that they parked in free staff parking at their place of work/education;
A quarter of respondents said they would occasionally be a car passenger and that this is a mode available to them. This is encouraging as a quarter of respondents are already car sharing occasionally;
Over half of respondents rated the public transport service serving Ringaskiddy as 'poor' or 'very poor', while a third rated it as 'adequate'. Indeed respondents frequently stated that there was no direct bus service serving their home to their destination and that using a bus to travel would involve an extra-long journey which they deemed unnecessary;
Over a quarter of respondents said that a bicycle was available to them, however, only 9% said that they occasionally cycled;
If improvements were made in the provision of cycle lanes and cycle infrastructure almost three quarters of respondents said they may consider cycling for all or part of their journey to work/education at least occasionally;
With regard to pedestrian infrastructure, as many as 89% said that they thought it was 'poor' or 'very poor'; and
In addition to this, many respondents said it was simply too far and therefore took too long to walk to their destination.

Overall Conclusion

The survey shows that free parking may be a significant contributor to people driving to work in this area.
The survey illustrates that many respondents consider the N28 to be heavily congested, impacting on their journey to work.
73% of respondents travel over 10km on their journey to work (36% travel 10-20km and 37% travel greater than 20km), therefore the propensity for people to walk and cycle to work is low. Consequently, it may only be possible to target, at most, 27% of people with reference to switching to walking and cycling modes particularly.
46% of journeys to work took between 15-30 minutes, while journeys from work generally took between 15-30 minutes (38%) or 30-45 minutes (27.5%). The implication of this is that it would be difficult for public transport to compete with car journey times of less than 30 minutes.
Many respondents left for work before 08:00, with 30% of them leaving before 07:00. Public transport, walking and cycling may not be feasible for this group who already leave early in the morning to drive to work.
The findings to the survey do show, however, that there is potential for a higher modal share for walking, cycling and public transport use if improvements were made. This, again, may only be the case for those who travel less than 10km on their journey to work.
3. REVIEW OF PLANNING AND POLICY DOCUMENTS

3.1 Introduction

3.1.1 As part of the Baseline Evaluation, all relevant national and regional guidelines and other transport studies have been reviewed in the context of this study. The following documents and studies are considered to have relevance to the study and therefore have been reviewed:

Policy Documents
- Cork Area Strategic Plan (2001-2020)
- National Spatial Strategy (2002-2020)
- Cork County Development Plan (2009)
- South West Regional Planning Guidelines (2010-2022)
- Carrigaline Local Area Plan (2011)
- Douglas Land Use and Transport Strategy (2013)
- Spatial Planning and National Roads – Guidelines for Planning Authorities (2012)
- Design Manual for Urban Road and Streets (2013)

Infrastructure
- N28 Cork to Ringaskiddy Upgrade (2014)
- Dunkettle Interchange (2013)
- Proposed Green Route (2012)

Mobility Management and Traffic Impact Assessment
- Smarter Travel (2009)
- RSA Accident Statistics
- N28 Corridor STS Transport Questionnaire (2012)
- N28 Corridor STS (2013)

Port Policy
- PoC Strategic Development Plan (2010)
- PoC Strategic Development Plan Review (2010)
3.2 Cork Area Strategic Plan (2001-2020)

3.2.1 The Cork Area Strategic Plan (CASP) provides a vision and strategy for the Land Use Planning and Transport development of the Cork City Region up to 2020. It was jointly sponsored by Cork City Council and Cork County Council and is a successor, in strategic planning terms, to the Cork LUTS initiative, dating from 1976, which pioneered the strategic land use and transport planning of the Cork region. In particular CASP incorporates the Government supported European-wide initiative to create a sustainable approach to social and economic development. This is encouraging planning authorities to take a more critical view of settlement patterns, development needs and infrastructure requirements through the preparation of strategic plans.

3.2.2 According to CASP, Cork has a high standard of road infrastructure but public transport has had little capital investment. This has encouraged dispersed development, which combined with the large forecast growth in population and the increase in incomes, results in higher rates of car ownership that will only exacerbate the trend of increased car based travel.

3.2.3 Green routes, featuring bus priority and improved provision for pedestrians and cyclists, have been recommended for key radial routes into Cork City. One of these is along the route corridor from Ringaskiddy to Cork City via Douglas and Carrigaline.

3.2.4 CASP was updated in 2008, to be in line with the National Climate Strategy 2007-2012. This updated strategy forecasts a significant enhancement in economic growth and provides for a greater population than originally envisaged. The CASP update states that upgrading the N28 road access to Ringaskiddy Port and its associated industrial zone is a critical project, which will facilitate other key strategic projects in the CASP Area, including the migration of Port activities from Cork City to Ringaskiddy and the release of the Docklands area of the city centre for redevelopment.

3.3 National Spatial Strategy (2002 – 2020)

3.3.1 The National Spatial Strategy (NSS 2002-2020) is a twenty year strategic planning framework designed to counterbalance disparities in regional development. Cork is classed as a "Gateway" under the NSS. As a Gateway, Cork has a strategic national location relative to its surrounding areas and provides national-scale social, economic infrastructure and support services to the southern region.

3.3.2 According to the NSS, of the regional cities Cork has the most immediate potential to be developed to the national level of scale required to complement Dublin. CASP sets a positive agenda for proceeding in this direction, given its emphasis on enhancing Cork's critical mass potential as a metropolitan public transport based business area, including a physically attractive and friendly city at its core.
3.3.3 In early 2013, the Government announced that the National Spatial Strategy (NSS) is to be abandoned and replaced by a new policy in about a year’s time.

3.4 National Development Plan (2007-2013)

3.4.1 The National Development Plan (NDP) sets out the development strategy for the Country over a seven-year period, which is supported by quantified, multi-annual investment proposals in all sectors of the economy. It also seeks to promote social inclusion, gender equality and more balanced regional development. Economic infrastructure has been identified as a top priority within the NDP (2007-13), which includes transport infrastructure. Three broad transport investment priorities have been identified:

- Rail / Public Transport;
- Airports; and
- Ports.

3.4.2 The NDP plan states that Atlantic Gateways such as Cork and Limerick have the potential, through strengthening individual cities, to enhance connectivity and promote a collaborative approach through planning and development, to develop the second major metropolitan corridor on the island of Ireland which would complement and to counterbalance the strengthening Dublin-Belfast corridor. It states that investment in key projects such as the Atlantic Corridor (N20 / N25) will help unlock the potential of the Atlantic Gateways concept.

3.5 Cork County Development Plan (2009)

3.5.1 The Cork County Development Plan (CCDP) is a six year plan that sets out Cork County Council's strategy for the proper planning and sustainable development of the County. The plan looks forward to the horizon year of 2020 so that it is aligned with national and regional planning policies and also so that it can provide an adequate framework for the County’s Electoral Area Local Area Plans.

3.5.2 The key aims that underpin the strategy were first developed in the County Development Plan 2003 and the updated plan (2009) sought to maintain and enhance their implementation into the future, in order to achieve:

- Enhanced quality of life for all, based on high quality residential, working and recreational environments and sustainable transportation patterns;
- Sustainable patterns of growth in urban and rural areas that are well balanced throughout the County, reflecting the need to reduce energy consumption and emissions and taking account of the need to plan for the effects of climate change, together with efficient provision of social and physical infrastructure;

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Sustainable and balanced economic investment, in jobs and services, to sustain the future population of the County together with wise management of the County’s environmental, heritage and cultural assets; and

Responsible guardianship of the County so that it can be handed on to future generations in a healthy state.

3.5.3 The policy and objectives of this plan for the Cork Metropolitan Strategic Planning Area in the County are based on the following planning and sustainability goals:

- To recognise the importance of the role to be played by Metropolitan Cork in the development of the Cork 'Gateway' as a key part of the Atlantic Gateways Initiative. In tandem with the development of Cork City, to promote its development as an integrated planning unit to function as a single market area for homes and jobs where there is equality of access for all, through an integrated transport system, to the educational and cultural facilities worthy of a modern and vibrant European City.

- To maintain the principles of the Metropolitan Cork Greenbelt to protect the setting of the City and the Metropolitan Towns and to provide easy access to the countryside and facilities for sports and recreation.

- In the Cork Harbour area generally, to protect and enhance the area's natural and built heritage and establish an appropriate balance between competing land-uses, to maximise the area’s overall contribution to Metropolitan Cork.

- To assist in the redevelopment of the Cork City Docklands by providing for the relocation and development of industrial uses and major port facilities, primarily to Ringaskiddy, where deep-water berths can be developed and modern road infrastructure is planned to facilitate freight transport.

- To recognise the long-term importance of Cork International Airport and to maintain and enhance the infrastructure and other resources likely to be required for its future development.

- To develop the Cork City Environs so that they complement the City as a whole. In the South, priority should be given to consolidating the rapid growth that has occurred in recent years by the provision of services, social infrastructure and recreation facilities to meet the needs of the population.

- To maximise new development, for both jobs and housing, in the Metropolitan Towns served by the Blarney - Middleton/Cobh rail route (including the proposed new settlement at Monard) and to enhance the capacity of these towns to provide services and facilities to meet the needs of their population.

- To provide an enhanced public transport network linking the City, its environs, the Metropolitan towns and the major centres of employment.

3.5.4 It is also an objective of the 2009 Cork County Development Plan (CCDP) to seek the support of the NRA in the implementation of the N28 (Cork - Ringaskiddy) upgrade.

3.5.5 The 2009 CCDP noted that the decision by ABP in 2008 relating to a proposed container terminal at Ringaskiddy identified concerns regarding traffic impact at key locations on the N28 road network and the lack of potential for the future transport of freight by rail in the Ringaskiddy area. The plan states that the maintenance of modern port facilities
and the need to release port-related land in the Docklands and at Tivoli for mixed-use development formats are both critical to the overall strategy for the sustainable development of the CASP area and to the achievement of the target populations for the City.

3.5.6 The CCDP indicates that while Ringaskiddy remains the preferred location for the relocation of port activities, Cork County Council is committed to engage with the PoC and other relevant stakeholders, to seek a resolution to the difficulties raised by ABP and, if necessary, give consideration to possible alternative locations.

3.6 South West Regional Planning Guidelines (2010-2022)

3.6.1 The South West Regional Authority prepared the Regional Planning Guidelines for the South West Region to act as a regional tier in the hierarchy of plans and policies that inform local plans such as the Development Plan.

3.6.2 The task of the Guidelines is to provide a broad canvas to steer the sustainable growth and prosperity of the Region and its people. The Plan contains statements and analysis of key economic objectives, together with a set of planning guidelines to be incorporated within the development plans of the local authorities in the region.

3.6.3 The Guidelines cover the South West Region, which incorporates County Cork together with County Kerry. Development priorities that have been identified for the Greater Cork Area in these guidelines are:

- Realignment and reinforcement of spatial planning and land use policies;
- Plan for an increase in the population and employment of the Cork Gateway;
- Refocusing of economic and investment strategy;
- Front-loading of infrastructure and implementation of an integrated transport strategy; and
- Priority infrastructure investments for the Cork Docklands.

3.6.4 The Guidelines also recognise that the PoC needs additional capacity and has identified a number of issues and priorities for infrastructural provisions and up-grades related to the Port, Ringaskiddy and the N28. These include:

- Integral to both the expansion of the PoC and the planned redevelopment of the City Docklands is the relocation of port activities and related uses from the City Docklands and Tivoli to new sustainable locations in the harbour;
- It is important to the development of the region’s economy that the PoC can increase its tonnage in line with the future economic growth of the region and its own strategic development plan will guide this approach;
- Prioritise the upgrading of the N28, to facilitate ease of access to the Port and industrial development in Ringaskiddy. Provision for public transport priorities should be built into this scheme;
- Promote the development of a lower harbour, wastewater treatment scheme, to facilitate the development of lands in Ringaskiddy; and
It is an objective to support the sustainable expansion of the PoC in line with the targeted economic growth of the region. It will be important for the PoC to relocate its activities from the City to another suitable, sustainable, location within Cork Harbour. Once the PoC has resolved the issues of transport facilities to serve the port in the future, the local authorities will examine the potential of possible locations and, where appropriate, protect the most suitable for future port development in their development and local area plans.

3.7 Carrigaline Local Area Plan (2011)

3.7.1 The Carrigaline Electoral Area lies within the CASP area and is entirely contained within the County Metropolitan Strategic Planning Area as defined in the County Development Plan 2009. The Electoral Area is located to the south of Cork City and also includes the Cork City South Environ (Ringaskiddy, Carrigaline, Douglas, Grange, Frankfield, Donnybrook, Maryborough, Rochestown, Doughcloyne and Togher).

3.7.2 The Local Area Plan (LAP) provides an easily understood but detailed planning framework for sustainable development responding to the needs of communities within the Electoral Area. It aims to deliver quality outcomes, based on consensus, that have been informed by meaningful and effective public participation. The plan sets out proposals for the delivery of the physical, social and environmental infrastructure necessary to sustain the communities of the area into the future.

3.7.3 The N28 National Primary route links Ringaskiddy to Cork City and onwards to the wider regional area. It is proposed to improve the existing N28 between the Bloomfield interchange with the N25 South Ring Road and Ringaskiddy. The improved road will have a greater capacity particularly for freight vehicles making journeys to and from the port at Ringaskiddy and this will substantially improve the standard of the existing N28.

3.7.4 The development of this road scheme is being promoted by Cork County Council and is funded by the National Roads Authority (however this project has since been put on hold). The Carrigaline LAP noted that it is critical that the N28 project be finalised as quickly as possible in order to bring certainty and assurance of commitment to existing and future investment in the Ringaskiddy area. This planned upgrade represents an important catalyst for the economic development of Cork and the South-West region.

3.7.5 Public Transport opportunities in the Electoral Area are solely focused on public bus operators, with an hourly service operating between Cork City and the main towns of Carrigaline, Passage West and Ringaskiddy and the key village of Crosshaven. The South Environ is served by a City bus service, with buses available at regular intervals. The travel to work patterns which have emerged from the 2006 census have shown that Carrigaline is the most car dependent in the country and efforts to improve the situation through various traffic management schemes will be made. It is important that provision is made for good walking and cycling facilities within all of the settlements.

3.7.6 The LAP defines Ringaskiddy as a Strategic Employment Centre, within the County Metropolitan Strategic Planning Area and has developed into one of the most significant
employment areas in the Country. The aim is to encourage the development of
Ringaskiddy as a major location for port development and large-scale stand-alone
industry, taking account of the need to enhance public transport (including the provision
of a high quality green route) and protect the environment of the existing residential
community, to continue the sustainable development of Ringaskiddy.

3.7.7 The LAP adds that this Strategic Employment Centre includes two small villages,
Shanbally and Ringaskiddy, and there are a number of residential and amenity uses that
would benefit from protection from the impact of nearby large scale development.
There is, however, very limited expansion potential for residential uses because of the
importance of the area for future industrial and port development.

3.7.8 According to the LAP, outside of the Greater Dublin Area, Ringaskiddy has the largest
direct investment employment centre in Ireland. Many of the top world leading
pharmaceutical companies are located there. In 2009, over 7,800 people were employed
in the Ringaskiddy-Carrigaline area. There are 400 acres of IDA industrial zoned land
available.

3.7.9 As stated in the LAP, the PoC’s deep water berth at Ringaskiddy is of huge importance to
the region both from a commercial and a tourism perspective. Facilities at the
deepwater berth can handle a range of cargo types, including roll-on roll-off, lift-on lift-
off and dry bulk. Swansea-Cork Ferries operate a sailing to the UK out of Ringaskiddy,
while Brittany Ferries sail out of Ringaskiddy to Roscoff in France.

3.7.10 The LAP notes that there are plans to expand the existing National Maritime College in
Ringaskiddy eastwards to provide a maritime campus adjacent to the college,
accommodating the Maritime and Energy Cluster Ireland (MERC). It is intended this will
include facilities for UCC’s Coastal and Marine Resources Centre (CMRC) and Hydraulics
and Maritime Research Centre (HMRC), as well as maritime IT, incubator and marine
business accommodation. Renewable ocean energy is seen as one of the niche areas the
campus will initially focus on.

3.7.11 The CASP Update combined Ringaskiddy and Carrigaline into a single employment area.
The future jobs requirement for 2020, as set out in both the CASP Update and the Cork
County Development Plan 2009, is 10,316 which is an increase of 2,500 jobs or 32%.

3.7.12 While it is the Council’s intention to develop Ringaskiddy as a Strategic Employment
Centre within Metropolitan Cork, there is a need to protect the amenity afforded to the
existing communities of Ringaskiddy village and Shanbally. Balancing these two
requirements is a challenge which will require much consideration. While Cork County
Council will continue to promote the employment role of Ringaskiddy, greater
recognition will be given to the needs of the established resident community.

3.8 Douglas Land Use and Transport Strategy (2013)

3.8.1 The Douglas Land Use and Transport Strategy (DLUTS) and the Carrigaline LAP both
envision mode shift away from car use for commuters as per the objectives of Smarter
Travel. The indications from the DLUTS model and the proposed junction improvements are that there will be a modest reduction in traffic on the N28 and the N40 if and when the DLUTS proposals are implemented. The strategy is currently estimated to be implemented by 2022 but could be sooner depending on funding.

3.9 Spatial Planning and National Roads – Guidelines for Planning Authorities (2012)

3.9.1 These guidelines have been prepared by the Department of the Environment, Community and Local Government in the context of the delivery of the National Spatial Strategy and actions identified in Smarter Travel, A Sustainable Transport Future, A New Transport Policy for Ireland 2009-2020.

3.9.2 The guidelines set out planning policy considerations relating to development affecting national primary and secondary roads, including motorways and associated junctions, outside the 50-60 km/hr speed limit zones for cities, towns and villages. They have been developed by following a number of key principles and aim to facilitate a well-informed, integrated and consistent approach that affords maximum support for the goal of achieving and maintaining a safe and efficient network of national roads in the broader context of sustainable development strategies, thereby facilitating continued economic growth and development throughout the country. Also contained within these guidelines are key steps in undertaking an evidence-based approach for development frameworks and a land use and transport planning checklist.

3.9.3 This document states that national roads play a key role within Ireland’s overall transport system and in the country’s economic, social and physical development. The primary purpose of the national road network is to provide strategic transport links between the main centres of population and employment, including key international gateways such as the main ports and airports, and to provide access between all regions.


3.10.1 The National Cycle Manual embraces the principles of Sustainable Safety to offer a safe traffic environment for all road users including cyclists. It offers guidance on how to integrate cycling into urban area design and transport networks. It aims to challenge planners and engineers to be more proactive in integrating bicycles into transport networks than before. The overall objective is to plan for and encourage many more people to choose and use the bicycle in Irish towns and cities.

3.11 Design Manual for Urban Road and Streets (2013)

3.11.1 The Design Manual for Urban Roads and Streets (DMURS) seeks to address street design within urban areas (i.e. cities, towns and villages) and sets out an integrated design approach. A further aim of this manual is to put well designed streets at the heart of sustainable communities. Well-designed streets can create connected physical, social and transport networks that promote real alternatives to car journeys.
3.11.2 The principles, approaches and standards set out in the DMURS apply to the design of all urban roads and streets (that is streets and roads with a speed limit of 60 km/h or less). The manual introduces a set of principles, approaches and standards necessary to achieve best practice in urban roads and street design.

3.12 N28 Cork to Ringaskiddy Upgrade

3.12.1 The N28 is the National Primary Road which links the N40 Cork Ring Road to Ringaskiddy. It is proposed to improve the existing N28 from the Bloomfield Interchange with the N40 South Ring Road to Ringaskiddy Village, upgrading it to a motorway/dual carriageway. For the purposes of this assessment, the N28 Upgrade is not expected to be delivered before 2023.

3.12.2 The main objectives of the N28 Upgrade scheme are to provide priority access and increased capacity between the Port and other major employers at Ringaskiddy and the National Road Network and to bypass the villages of Shanbally and Ringaskiddy. The upgrade will provide for a safer National Road Network and improve national route access to the Ringaskiddy Strategic Employment Centre for economic development. The need for the N28 Upgrade has been highlighted in numerous national studies including the National Development Plan (2007-2013).

3.12.3 As illustrated in Figure 6, it is anticipated that the N28 Upgrade route would follow a completely new offline section of road between east of Ringaskiddy Village and north of Shannon Park Roundabout through extensive tracts of land zoned for industrial development and passing through the northern section of the Fernhill Golf Club, south of the Raffeen Bridge.

3.12.4 Currently the NRA are exploring different options regarding this upgrade. Consultants have been appointed to prepare an Environmental Impact Statement (EIS) and bring the scheme through the statutory consent processes. One option is that the N28 Upgrade would terminate east of Ringaskiddy village whereas another option is that the N28 Upgrade terminates at the R613, rejoining the existing N28 west of Ringaskiddy village.
3.13 Dunkettle Interchange (2013)

3.13.1 An application for the Dunkettle Interchange Improvement Motorway Scheme was made by the National Roads Authority (NRA) to ABP for Approval on 19th July 2012. The oral hearing took place on the 14th and 15th December, 2012 and on 9th January 2013.

3.13.2 The existing interchange forms the junction of the N8, the N25 and the Jack Lynch Tunnel and suffers from significant congestion leading to long delays and queuing. The current interchange arrangement has free flow for the traffic going in an east - west direction but forces North - South traffic and turning traffic to use a traffic signal controlled roundabout. It is proposed to upgrade the interchange to achieve free flow for key movements and to include measures to remove locally generated traffic from the interchange.

3.13.3 In April 2013, ABP indicated their intention to approve the Dunkettle Interchange Improvement Motorway Scheme and the corresponding CPO such that the proposed lands could be acquired by compulsory acquisition.
3.14 Proposed Green Route (2012)

3.14.1 In July 2012, consultants on behalf of Cork County Council, completed a Feasibility Study on the development of an 8km greenway (shared walking and cycling route) between Passage West and Carrigaline, including a branch to Ringaskiddy. This will link the Rochestown to Passage West and Carrigaline to Crosshaven routes and thereby provide a continuous dedicated walking and cycling route from Rochestown to Crosshaven, while also making important links with transport connections at the Carrigaloe cross river ferry (and hence onwards to Cobh) and the international passenger ferry terminal at Ringaskiddy.

3.14.2 The Greenway will serve as a high quality amenity for walkers and cyclists of all ages while also improving facilities for accessing local employment and schools, thereby promoting sustainable travel options.

3.14.3 The proposed route is generally along the coast from Rochestown through Passage West and Monkstown. The route crosses the N28 close to Raffeen. From here the route runs through Ballyhemiken, entering Carrigaline near the Fernhill Golf and Country Club. Potential route options are being considered to Ringaskiddy, via the N28 and L6473.

3.14.4 Cork County Council are now actively pursuing the implementation of Phase 1 of the route.

3.15 Smarter Travel (2009)

3.15.1 Smarter Travel – A Sustainable Transport Future was published in 2009 and its aim is to help achieve a sustainable transport future by 2020. This report looks at the existing unsustainable travel patterns and outlines ways in which more sustainable patterns of travel can be established. It also recognises the importance of ports and has set out a number of key actions in relation to port and freight activity, including:

- Organise a forum to bring all interested parties together, to explore in greater depth the issues relating to the movement of goods including
  - the realistic potential for rail freight
  - scheduling of deliveries from the ports and urban areas to avoid peak use;
- Review port policy with a view to maximising efficiency in the movement of goods; and
- Undertake further investigation to see how the issue of freight transport and the reduction of emissions can be addressed.

3.15.2 The NTA have prepared numerous guidance documents to assist employers in preparing a Workplace Travel Plan (WTP). A Workplace Travel Plan is described as a package of measures aimed at supporting sustainable travel for work-related journeys. It comprises actions to promote walking, cycling, public transport, car sharing, the use of technology instead of travel, and flexible working practices.
3.15.3 The NTA are available to assist employers in developing a Workplace Travel Plan for their business. On request, the NTA facilitators meet with employers to discuss mobility management options such as car sharing, walking, cycling, public transport, etc.

3.15.4 The NTA have been actively encouraging employers in the Ringaskiddy area to implement such WTPs and avail themselves of the services provided by the NTA facilitators. In conjunction with Cork County Councils N28 Sustainable Travel Strategy (N28 STS), the NTA have assigned two facilitators to liaise and support the employers in the Ringaskiddy area. To date it is understood that three employers are participating in the WTP program in Ringaskiddy: the National Maritime College and the Navy, Port of Cork and Depuy (a biomedical company with over 1000 employees).

3.15.5 Results from 25 Smarter Travel Workplace Partner employers (throughout Ireland) with WTP in place for a minimum of one year show that:

- 19 of the 25 organisations (76%) achieved a reduction in car driver trips;
- The average reduction in car driver trips was 18%;
- Seven organisations achieved more than a 20% reduction in car driver trips; and
- Cycling increased in 20 out of 24 organisations, with an average increase of 156%.

3.15.6 A number of mobility management measures were identified that can optimise road operations at the port, thereby making the most productive use of road infrastructure and operational resources. These measures, which are used at other port / freight locations, are summarised below:

- **Port of Sydney:**
  - Extended operating hours for the port and the logistics companies;
  - High efficiency containers;
  - Road enhancements;
  - Higher mass limits;
  - Mechanisms that support better truck scheduling and utilisation; and
  - Expanding Sydney road freight corridors.

- **Port of Melbourne:**
  - Regional and local area terminals;
  - High productivity freight vehicles;
  - Empty container parks;
  - Information communication technologies;
  - Road improvements; and
  - Stevedore systems and port practices.

- **Felixstowe:**
  - PARIS computer system which optimises transport planning at the port.

- **Rotterdam:**
- Live information system;
- Road development;
- Internal traffic management company;
- Cash payments to encourage road users not to use certain roads (A15); and
- Purpose built inland distribution terminal locations.

- Port of Dublin:
  - Vessel traffic management systems and trained operators.

- TELLUS Project:
  - Fleet management by GPS;
  - Inner City Logistics Centre;
  - E-commerce logistics;
  - Incentives for improving the load factor in inner city freight transport; and
  - Consumer driven goods management from a mobility centre base.

- Other ports:
  - Los Angeles uses a ‘PierPass’ charging regime to discourage truck movements at the port during peak periods; and
  - The Port of Antwerp has collaboration with hinterland hubs.

3.15.7 Other mobility management literature was reviewed which details further many of the options stated above as well as mobility management practices and implementation.

3.16 **NRA Project Appraisal Guidelines (2011)**

3.16.1 The Project Appraisal Guidelines provide a comprehensive guidance document to scheme promoters on the methods to be used in scheme modelling and appraisal. Traffic growth is predicted for two periods: 2006 – 2025 and 2026 – 2040. For each period, there are low, medium and high growth assumptions.

3.16.2 NRA medium growth rates are assumed for the PoC Strategic Model, as per the Dunkettle Model. The traffic growth assumed will be sense checked against traffic generation of all committed developments which are likely to be built within these time periods and are included within this growth, e.g. development in Ringaskiddy and Cork Docklands.


3.17.1 The purpose of the Traffic Management Guidelines manual is to provide guidance on a variety of issues including traffic planning, traffic calming and management, incorporation of speed restraint measures in new residential designs and the provision of suitably designed facilities for public transport users and for vulnerable road users such as cyclists, motorcyclists and pedestrians (including those with mobility/sensory...
impairments). It also focuses on how these issues must be examined and implemented in the context of overall transportation and land use policies.

3.17.2 The thresholds above which a Transport Assessment is automatically required, which are relevant to this study, are:

- Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road;
- Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive;
- Industrial development in excess of 5,000m²; and
- Distribution and warehousing in excess of 10,000m².

3.17.3 The principal types of junctions include priority junctions (stop or yield), roundabouts, traffic signal control junctions or grade separated junctions. Priority junctions have the advantage that they cause little delay for major road traffic. They are the most common form of junction and work best where the traffic flow on minor roads is relatively low in relation to the major road flow. For them to operate safely there needs to be:

- Adequate gaps in major road traffic for vehicles to enter and leave minor roads safely;
- Specific facilities for significant numbers of turning vehicles such as turning lanes and adequate width for the swept path of long vehicles;
- Low speeds and adequate sight distances; and
- Specific facilities (such as crossings) for cyclists, pedestrians and mobility impaired road users.

3.17.4 Traffic signals and roundabouts (including mini-roundabouts) should be considered as an alternative to priority junctions when there are substantial delays to minor road traffic or where there are accident problems relating to vehicle turning movements.

3.17.5 The choice between signals or roundabouts for any given location in an urban area depends on a number of factors:

- Traffic signals can offer the facilities to give particular types of vehicle (such as buses) and vulnerable road users’ priority. They generally have a lower land take requirement than normal roundabouts and are often cheaper and easier to implement in urban areas;
- Roundabouts can present safety problems for pedestrians and cyclists unless the roundabout has been designed for these users (see Cycle manual);
- Roundabouts tend to be better for isolated junctions where there are significant proportions of turning vehicles (particularly right turns), and traffic flows are evenly balanced with few pedestrians or cyclists;
- Properly maintained, signalised junctions retain higher capacity than roundabouts, and are safer for vulnerable road users;
- Co-ordinated traffic signal systems can be disrupted if roundabouts are located within the control area of the signals;
Mini-roundabouts should be regarded as a remedial measure to treat specific problems on existing roads, rather than a general traffic management solution. Alternative junction types are preferred in new developments;

- Mini-roundabouts can help to reduce speeds and create a better balance of flow at tight urban junctions. They are often used as part of a traffic calming scheme. They should only be used at locations where approach speeds are low. Specific facilities should be provided for pedestrians and cyclists; and

- Grade separation should only be considered for the higher levels of traffic flow on Primary distributor roads. Crossing facilities for cyclists and pedestrians must be provided for.


3.18.1 The purpose of this document is to set down best practice guidance for the preparation of Traffic and Transport Assessments (TTA) and to explain the relevance of TTA in the planning process. Due to the strategic role of national roads and the need to ensure that the carrying capacity, efficiency and safety of the network is maintained, the management of development may in certain circumstances require tighter control than that required by the Traffic Management Guidelines (detailed above). Where applications affect national routes (including those which impact on interchanges or urban areas with no bypasses) a TTA should be requested if the following thresholds (which are relevant to this study) are exceeded:

- 100 trips in / out combined in the peak hours for the proposed development;
- Development traffic exceeds 10% of turning movements at junctions with, and on, National Roads;
- Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive;
- Industry 5,000m² Gross Floor Area;
- Distribution and warehousing 10,000m² Gross Floor Area; or
- 100 on-site parking spaces.

3.18.2 In some cases the impact of traffic volumes may not be significant and the thresholds for a TTA may not be exceeded. However, the type and volume of generated traffic on national roads may be of a nature to raise concerns about effects on road safety and road structure. It is recommended that if the proposed development meets two or more of these criteria, then a TTA should be requested:

- The character and total number of trips in / out combined per day are such that as to cause concern;
- The site is not consistent with national guidance or local plan policy or accessibility criteria contained in the Development Plan;
- The development is part of incremental development that will have significant transport implications;
- The development may generate traffic at peak times in a congested area or near a junction with a main traffic route;
The development may generate traffic, particularly heavy vehicles in a residential area;
- There is significant concern over the development's effect on road safety;
- The development is in tourist areas with potential for congestion; or
- The planning authority considers the proposal will result in a material change in trips or raises significant transport implications.

### 3.19 RSA Accident Statistics

#### 3.19.1 The Road Safety Authority produces annual road safety statistics. The statistics of note to this study are:

- In 2011, there were two fatal accidents on the N28. One was a pedestrian during the daytime, between Shanbally and Shannon Park. The other was between a bus and a pedestrian at night, between Carrs Hill and Bloomfield;
- In 2010, there were two fatal accidents on the N28, north of Shannon Park; one on the N40 and two within Carrigaline. Of the two on the N28, both were during the night, one involved a single car, the other involved two vehicles. A pedestrian-car collision occurred on the N40 during the night. One of the fatal accidents in Carrigaline was also during the night, single vehicle only. The other accident in Carrigaline involved a pedestrian and a car during the day time.
- In 2009, there were no fatal accidents in the study area. There was one serious accident on the N28, north of Shannon Park, involving a car. This occurred during the day time.
- A number of minor accidents have been recorded along the N28 between Ringaskiddy and Shannon Park. Two of these involved cars during the day (2007, 2010), two more involved cars during the evening (2005, 2008) and one during the night (2010). One involved a motorcycle during the day (2011) and one involved a heavy goods vehicle during the day (2011).
- Other heavy goods vehicle accidents include a minor accident during the daytime at Bloomfield (2007) and one minor accident approaching the Jack Lynch Tunnel during the daytime (2008). Three minor (2007, 2011) and one serious accident (2005) occurred along the N8 between Dunkettle and the City.

### 3.20 N28 Corridor Sustainable Transport strategy (2013)

#### 3.20.1 Cork County Council in association with the National Transport Authority is currently preparing a Sustainable Transport Strategy (STS) for the N28 Corridor which will involve the management of commuter travel to Ringaskiddy through the delivery of sustainable travel options and the adoption of sustainable travel initiatives including WTP and area-wide Mobility Management Plans which will be developed /updated in partnership with the local employers and representatives of the community.

#### 3.20.2 Sustainable modes of travel include walking, cycling, public transport and car sharing. Sustainable Transport can lead to a reduction in car based commuter travel and more efficient use of transport infrastructure. It can reduce the amount of space required for parking, can reduce overall travel costs and improve the quality of life of commuters and
3.20.3 The N28 STS is intended to be a long term management approach and implementation framework for managing travel in an area which encourages, supports and facilitates the greater use of sustainable travel choices among commuters, particularly single occupancy car users. The increased use of sustainable travel modes is achieved through promotional initiatives and the provision of comparatively low cost infrastructure improvements, which raise awareness of the choices of travel modes available and make it easier for commuters to make these choices, change their travel behaviour and benefit from sustainable travel options.

3.20.4 The Cork County Development Plan has identified the Ringaskiddy Strategic Industrial Area as one of the key manufacturing based employment areas in the County. The sustainability and expansion of these employment activities is critical to the economic viability of the greater Cork region. In order to achieve the medium to long term planning objectives for the Ringaskiddy Strategic Industrial Area it is important to ensure that the transport network serving the area is sustainable, well managed and can accommodate the current and future needs of the local employers.

3.21 PoC Strategic Development Plan (2010)

Overview

3.21.1 The PoC Strategic Development Plan review (2010) was undertaken as a result of the ABP refusal of the SID application for a port facility development at Ringaskiddy and in response to changes in planning and transportation policies at National, Regional and Local levels. The review examines the future development of the PoC with respect to its cargo handling capacity in terms of achieving a sustainable balance economically, socially and environmentally.

3.21.2 The PoC is a key component of and catalyst for economic activity in the region, and also contributes significantly to the overall competitiveness of the Cork Gateway and its hinterland. The PoC commissioned the Centre for Policy Studies, University College Cork, to assess the contribution made by the PoC to the Irish economy in 2007. Some of the findings from this study are as follows:

- The PoC is one of two major national multi-modal ports in the Republic and the second largest in terms of turnover. Turnover in 2007 was approximately €25 million and approximately 10.5 million tonnes of freight;
- The total contributions of all activities at the PoC for 2007 include expenditure on goods and services of €289.7 million and 1,796 FTE jobs;
- The direct contributions of all activities related to the PoC for 2007 include expenditure on locally produced goods and services of €166.2 million and 674 FTE jobs;
- 325,000 FTE jobs are related to trade through the Port; and
In 2007 Goods Received by the Port was worth €6,645 million, while Goods Forwarded were worth €17,763 million.

3.21.3 RPS were also commissioned to review the PoC’s Strategic Development Plan (2002). This review was a key outcome from the peer review of the decision of ABP to refuse permission for the proposed container ferry at Ringaskiddy.

3.21.4 This PoC Strategic Development Plan Review (2010) incorporated a full review of all relevant EU, National, Regional and Local policy documents, analysis of existing traffic conditions and of Port operations and a site assessment and feasibility study of the various sites considered for the relocated port.

3.21.5 The findings of this review can be summarised as follows:

- Three sites were shortlisted as possible locations for the relocated PoC (Marino Point, Whitegate and Ringaskiddy);
- Existing ADT’s on each of the roads serving these sites (N28, R624, R630) show that demand exceeds supply on all of these roads;
- The N28, R624 and R630 would need significant upgrading to alleviate existing capacity problems before any additional port traffic could be accommodated;
- A substantial proportion of Port Traffic has origin/destination in the city area;
- All site location scenarios included create additional congestion and delays at strategic junctions; and
- Dunkettle Interchange is a critical junction for all scenarios.


3.22.1 The Department of Transport, Tourism and Sport published the National Ports Policy Statement (NPPS) in 2013. The policy introduces clear categorisation of the ports sector into Ports of National Significance (Tier 1), Ports of National Significance (Tier 2) and Ports of Regional Significance. PoC has been identified as a Port of National Significance (Tier 1).

3.22.2 The National Ports Policy statement highlights that the Port of Cork is only one of two ports nationally, (the other being Dublin), capable of handling traffic across all five principal traffic modes (LoLo, RoRo, Break Bulk, Dry Bulk and Liquid Bulk), and that PoC handles approximately 19% of all seaborne trade in the State.

3.22.3 The NPPS acknowledges that:

“PoC’s Strategic Development Plan Review, published in 2010, outlined the company’s intention over time to relocate commercial trade to the lower harbour area at Ringaskiddy. The Government endorses the core principles underpinning the company’s Strategic Development Plan Review, and the continued commercial development of the PoC Company is a key strategic objective of the National Ports Policy.”

3.22.4 Key points arising from the NPPS in relation to this baseline review include:
It is the Government's position that those ports considered to be of national significance must be capable of providing the type of port facilities and the required capacity to ensure continued access to both regional and global markets for our trading economy;

- Port master-planning is in line with international best practice and it is consistent with policy to improve integrated planning for all modes of transport. National Ports Policy recognises strongly the desirability of this process for the long term planning of all Ports of National Significance (Tier 1 & 2).

- The interconnections between the national primary road network and the commercial port network will continue to be of primary importance. This is recognised in the recently adopted Spatial Planning and National Roads – Guidelines for Planning Authorities. These state that “the primary purpose of the national road network is to provide strategic transport links between the main centres of population and employment, including key international gateways such as the main ports and airports” (Department of Environment, Community and Local Government, 2012).

- Efficient hinterland connections are critically important to any port’s ability to facilitate large volumes of traffic. To inform considerations of future national primary road network development, the National Roads Authority shall consult on a regular basis with the Department’s Maritime Transport Division, as well as individual Ports of National Significance (Tier 1 & 2), on future network developments (Note this provision of the NPPS can be related specifically to the current status of the N28); and

- It is important that the port network have the potential to offer multi-modal distribution networks as part of its response to future changes in freight distribution that may arise. However, it must be acknowledged that, even with an increase in rail freight to Irish Ports, most freight will continue to be carried by road.
4. EXISTING TRAFFIC MOVEMENT

4.1 Introduction

4.1.1 An extensive set of survey information was reviewed and assessed in order to get a clear understanding of existing traffic movement and conditions on the road network within the study area. The road network can be separated into four categories, these are:

- Motorways - providing connections between major cities;
- National Roads - providing connection between major cities and towns;
- Regional Roads - providing connection between Cork and surrounding towns; and
- Local Roads - providing connection between towns and local areas.

4.1.2 In addition to the traffic survey information gathered to assess the PoC relocation to Ringaskiddy, traffic survey information gathered in the process of developing the Douglas Land Use and Transport Strategy (DLUTS 2012) and the CASP Update has also been made available by Cork County Council for use in this study.

4.1.3 The following surveys were used:

- Traffic surveys at Tivoli and Ringaskiddy ports, including turning counts at the Ferry Terminal, conducted in May 2012;
- Road Side Interviews at Tivoli and Ringaskiddy and observations at City Quays, conducted in May 2012;
- Journey Time surveys along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- Automatic Traffic Counter (ATC) surveys at Bloomfield Interchange and along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- ATC surveys along the N28 and other roads in the vicinity of Douglas/Rochestown, conducted April 2012;
- Manual Classified Counter (MCC) surveys along roads in the vicinity of Douglas/Rochestown, conducted April 2012;
- MCC surveys near Dunkettle and Cork City undertaken as part of the update of the CASP traffic model in November 2012;
- PoC Employee Survey (2012);
- NRA traffic counters along the N25; and
- MCC surveys commissioned as part of this study, April 2013, at:
  - Cork Road / Church Road roundabout
  - Fernhill Road / Church Road

4.1.4 Survey locations for each of the above surveys are illustrated in Figure 7.
4.2 Traffic Surveys at Tivoli and Ringaskiddy Ports

4.2.1 Traffic surveys were conducted at Tivoli and Ringaskiddy ports, including turning counts at the Ferry Terminal in May 2012. These traffic surveys are further discussed in Chapters Five and Six.

4.3 Road Side Interviews

Evaluation of Key Movement Desire Lines

4.3.1 Road Side Interview surveys were undertaken at both Tivoli and Ringaskiddy in 2012. The results of these surveys are summarised below. They are of key importance as it is assumed that the profile and distribution of Port traffic will remain consistent, even with the move from Tivoli / City Quays to Ringaskiddy.
4.3.2 Results of the analysis of Haulier movements out of Tivoli:

- The N25 accounts for 34% of all movements towards Tivoli. The N25 provides a link from Little Island and Waterford, with the majority of this traffic originating in Little Island.
- The N20 accounts for 18% of all movements. Limerick City is the main producer of haulier trips along the N20.
The M8 accounts for a further 17%. Clonmel produces the most trips along the M8 although there are a significant number of low trip generators along the M8 in Tipperary and further afield.

The N22 accounts for 10% of haulier trips with Killarney producing the majority of trips.

The N28 which accounts for 5% does not include trips from Ringaskiddy, which account for 3%. 

Figure 8. Key Movement Desire Lines from Tivoli
The main desire line from Tivoli is along the N25, which accounts for 30% of all haulier movements from the port. The primary movement along this desire line is towards Little Island.

The N20 accounts for 20% each of all movements and the primary movement is towards Limerick City.

The M8 accounts for 18% of movement out of Tivoli and Dublin City is the primary movement.

The N22 accounts for 10% of movements but this is made up of a number of destinations.

The N28 accounts for 5% of trips out of Tivoli while Ringaskiddy accounts for an additional 5% of all haulier movements.
4.3.3 Results of the analysis of Haulier movements out of Ringaskiddy:

- With very little exception, all movement **towards** Ringaskiddy is facilitated by the N40 and the N28.
- The prime origin of movements towards Ringaskiddy is along the M8, which accounts for 19% of all movements. This is made up by a number of origins; Dublin is the most significant.
- The N20 sees 17% of all movements. Mallow and Limerick produce most of the trips along the N20.
- The N25 sees 15% of all movements and Carraigtwobhill produces most of the trips along the N25.
- 7% of all trips towards Ringaskiddy come from Tivoli.
- Trips generated by the N28 alone account for less than 1% of all trips, Carrigaline is the most significant trip generator along this section of the route.

![Figure 10. Key Movement Desire Lines from Ringaskiddy](image-url)
- The prime desire line from Ringaskiddy is along the M8 with 24% of movements, mainly to Dublin. Kilkenny and Thurles also account for a significant portion of this movement.
- The N20 accounts for 19% of movement from the port with Limerick and Lombards town, near Mallow, the main cause of movement along the N20.
- The N25 accounts for 12%, primarily to Carrigtwohill.
- Tivoli accounts for 9% of the movements out of Ringaskiddy.

4.3.4 Further detail of is provided in desire line maps included in Appendix A.

4.4 Journey Time Surveys

4.4.1 The journey surveys along the N28 were conducted on the 15th of May. The journey time survey routes are shown below in Figure 12. The journey time surveys were taken in both directions for the four routes. Journey times are used to validate modelled journey times against observed, to ensure the model is giving reliable results.
4.5 PoC Employee Survey

4.5.1 PoC conducted a survey on our behalf in May 2013 to determine where their staff travel from. 116 people responded to the survey. The results were quite dispersed, therefore some nearby areas were amalgamated. The highest number of employees, 25, came from Cobh which represents 22% of those that responded. 7% of employees (8 respondents) come from Cork City and another 7% come from Carrigaline.

4.6 Automated Traffic Counter (ATC Surveys)

4.6.1 Automated Traffic Counts (ATCs) were analysed at six locations along the N28 Corridor. Figure 13 to Figure 16 illustrates the results of the ATC surveys for the AM peaks. The AM peak times varied at each location and are detailed with each count. The time is shown in brackets along with the count of vehicles. The time shown in the beginning of the peak hour, e.g. AM (08:00) indicates the AM Peak hour between 08:00 and 09:00. In most cases, the AM peak hour is between 08:00 and 09:00hrs. At one location, the AM peak hour is from 10:00 to 11:00hrs. The PM peak hour varies at each junction, between 15:00 and 18:00hrs.

AM Peak ATC Flows

4.6.2 Significant traffic flows are noted on the slip road from the N28 onto the South Ring Road westbound at Survey Location D (1,542 vehicles) and southbound at Survey Location B (1,385 vehicles), as shown in Figure 13. Significant traffic flows are also noted eastbound after the Shannon Park Roundabout at ATC Survey Location E, with a count of 1,035, as shown in Figure 14.

4.6.3 The largest traffic flows during the AM Peak (08:00 - 09:00) were recorded on the national roads which border Douglas Village. The largest count is seen on the N28 at ATC Survey Location G1, with 2,487 and 1,549 travelling northbound and southbound respectively, as shown in Figure 16. Other large counts can be seen on the N28 northbound at ATC Survey Location G2 as shown in Figure 4.10 with a count of 1,309 and

4.6.4 These counts show that the primary movement of traffic in the AM peak is onto the South Ring Road in both directions or southbound on the N28 towards the Shannon Park Roundabout. A large proportion of this southbound traffic uses the N28 eastbound towards Ringaskiddy, resulting in the capacity-related issues described later in this report.

PM Peak ATC Flows

4.6.5 Significant traffic flows during the PM Peak were registered on the slip roads back onto the N28 at ATC Survey Locations A (1,378 vehicles) and C (1,263 vehicles) in Figure 13. These slip roads experience different PM peak hours; 18:00-19:00hrs for A and 17:00-18:00hrs for C.
4.6.6 These counts, as would be expected, show that the primary movement of traffic in the PM peak is a reversal of the AM peak. There is heavy traffic in both directions on the N28 but there is a greater flow in the southbound direction at the Shannon Park Roundabout and through Carrigaline.

4.6.7 The largest flow during the PM peak is at ATC Survey Location G1, southbound on the N28 after the slip roads have joined, (i.e. south of Bloomfield and Rochestown Road) with a count of 2,323 vehicles, as shown in Figure 16. There is also a large flow in the northbound direction at this point, with a count of 1,607 vehicles. The PM peak at this location is 17:00-18:00hrs.

Figure 12. ATC Survey Results for the Bloomfield Interchange
Figure 13. ATC Survey Results for the Shannon Park Roundabout
4.7 Classified Junction Turning Count Surveys

4.7.1 Manual Classified Count surveys (MCC) at seven junctions for the AM and PM peak periods (07:00-10:00 and 16:00-19:00) were analysed. These counts were classified for light vehicles (LVs) (which includes cars) and Heavy Good Vehicles (HGVs).

**AM Traffic Flows**

4.7.2 AM peak traffic flows at Shannon Park Roundabout are highest between 07:30-08:30hrs. During this time, the heaviest traffic flow is travelling southbound on the N28, where a total of 1,335 LVs were counted. During the same period, 1,243 LVs were noted travelling northbound from the Shannon Park Roundabout and 1,191 cars and LVs were counted moving eastbound on the N28. This heavy eastbound movement continued towards Ringaskiddy. 1,239 LVs were recorded on the approach from Carrigaline (Cork Road).
4.7.3 It is interesting to note that approximately 80% of traffic approaching the roundabout from Carrigaline travels northbound on the N28. Similarly, approximately 80% of traffic travelling southbound on the N28 turns left towards Ringaskiddy.

4.7.4 Other significant traffic flows were recorded on the North Ring Road which extends from the Silversprings Overpass / Tivoli Port access to the N20 Cork Mallow road. 700 LVs were surveyed travelling from the North Ring Road onto the slip road for the N8 at Silversprings Hotel during the AM peak. The majority of this traffic (95%) comes from the North Ring Road southbound.

**PM Traffic Flows**

4.7.5 During the PM peak (17:00-18:00hrs), the heaviest traffic flow (1,220 vehicles) was observed on the N28 southbound, moving towards Shannon Park Roundabout. The next largest traffic flows are also seen at this roundabout, on the N28 northbound and on the Cork Road (between the Shannon Park Roundabout and Carrigaline), with counts of 1,150 and 1,154 vehicles respectively.

4.7.6 85% of the flow on the Cork Road, travelling southbound away from the roundabout, comes directly from the N28 southbound approach (i.e. from Cork City direction – turning right at the RB heading into Carrigaline). Of the 1,150 LVs travelling northbound on the N28, approximately 50% approach from the Cork Road and 50% from Ringaskiddy. Of the 1,220 LVs approaching the roundabout from the N28 southbound, 80% of them turn onto the N28 eastbound (i.e. turn left at the RB heading towards Ringaskiddy).

4.7.7 The survey also highlighted significant HGV movements at this roundabout with 25 HGVs heading northbound on the N28. Of these HGVs, 56% of these came from Ringaskiddy and 44% came from the Carrigaline direction.

4.8 **MCC Surveys at Junctions along Church Road**

4.8.1 MCC surveys were commissioned as part of this study at two junctions along Church Road in April 2013. The junctions surveyed were the roundabout with the Cork road and the T-junction at Fernhill Road. There are counts for each arm at the two junctions.
5. SUMMARY BASELINE TRAFFIC EVALUATION

5.1 Introduction

5.1.1 This chapter provides a detailed summary of current traffic conditions in the study area in terms of infrastructure for each transport mode, utilisation of that infrastructure and conditions experienced.

5.2 Methodology

5.2.1 To facilitate an understanding of these traffic conditions, an extensive site visit was undertaken on the following dates:

- Wednesday 10th April 2013 – evening peak;
- Thursday 11th April 2013 – morning peak; and
- Friday 12th April 2013 – morning peak.

5.2.2 During these site visits, detailed observations on current traffic management arrangements for each road user classification, conditions experienced by each road user, observations of local land uses and photographic records were taken.

5.3 General Traffic Conditions

5.3.1 The following key points relating to general traffic management arrangements were noted:

- The N28 experiences congestion in the AM and PM peaks at different sections along the route. The sections with most notable congestion were at Carrs Hill, the Maryborough Hill merge, Shannon Park Roundabout and Shanbally Roundabout. Traffic queues form at these sections in both directions at different times during both the AM and PM peaks.

- There is a high volume of traffic spread over the peaks. Traffic delays are most significant through Shanbally towards Ringaskiddy during the early morning peak. Traffic delays are also significant at the Shannon Park Roundabout from Carrigaline and also on the N28 north of Shannon Park during the morning peak. In the evening peak, traffic delays occur at Shannon Park Roundabout from Ringaskiddy and also along the N28 southbound.

- There are capacity and operational issues at Dunkettle Interchange. Queuing was noted during the site visits in both the AM and PM peak in all directions. The capacity at the Dunkettle Interchange is not sufficient during the peak to withstand the volume of traffic. Traffic flowed well during the off-peak, with green time sufficient in clearing queues that had built up while waiting.
5.4 Road Network Description and Issues

5.4.1 Traffic management arrangements (e.g. no. of lanes, lane widths) and related conditions observed (levels of queuing, congestion, ambient traffic speeds etc.) at the junctions are described in this section of the report. The locations of the key roads in the study area analysed during site visits are illustrated in Figure 17 overleaf.

5.4.2 This Transport Network Review of the area between Tivoli, City Quays and Ringaskiddy is based upon observations made on-site. We are satisfied that these represent typical / average day-to-day operation of the transport network on the major roads linking the port sites.

M8 between Cork and Dublin

5.4.3 The M8 is a major inter urban connector which joins two of the main cities in the country; Dublin and Cork. The M8 begins at Aghaboe, Co Laois where it ties into the M7 which connects Limerick to Dublin, and the M8 continues towards Cork. The M8 extends approximately 150km and terminates at the Dunkettle Interchange. The N8 was upgraded to motorway in 2010.
5.5 National Roads

N8 between Dunkettle Interchange and Cork City

5.5.1 The N8 is a major national distributor which connects the Dunkettle Interchange to Cork City centre and the PoC facilities at Tivoli and City Quays. The N8 is both single carriageway and dual carriageway in sections between the City and the Dunkettle Interchange. The road narrows towards the city centre. Traffic from both ports has to travel on this road to reach most of the other national distributors in the area such as the N20, N25, N27, N40, N71 and the M8. Parts of the N8 are one way in the City centre, near the quays and where it crosses the River Lee.

5.5.2 There are capacity and operational issues at Dunkettle Interchange. Queuing was noted during the site visits in both the AM and PM peak in all directions. The capacity at the interchange is not sufficient during the peak to withstand the volume of traffic. Traffic
flowed well during the off-peak with green time sufficient in clearing queues that had built up while waiting.

**N20 between Cork City and Limerick City**

5.5.3 The N20 is a major national distributor which connects Cork City and Limerick. A short section of this route has been upgraded to motorway and is known as the M20 between the Rosbrien Interchange and Limerick city. The majority of the connection is a single carriageway which varies in width.

**N22 between Cork City and Tralee**

5.5.4 The N22 is a major national distributor which connects Cork City and Tralee. It goes through towns such as Killarney and Macroom. The N22, which links counties Cork and Kerry, has been upgraded substantially in recent years particularly in County Kerry and some sections on the outskirts of both Cork and Tralee of it are of Dual Carriageway standard, although some sections are still single carriageway. ABP has approved a Dual Carriageway bypass of Macroom but the project is currently on hold. The N22 connects with the N40 South Ring Road at the Bandon Road Interchange to the west of Cork City.

**N25 between Cork City and Rosslare Europort**

5.5.5 This is a major national distributor which connects Cork City to Rosslare Europort, via Waterford City. The N25 is single and dual carriageway in sections between the two cities and forms part of the Atlantic Corridor, a project which will eventually provide a dual carriageway connection between Waterford and Letterkenny, however at time of writing much of this proposed road development has been suspended due to the economic downturn.

**N27 South Link Road between Cork City Centre and Cork International Airport**

5.5.6 This is a major national distributor, as it connects the City Centre with the M40 and onwards to Cork International Airport, as well as major employers near the airport with the wider labour market in Cork County and the City Centre. It is a dual carriageway with bus lanes and speed limits ranging from 100 kph to 60 kph.

5.5.7 The N27 extends from South to North along the western boundary of the study area. Traffic on the N27 experiences delays during peak periods at the Kinsale Roundabout and the signalised crossroads with Forge Hill and the Ballycurreen Road. South of the Ballycurreen Road junction, traffic is relatively free flowing south bound and suffers minimal delays. Some delays are experienced during peak periods on the northbound approach to the junction.

**N28 between Ringaskiddy/ Shannon Park Roundabout and the N40**

5.5.8 This is a major national distributor which connects the wider national road network with Ringaskiddy, including the major employers and the national sea freight and passenger services at the PoC terminal. The N28 is a single carriageway generally with a one metre...
hard strip, however some sections are narrower and wider than others. A major junction on the route is the Shannon Park roundabout. Traffic from Carrigaline and Ringaskiddy must travel through the Shannon Park Roundabout to get onto the northern section of N28 and traffic heading from Cork City / Douglas towards Ringaskiddy also travels through Shannon Park Roundabout.

5.5.9 Congestion occurs at various sections along the N28 as a result of merging lanes at Maryborough Hill and reduced lane width at Carrs Hill. Congestion also occurs at the Shannon Park Roundabout when traffic flow is heavy in both directions throughout the morning and evening peaks. There are also considerable delays at Shanbally Roundabout during the AM peak travelling towards Ringaskiddy.

5.5.10 The Southern Ring Road is a major national distributor road allowing access to the wider national network including the M8 to Dublin (to the north) and the N22 to Killarney (to the west). As a result of this, it is subject to relatively heavily traffic during peak periods. The Southern Ring Road is a two-lane dual carriageway with hard shoulders and a speed limit of 100 kph.

5.5.11 Traffic on the N40, in the vicinity of the study area, is generally free flowing until it reaches the Kinsale Roundabout at the junction with the N27 (west of the study area). Traffic travelling onto the N27, via the slip road, can experience significant delays at this signalised roundabout during peak periods but since this junction is grade separated the through traffic on the N40 is unaffected crossing this junction. Both eastbound and
westbound traffic on the N40 also experiences delays accessing the Mahon Point Interchange to the east of the study area.

5.5.12 Capacity and operational issues exist in tandem with the Dunkettle Interchange. It was observed during site visits that the Jack Lynch Tunnel experienced tailbacks past the tunnel towards the Mahon Interchange on approach to the Dunkettle Interchange in both peaks. Traffic was moving at approximately 5-10kph which subsequently had a knock-on effect on traffic moving towards the Mahon Interchange. The speed limit at the Jack Lynch Tunnel is 80kph.

5.5.13 Traffic on the N40 can enter the N28 Bloomfield Interchange to the east of the Douglas Village. Westbound traffic travelling to Douglas also uses this exit and then takes the slip road from the N28 onto the Rochestown Road. Alternatively westbound traffic can exit at the Kinsale Roundabout and enter the study area via the Frankfield Road or the N27 to the west of Douglas Village. Similarly, eastbound traffic on the M40 can access Douglas via the slip road onto the South Douglas Road or alternatively use the slip road onto the main Douglas road. Queues can occur on each of these slip roads during peak hours, which can occasionally extend onto the N40.

PICTURE 1

PICTURE 2

Jack Lynch Tunnel southbound

N40 - Bloomfield Interchange northbound

Figure 18. Traffic Delays on the N40

N71 Road

5.5.14 The N71 is a national secondary road providing a link between Cork City and West Cork (Skibbereen/Bantry) and West County Kerry (Kenmare). The route is predominantly single carriageway with improvements in the sections near Cork and some limited sections of dual carriageway nearing the city.

5.5.15 Delays can occur at peak hour on the N71 where it passes through the village of Innashannon approximately half-way between Cork City and Bandon.
5.6 Regional Roads

R610 Rochestown Road / Strand Road

5.6.1 The Rochestown Road / Strand Road is a regional distributor road which connects Rochestown with the wider district and national road network. It is single carriageway. It approaches the N28 from the south and is the primary route for people living in Passage West and Rochestown to connect to the N40 via the Bloomfield Interchange (N28 northbound only) junction. Traffic from Rochestown / Passage west heading to Ringaskiddy / Carrigaline will generally travel along the R610 and connect to the N28 at Rafeen junction east of Shannon Park Roundabout.

R613 Church Road

5.6.2 Church Road is a regional road connecting Carrigaline to the N28, at Ringaskiddy. It is a single carriageway approximately 5km long and extends from Carrigaline and runs parallel to, but to the south of, the section of the N28 east of Shannonpark roundabout.

5.6.3 Church Road approaches the N28 from the south. Many of the major employers in the Ringaskiddy area are located off this route such as GlaxoSmithKline (GSK), Novartis and Johnson & Johnson. There are two distinct sections of road along Church Road. The section of the road from St. Bernadette Place to the N28 is far superior to the section from St. Bernadette Place west towards Carrigaline. The speed limit of the section nearer Ringaskiddy is 80kph where this section of road is considerably wider than the section nearer Carrigaline. Parts of the Carrigaline section of road are sub-standard,
extremely narrow and barely wide enough for two vehicles coming in opposing directions.

5.6.4 Considerable levels of traffic use both the St. Bernadette Place route (south of Shanbally Roundabout) and Church Road from Carrigaline. There is little to no congestion experienced on this route.

5.6.5 Ringaskiddy Lower Harbour National School is located in Loughbeg, off the R613 (Church Road) and west of Ringaskiddy Main Street. A one-way system is operated in the area for school pick up and drop off. Figure 21 shows the difference between the two sections of Church Road, Picture 1 shows the wider 80kph section and Picture 2 shows the 50kph narrower section. The change occurs close to the turn off for GSK.

**PICTURE 1**

R613 approaching the N28

**PICTURE 2**

Change of road quality near Bernadette Place

**Figure 20. Church Road**

R635 North Ring Road

5.6.6 The R635 known also as the North Ring Road is a regional road which takes traffic off the N8 approaching the city centre and offers an alternative route onto the N20. Parts of the route are dual carriageway and 2+1 (climbing lane northbound from the Silversprings overpass road but it is mostly a single carriageway with reasonably wide roads.

R639

5.6.7 The R639 was part of the old N8 and runs parallel to the M8 through towns such as Fermoy, Mitchelstown and Cahir as far as Durrow in County Laois. When the M8 was opened, parts of the old N8 were re-designated as the R639. It is a reasonably wide single carriageway with a hard shoulder for the most part. Some sections are quite narrow with very little hard shoulder while other sections of the R639 are 2+1 road.
5.7 Local Roads

L2545

5.7.1 The L2545 is a local road which is a linear continuation of the N28 road (which terminates at the entrance to the Port east of Ringaskiddy village) and which provides access from the N28 to the National Maritime College of Ireland (NMCI) and the Haulbowline Naval Base on Haulbowline Island. It is a single carriageway stretch approximately 2km in length that joins with the N28 at the crossroads with Shamrock Place, the N28 and the PoC entrance at the eastern end of Ringaskiddy village.

5.7.2 The L2545 approaches the N28/Ringaskiddy Main Street from the east. Congestion is generally not an issue although there is a steady stream of vehicles including heavy goods vehicles in and out of the area at peak times. The local residents have expressed concern about the absence of a pedestrian crossing of the N28 at Ringaskiddy village for the safety of pedestrians. Figure 22 shows the single lane carriageway and the Bus Éireann stop located adjacent the NMCI.

L2490

5.7.3 The L2490 is a local road approximately 2km in length which joins the N28 to the R613, just east of Carrigaline. There are a number of access routes to estates off the L2490, as well as access to the Fernhill Golf Club.

5.7.4 There is a steady stream of traffic from the N28 at peak times, as drivers avoid driving through Carrigaline village. The road is extremely narrow in sections, barely wide enough for two opposing vehicles to pass, and parts are in poor condition. Figure 23,
Picture 1 shows its junction with the R613 / Church Road. Picture 2 shows one of the narrow sections along the route.

**Picture 1**

L2490 T-junction with Church Road

**Picture 2**

Narrow section of L2490

**L2492**

5.7.5 The L2492 is a local road, approximately 1.4km in length, which joins the N28 at Shanbally Roundabout to the R613 at Coolmore Cross. Shanbally National School is located along this route as well as a number of estates and housing areas.

5.7.6 There is a steady flow of traffic in the peak times in both directions, likely to be a result of shift changes. This route provides access to some of the major employers in the Ringaskiddy area such as GSK, Novartis and Johnson & Johnson. Although there are a considerable number of vehicles on the route, traffic moves well at both ends of the L2492 at Shanbally Roundabout and the junction at Church Road. There are some delays at the Shanbally Roundabout during the morning peak (approx. 08:45hrs) when the Shanbally National School opens.
5.8 **Junction Evaluation**

5.8.1 Junctions represent the major point of conflict between road users, with intra modal (e.g. general traffic to general traffic) and inter modal (e.g. general traffic/ pedestrian/ cyclist) conflict occurring. In terms of the efficient operation of an urban traffic management system, the layout and operation/ management of junctions is essential to ensure that a fair balance is achieved between the competing needs of each transport mode. Given the conflict between road users that exists at junctions, the traffic management arrangements in place determine how well the junction will perform from a safety perspective.

5.9 **Key Junction Arrangements**

5.9.1 The issues observed in the study area can be separated into the following three categories:

- **Operational Issue** - relates to a junction or an area where the operation is the main issue, this could include conflict between different modes or uses;
- **Capacity Issue** - relates mainly to a junction or an area where capacity is the main issue, this could be caused by operational issues, but mainly relates to demand exceeding capacity (i.e. vehicular demand passing wishing to pass through a junction or road exceeds to capacity available, this often leads to queuing and congestion), and includes confined / restricted road widths; and
- **Pedestrian and Cyclist Issue** - relates to a junction or an area where pedestrian and cycle facilities are the main issue, particularly where they are not catered for by the design of the road or junction. These issues are usually due to junction arrangements, pavement widths or crossing facilities.
Figure 25 below illustrates examples of some of the issues experienced in the area.

**EXAMPLE OF ISSUES**

- Picture 1 shows an example of traffic congestion at the Shannon Park Roundabout on the approach from Ringaskiddy in the PM peak.
- Picture 2 shows an example of traffic congestion at the Shannon Park Roundabout on the northern arm (from Cork City) in the PM peak.
- Picture 3 shows congestion on the N28 during the AM, where traffic queues from the junction with the R610 to the Shanbally Roundabout.
- Picture 4 shows high levels of free flowing traffic at Shanbally Roundabout travelling towards Ringaskiddy during the AM peak.

Figure 24. Examples of the issues on the N28
5.9.3 Observations were made at each of the following junctions and their locations are illustrated in Figure 26 below:

- Jct 1. Dunkettle Interchange;
- Jct 2. Jack Lynch Tunnel;
- Jct 3. Mahon Interchange;
- Jct 4. Bloomfield Interchange;
- Jct 5. N28/Rochestown Road (R610);
- Jct 6. N28/Maryborough Hill;
- Jct 7. N28/Carrigaline Road (R609);
- Jct 8. N28/Carrs Hill;
- Jct 9. N28/L6477;
- Jct 10. Shannon Park Junction;
- Jct 11. N28/L2490;
- Jct 12. N28/R610;
- Jct 13. Shanbally Roundabout;
- Jct 14. Entrances to Pfizer;
- Jct 15. N28/Church Road (R613);
- Jct 16. N28/Shamrock Place;
- Jct 17. Church Road (R613)/L2492;
- Jct 18. Church Road (R613)/L2490;
- Jct 19. Signalised Junction at R613/R612;
- Jct 20. Signalised Junction at R612/R611; and
- Jct 21. Ballea Road/Church Road (R613)/Cork Road (R611) roundabout;
- Jct 22. Tivoli access at NB/R635 (North Ring Road);
- Jct 23. Entrance to City Quay Port on Albert Quay.
Figure 25. Study Area Junction Map
### 5.10 Road Network Evaluation - Key Junction Arrangements

#### 5.10.1
Table 5.1 summarises the issues which have been identified and details them as Operational, Capacity or Pedestrian and Cyclist issues. Figure 26 above maps out each junction identified in Table 5.1.

#### 5.10.2
Appendix B provides further details of the issues at specific junctions.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>OPERATIONAL ISSUES</th>
<th>TRAFFIC CAPACITY</th>
<th>PED &amp; CYCLIST FACILITIES</th>
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<tr>
<td>1. Dunkettle Interchange</td>
<td>✓</td>
<td>Queuing during peaks in all directions</td>
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</tr>
<tr>
<td>2. Jack Lynch Tunnel</td>
<td>✓</td>
<td>Queuing during peaks in all directions</td>
<td>X</td>
</tr>
<tr>
<td>3. Mahon Interchange</td>
<td>X</td>
<td>No capacity issues observed</td>
<td>X</td>
</tr>
<tr>
<td>4. Bloomfield Interchange</td>
<td>X</td>
<td>No capacity issues observed</td>
<td>X</td>
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<tr>
<td>5. N28/ Rochestown Rd</td>
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<td>Some capacity issues observed</td>
<td>X</td>
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<td>6. N28/ Maryborough Hill</td>
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<td>Capacity issues during peak</td>
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<td>7. N28/ Carrigaline Rd</td>
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<td>No capacity issues observed</td>
<td>X</td>
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<td>9. N28/ L6477</td>
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<td>No capacity issues observed</td>
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<td>10. Shannon Park</td>
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<td>No capacity issues observed</td>
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<td>N28/ R610</td>
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<td>No capacity issues observed</td>
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<td>13</td>
<td>Shanbally</td>
<td>X</td>
<td>Capacity issues observed, especially during AM peak</td>
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<td>Footpaths provided in village, along with some pedestrian refuges. No cyclist facilities.</td>
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<td>Pfizer</td>
<td>X</td>
<td>No capacity issues observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian footpath along northern side of road, between Shanbally and Ringaskiddy. No cyclist facilities.</td>
</tr>
<tr>
<td>15</td>
<td>N28/ R613</td>
<td>X</td>
<td>Some queuing observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian footpath along northern side of road, between Shanbally and Ringaskiddy. No cyclist facilities.</td>
</tr>
<tr>
<td>16</td>
<td>N28/ Shamrock Place</td>
<td>X</td>
<td>No capacity issues observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian footpath along eastern side of road, linking to Ringaskiddy. No cyclist facilities.</td>
</tr>
<tr>
<td>17</td>
<td>R613/ L2492</td>
<td>X</td>
<td>Some queuing observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>R613/ L2490</td>
<td>X</td>
<td>Some queuing observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian footpath on one side of road, for section from south. No cyclist facilities.</td>
</tr>
<tr>
<td>19</td>
<td>R613/ R612</td>
<td>X</td>
<td>Some queuing observed, but cleared during green times</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian facilities including signalised crossings. No cyclist facilities</td>
</tr>
<tr>
<td>20</td>
<td>R612/ R611</td>
<td>✓</td>
<td>Queuing was observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian facilities including signalised crossings. No cyclist facilities</td>
</tr>
<tr>
<td>21</td>
<td>Ballea Rd/ R613/ R611</td>
<td>X</td>
<td>Queuing was observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian footpaths. No cyclist facilities</td>
</tr>
<tr>
<td>22</td>
<td>Access to Tivoli</td>
<td>X</td>
<td>No capacity issues observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian footpaths. No cyclist facilities</td>
</tr>
<tr>
<td>23</td>
<td>Access to City Quays</td>
<td>X</td>
<td>No capacity issues observed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No formal facilities</td>
</tr>
</tbody>
</table>
5.11 Pedestrian & Cycling Facilities and Conditions

Introduction

5.11.1 Pedestrian facilities (such as footpaths, adequate crossing points, etc.) which play a large part in determining the levels of pedestrian activity are of good quality at City Quays, but poor at Tivoli and Ringaskiddy. Other factors which determine pedestrian activity are traffic speeds and volumes and the presence of heavy goods vehicles (HGV) as these can adversely affect the pedestrian environment.

5.11.2 City Quays is located very close to Cork city centre which means that pedestrian access is good, with footpaths on both sides of the roads for the most part near City Quays. The access routes coming from the south are well served by footpaths. Other access routes could be improved with better crossing facilities. There are no pedestrian crossing facilities from the N27 on Albert Quay. There is a footpath on only one side of the road which means pedestrians have to cross over without any facilities.

5.11.3 Pedestrian access to Tivoli is provided, but is of a sub-standard quality. Access to the port is the same for both pedestrians and vehicles; via the off ramp from the N8 or across the Silversprings Overpass (the fly-over bridge over the N8) from the R635, the North Ring Road. Footpaths are sufficiently wide on the bridge but there is no pedestrian crossing to get from the bridge across the off ramp. There is a stairs that provides access to the port entrance from the bridge which is in close proximity to the road and the main port access for HGVs and other vehicles.

5.11.4 In general, pedestrian facilities are poor along the N28 and very low levels of pedestrian activity were observed. Some of the N28 has facilities for pedestrians, notably between Shanbally village and Ringaskiddy village. However, there are also narrow parts along the route, e.g. at Carrs Hill, where the width is only sufficient for two vehicles. The N28 is a primary route and as such caters for vehicles more than pedestrians. There is little on the N28 to encourage pedestrians to use it.

5.11.5 As in most parts of the Country, levels of cycling are low within the study area. The road network represents a poor cycling environment, and as a result, very little cycle activity was observed. The high volumes of traffic, including HGVs, and narrow road widths along sections represent a major barrier to cycle use along the N28. As a result, low levels of cycling activity were observed in the area. There is no provision for cyclists at either City Quays or Tivoli. Provision for cyclists will improve at Ringaskiddy under the Cork County Development Plan, whereby an off-road cycle route is proposed linking Passage West – Carrigaline – Ringaskiddy.
PEDESTRIAN & CYCLING FACILITIES

- Few roads along the Port Access Corridor facilitate pedestrian and cyclist movements
- There are no cycle lanes
- Footpaths are located on roads adjoining Tivoli entrance
- No pedestrian facilities are provided along the N28, except for in Shanbally and Ringaskiddy, and between the two

- Pedestrian facilities are located within Carrigaline village
- There is a footpath on a section of Church Road, between Ringaskiddy and the turn-off for GSK
- There is a footpath on one side of Shamrock Road between Ringaskiddy and De Puy, GSK, etc
- Walking and cycling is very dangerous on the narrow section of Church Road, nearer Carrigaline

Figure 26. Pedestrian and Cycling facilities/conditions within study area
5.12 Bus Operating Arrangements and Conditions

5.12.1 At present, the Ringaskiddy area is served by one Bus Éireann Regional Route (223). This route is detailed in Table 5.2 and shown in Figure 29 below. Although the service is quite frequent, the route varies throughout the day. For example, Route 223 (to Ringaskiddy) on occasions turns right at Shanbally and continues to Ringaskiddy along Church Road, whereas at other times it stays on the N28 past Pfizer and into Ringaskiddy, as per the route shown.

5.12.2 There is a relatively low amount of PT use in Ringaskiddy, with 6% of people travelling to work by bus when compared to Cork City (10%), Cork County (9%) and state averages (16%). It is worth noting, as explained in Section 2.4, that the percentages are a reflection of the movements of those that live in Ringaskiddy alone where there are very few people.

### Table 5.2 Bus routes serving Ringaskiddy

<table>
<thead>
<tr>
<th>BUS ROUTES</th>
<th>SCHEDULED AM PEAK FREQUENCY (MAX ONE DIRECTIONAL FLOW 07:00 – 10:00)</th>
<th>ROUTE DETAILS (FROM, VIA, TO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BÉ Route 223</td>
<td>3 SB, 5 NB</td>
<td>City – Douglas - Ringaskiddy</td>
</tr>
</tbody>
</table>

5.12.3 City Quays is well serviced by Bus Éireann Intercity, Regional and town services. Many of the routes into Cork City Centre terminate at Parnell Place which is approximately 500 metres from the entrance on Albert Quay. Kent Railway Station is also within walking distance from Custom House Street, approximately 600-700 metres.
### Table 5.3  Bus routes servicing City Quays/Custom House Street

<table>
<thead>
<tr>
<th>BUS ROUTES</th>
<th>SCHEDULED AM PEAK FREQUENCY (MAX ONE-WAY 07:00 – 10:00)</th>
<th>ROUTE DETAILS (FROM, VIA, TO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BÉ # 215</td>
<td>8 EB, 9 WB</td>
<td>Cloughroe – City Centre – Mahon Point</td>
</tr>
<tr>
<td>BÉ # 221</td>
<td>3 NB, 3 SB</td>
<td>Cork – Riverstown – Knockraha</td>
</tr>
<tr>
<td>BÉ # 222</td>
<td>10 NB, 7 SB</td>
<td>Cork – Crosshaven – Fountainstown</td>
</tr>
<tr>
<td>BÉ # 223</td>
<td>5 NB, 3 SB</td>
<td>City – Douglas – Ringaskiddy</td>
</tr>
<tr>
<td>BÉ # 226</td>
<td>9 NB, 8 SB</td>
<td>Kent Station – Parnell Place – Cork Airport</td>
</tr>
<tr>
<td>BÉ # 232</td>
<td>6 EB, 6 WB</td>
<td>Cork - Ballincollig</td>
</tr>
<tr>
<td>BÉ # 233</td>
<td>7 EB, 6 WB</td>
<td>Cork - Macroom</td>
</tr>
<tr>
<td>BÉ # 235</td>
<td>2 EB</td>
<td>Cork – Rylane – Stuake</td>
</tr>
<tr>
<td>BÉ # 236</td>
<td>2 EB, 1 WB</td>
<td>Cork – Bantry – Castletownbere</td>
</tr>
<tr>
<td>BÉ # 237</td>
<td>4 EB, 2 WB</td>
<td>Cork – Skibbereen – Goleen</td>
</tr>
<tr>
<td>BÉ # 239</td>
<td>4 EB, 2 WB</td>
<td>Cork – Bandon</td>
</tr>
<tr>
<td>BÉ # 240</td>
<td>2 EB, 2 WB</td>
<td>Cork – Cloyne – Ballycotton</td>
</tr>
<tr>
<td>BÉ # 241</td>
<td>2 EB, 3 WB</td>
<td>Cork – Midelton – Whitegate – Traboulgan</td>
</tr>
<tr>
<td>BÉ # 243</td>
<td>1 NB, 1 SB</td>
<td>Cork – Mallow – Buttevant – Newmarket</td>
</tr>
<tr>
<td>BÉ # 245</td>
<td>2 NB, 4 SB</td>
<td>Mitchelstown – Fermoy – Cork</td>
</tr>
<tr>
<td>BÉ # 248</td>
<td>1 NB, 1 SB</td>
<td>Cork – Carrignavar – Glenville</td>
</tr>
<tr>
<td>BÉ # 249</td>
<td>3 NB, 5 SB</td>
<td>Cork – Airport – Kinsale</td>
</tr>
<tr>
<td>BÉ # 260</td>
<td>1 EB, 5 WB</td>
<td>Cork – Youghal – Ardmore</td>
</tr>
<tr>
<td>BÉ # 261</td>
<td>2 EB, 2 WB</td>
<td>Cork – Carrigtwohill – Midleton – Ballinacurra</td>
</tr>
</tbody>
</table>
5.12.4 There are a number of BÉ Regional services that run outside Tivoli Industrial Estate; 221, 240, 241, 245, 246, 260 and 261. Some intercity services also run outside the industrial estate; 7 and 8. Details of these services are shown in Table 5.3.

**Bus Facilities and Conditions**

5.12.5 There are few bus stops along the N28, except for in Shanbally and Ringaskiddy villages. There are also bus stops in Carrigaline village. The bus stops in Shanbally are located close to the village centre, school, church, etc. Footpaths within the village facilitate movements to and from these stops, as shown in Figure 28 (Photo 1).

5.12.6 There are a few bus stops located in Ringaskiddy, at both ends of the village. As with Shanbally, footpaths facilitate movements to/from these stops, as shown in Figure 28 (Photo 2). The major employers in Ringaskiddy, Lough Beg and the Ringaskiddy end of Church Road are all connected to these bus stops by at least one footpath, but distances to employers can be up to 2km. Employers further afield, e.g. GSK, are not connected.

5.12.7 City Quays is located near the Bus Éireann terminal at Parnell Place and there are also a number of other BÉ stops in the vicinity.

5.12.8 There are no bus stops located near Tivoli although there are two disused BÉ bus stops located near the entrance on the N8. The nearest stop is located a considerable distance from the entrance, approximately 3200 metres from the pedestrian entrance. Bus Éireann routes 221, 240, 245, 246 and 260 stop at this bus stop.

![Bus facilities in Shanbally and Ringaskiddy](Picture 1)

![Bus facilities in Shanbally and Ringaskiddy](Picture 2)
5.13 **Train Services**

5.13.1 Kent Station is located within walking distance for City Quays. It serves the Cork-Dublin Heuston, Cork-Tralee and Mallow-Cork-Cobh/Midleton lines. There is a regular hourly service between Cork and Dublin. Eight services a day facilitate travel between Cork and Tralee. There are regular commuter services between Cork and Midleton / Cobh (alternative services every 15 minutes – less regular outside peaks). Of these services, approximately one an hour originates in Mallow.

5.13.2 The Commuter train service from Cork to Midleton and Cobh runs through the Tivoli estate and port facility but there is no stop along this section of track. The first stop after Kent station is at Dunkettle Little Island.

5.14 **Heavy Goods Vehicles**

5.14.1 Currently, the N28 is well used by HGVs. Many of these are destined for the PoC, located in Ringaskiddy, or indeed the major pharmaceutical companies located in Ringaskiddy also. The volume of HGVs in both peaks is highest at the North Ring Road /
N8 junction, closely followed by the Shannon Park Roundabout. HGVs numbers reduce along the N28 towards Ringaskiddy.

5.14.2 There are climbing lanes on the N28 from Ringaskiddy village to facilitate slower HGV traffic moving up the hill towards Shanbally.

5.14.3 A summary of the surveyed peak volumes of HGVs at particular locations in the study area are as follows:

- **North Ring Road / N8:**
  - AM Peak 15 min: 40 HGVs 07:45-08:00
  - PM Peak 15 min: 38 HGVs 16:30-16:45

- **N28 / Church Road / PoC Access**
  - AM Peak 15 min: 24 HGVs 08:45-09:00
  - PM Peak 15 min: 15 HGVs 16:00-16:15

- **N28 / Ringaskiddy Terminal / Shamrock Place**
  - AM Peak 15 min: 9 HGVs 09:15-09:30
  - PM Peak 15 min: 5 HGVs 16:30-16:45

- **Church Road / Fernhill Road**
  - AM Peak 15 min: 4 HGVs 08:30-08:45
  - PM Peak 15 min: 2 HGVs 16:30-16:45

5.14.4 The counts were done in April in 2012. The HGV numbers represent the number of HGVs in all directions at the locations mentioned.

Nguyễn Văn A
6. **EXISTING PORT TRAFFIC**

6.1 **Introduction**

6.1.1 This chapter presents an overview of current PoC traffic in the context of the strategic road network.

6.2 **Daily Profile of Port Traffic**

6.2.1 The PoC carries out its operations at a number of locations around Cork Harbour and the traffic flows related to its main activities are summarised in Figure 29 below. The current estimated traffic demand generated by PoC activities at Tivoli and Ringaskiddy have a combined total of 4,174 vehicle movements per day (AADT), of which some 27% or 1,108 are HGV movements.

![Traffic totals of all of the Tivoli and Ringaskiddy sites](image)

6.2.2 The PoC currently generates traffic flows from its existing operations at Ringaskiddy as follows:

<table>
<thead>
<tr>
<th>Table 6.1</th>
<th>Ringaskiddy – Existing PoC traffic levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POC TRAFFIC</strong></td>
<td></td>
</tr>
<tr>
<td><strong>AADT</strong></td>
<td>1295</td>
</tr>
<tr>
<td><strong>% HGV</strong></td>
<td>28%</td>
</tr>
<tr>
<td><strong>HGV Nos.</strong></td>
<td>365</td>
</tr>
</tbody>
</table>

*Source: Independent Traffic Surveys April/May 2012*
6.2.3 The traffic generated by the PoC varies depending on levels of activities by customers including shipping related movements and by employees and related service providers. The PoC facilities at Ringaskiddy currently operate from 7am to 7pm, 5 days per week, and a half day on Saturday, all year round.

6.2.4 Based on the current pattern of arrival and departures of HGVs carrying Unitised Cargo (Containers) from the existing Container Terminal at Tivoli, approximately 13% of HGVs movements occur during the morning and evening peak hours.

6.2.5 Figures 30 to 32 below show the average number of HGVs using the Tivoli container terminal, the Ringaskiddy DWB and Ringaskiddy Terminal respectively for weekdays recorded over a two week period in May 2012. It can be seen that port traffic is reasonably steady during the day. There is a peak in the morning/afternoon period for two hours (11:00 – 13:00) at Tivoli and again in the evening period for three hours (14:00 – 17:00). Similarly, there is a morning and evening peak at Ringaskiddy but both peaks are for a period of one hour; 10:00 and 14:00.

6.2.6 Figure 30 gives the ATC counts taken outside the Tivoli entrance between the 14th and 27th of May in 2012. The numbers are based on an average weekday at the site.

![Tivoli - Average Weekday Daily Profile](image-url)

**Figure 30. Tivoli average daily HGV traffic profile**
6.2.7 Figure 31 gives the ATC counts taken outside the Ringaskiddy DWB entrance between the 14th and 27th of May in 2012. The numbers are based on an average weekday at the site.

![Ringaskiddy DWB average daily HGV traffic profile](image)

Figure 31. Ringaskiddy DWB average daily HGV traffic profile

6.2.8 Figure 32 gives the ATC counts taken outside the Ringaskiddy Terminal entrance between the 14th and 27th of May in 2012. The numbers are based on an average weekday at the site.
Figure 32. Ringaskiddy Terminal average daily HGV traffic profile
7. CONSULTATION

7.1 Introduction

7.1.1 This chapter discusses the consultation undertaken as part of this study, including public consultation and consultation with key stakeholders such as Cork County Council, the NRA and Port of Cork hauliers.

7.2 Public Consultation

7.2.1 Public consultation is an essential part of the preparation of the Environmental Impact Assessment of the proposed port development at Ringaskiddy. The first public consultation was held in Fota on 11th April 2013 and Carrigaline on 12th and 13th April 2013. The second round of public consultation is planned for early September 2013.

7.3 Key Stakeholder Consultation

7.3.1 Meetings were held between Port of Cork, Cork County Council and the NRA to discuss the proposed new Ringaskiddy port access and also the N28 Sustainable Travel Strategy, the proposed junction upgrades at Shannon Park and Shanbally, the upgrade planned for the Dunkettle Interchange, etc. Furthermore, consultation was undertaken with all of the hauliers which currently use each of the Port of Cork sites (Ringaskiddy, Tivoli and City Quays).
8. PREVIOUS PLANNING APPLICATION REFUSAL

8.1 Introduction

8.1.1 This chapter outlines the principal issues associated with the PoC submission to ABP for a container terminal and multi-purpose berth at Ringaskiddy in 2007 (Oyster Bank). The key differences between the Oyster Bank application and current proposals in relation to traffic and transport in the PoC Strategy are outlined, illustrating that the previous reasons for ABP’s refusal are no longer valid.

8.2 2007 PoC SID Application

8.2.1 In 2007, the PoC submitted a Strategic Infrastructure Development (SID) application to ABP for a container terminal and multi-purpose berth at Ringaskiddy – Oyster Bank in order to cater for future expansion of the total handling capacity of the PoC facilities, as part of its Strategic Development Plan.

8.2.2 In 2008 ABP refused permission to the PoC for their port development at Ringaskiddy – the Oyster Bank application - on the grounds that the development would:

(a) result in much of the port related traffic traversing the city road network which would adversely impact the carrying capacity of the strategic road network in and around Cork city and in particular the carrying capacity of the strategic interchanges at Bloomfield, Dunkettle and Kinsale Road and the Jack Lynch Tunnel which it is necessary to preserve; the proposed development would exacerbate serious traffic congestion at these strategic interchanges; and

(b) be unable to make use of rail freight carrying facilities in the future and would, therefore, represent a retrograde step in terms of sustainable transport planning (noting reference to the potential for rail freight in the Regional Planning Guidelines for the South West Region 2004-2020 and the Cork Area Strategic Plan 2001-2020).

8.2.3 The principal traffic issues associated with the planned development as per the Inspector’s Report are outlined in Table 8.1 below.
### Table 8.1 Summary of ABP Refusal

<table>
<thead>
<tr>
<th>ISSUE</th>
<th>BRIEF DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prematurity of development pending the upgrade of the N28</td>
<td>The upgrade of the N28 is critical for further large scale port development at Oyster Bank having particular regard to the fact that existing roundabouts on the N28, namely Shannon Park and Shanbally, experience significant congestion.</td>
</tr>
<tr>
<td>Impact on the wider road network</td>
<td>The issue was raised that the development and increased activity at Ringaskiddy will add to the congestion at the Jack Lynch tunnel and Dunkettle roundabout.</td>
</tr>
<tr>
<td>Lack of Rail access</td>
<td>An issue was raised regarding the lack of rail access to the new development at Ringaskiddy.</td>
</tr>
<tr>
<td>Cumulative Trip Generation from other Developments</td>
<td>Concerns were expressed that the EIS did not properly anticipate or evaluate the cumulative impacts of traffic resulting from other existing or planned developments in the Ringaskiddy area.</td>
</tr>
</tbody>
</table>
9. RINGASKIDDY STRATEGY REVIEW – KEY DIFFERENCES WITH 2007 APPLICATION

9.1 Smaller scale development

9.1.1 Following the 2008 decision by ABP, the PoC undertook a fundamental review of its Strategic Development Plan and completely re-examined from first principles the future growth of its port activities. As a consequence of this strategic review, which took full account of ABP’s reasons for refusal, and significantly revised economic growth forecasts, proposals have been developed for a much smaller scale development at Ringaskiddy.

9.2 Development of Cork City Harbour - relocation of port facilities

9.2.1 The Port expansion at Ringaskiddy is intended to complement a reduction of Port operations at the existing Tivoli and Cork Docklands sites, now being rebranded as Cork City Harbour, which cannot handle large vessels due to physical constraints.

9.2.2 The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (Docklands being within 750m and Tivoli on the commuter Railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal / non-industrial use. These are mutually-supportive objectives and are part of the CASP Strategy and the local Cork City Development Plan, which target future population and growth within the Cork Metropolitan area, with a strong reliance on the redevelopment of Cork City Harbour to achieve the projected growth.

9.2.3 Furthermore, the removal of bulk cargo and container handling facilities from these sites would also have the benefit of reducing the number of HGVs which pass through the City Centre road network. The relocation of bulk goods handling facilities from City Quay areas and the containers from Tivoli to Ringaskiddy are thus a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in well located City areas.

9.3 Key Differences

9.3.1 The key differences between the Oyster Bank application and current proposals in relation to traffic and transport in the PoC Strategy review are as follows:

- lower traffic generation;
- accompaniment of a Mobility Management Plan;
- significantly changed national and regional policy context; and
- lower forecast growth in traffic levels on the strategic network.

9.3.2 These are each described in turn in the subsequent sections.
Lower Traffic Generation

9.3.3 It was estimated that the Oyster Bank proposal would generate 7,284 vehicle movements per day. By comparison, for the current Ringaskiddy proposal it is estimated that, at full capacity, it would generate a total of 5,103 vehicle movements per day. In addition, the current proposal will result in a reduction of 1,207 vehicles between Tivoli and City Quays.

Mobility Management Planning

9.3.4 As part of this study, a Mobility Management Plan will be developed to minimise the impact of port generated traffic on the strategic interchanges of the National Road network around Cork City, during peak hours, which would take account of the revised Port Strategic Plan proposals.

9.3.5 The use of demand management is another important difference pertaining to the PoC’s strategy review. A Mobility Management Plan will be produced that will outline policies for limiting the amount of HGVs generated by the port when critical points in the network are at their busiest during peak times. The plan will also include objectives on vehicle routing, and outline measures to limit port traffic on ancillary (non-national) routes.

9.3.6 Measures put forward in the plan will include ways of suppressing HGV movement from the site when there is limited spare capacity on the network at peak commuting times. These measures will further decrease the risk of port related traffic from Ringaskiddy adversely impacting sensitive points in the network during peak times. These measures will complement an area-wide Mobility Management Plan for Ringaskiddy which will be implemented by Cork County Council as part of the N28 Corridor Sustainable Travel Strategy and is expected to include similar undertakings concerning commuter travel among the approximate 7,000 employees and students within the major employers and educational facilities in the area as part of the Smarter Travel Workplace Programme.

Policy Context

9.3.7 Transport policy in relation to the use of strategic road infrastructure has changed since the Oyster Bank application. The sections below outline those policies which are relevant to the planned application at Ringaskiddy, all of which are discussed earlier in Chapter 3.

Smarter Travel

9.3.8 Smarter Travel is government policy which has come into effect in 2009 since the Oyster Bank application. This policy seeks to reduce the share of travel demand growth which is car dependant. Its main objective is to promote a significant modal shift from private transport to public transport and sustainable transport modes for commuters over the period up to 2020. Controlling development so that it is sustainable/ public transport oriented is an objective of this policy and a mechanism by which this can be achieved.
9.3.9 Smarter Travel Policy recognises the role of the strategic national road network in providing for the efficient movement of interurban traffic and specifically mentions port traffic. Therefore, using the strategic road network for port traffic is consistent with the Smarter Travel Policy objectives. Capacity headroom can be used for strategic economic activity (i.e. HGVs from the port) according to the policy, while the management of commuter trips will reduce the use of this infrastructure by cars and contribute to provision of additional capacity headroom which is particularly relevant to the N28.

**N28 Corridor Sustainable Travel Strategy**

9.3.10 A recent survey of employees in the Ringaskiddy area undertaken as part of the N28 Corridor Sustainable Travel Strategy revealed that 96% of respondents generally travelled by car to work, with 2% regularly travelling as a car passenger and 1% travelling by Bus. However, 25% of respondents said that they occasionally travel as a passenger and have the opportunity to car share. Similarly, 9% of respondents occasionally travel by bus and 13% stated that bus was available to them as a mode. The on-line survey included a large representative sample of 1014 respondents and the results highlighted the potential for modal shift among these N28 commuters.

9.3.11 The NTA have reported an average nationwide reduction of 18% in single occupancy car based commuter trips through their Smarter Travel Workplaces Programme through incentivising car share schemes for large employers and the promotion of alternative travel modes. However, given the current provision of public transport and other modes in the Ringaskiddy area, it is considered that a more modest proposed medium-term target of 10% is achievable and would significantly benefit the available capacity on the N28 corridor at peak times. The Cork County Council N28 Corridor Sustainable Travel Strategy initiative will seek to reduce N28 commuter trips by at least 5% over the first five years and by 10% over 10 years.

9.3.12 As part of the N28 Corridor STS initiative a number of major employers in the area have signed up to the NTA Smarter Travel Workplaces Programme. Furthermore, Cork County Council have established a technical group who will implement the management and monitoring processes required to support the achievement of these reduced commuter trip targets in partnership with these key employer stakeholders, including the PoC. An N28 Corridor Travel Model is being prepared which will test the benefit of the various mode shift travel proposals and these forecasts will be validated and monitored by means of an on-going programme of monitoring on the N28 corridor. It is also intended that all significant new development within the Ringaskiddy area will be required (by way of variation to the County Development Plan) to prepare and implement mobility management plans as part of their development proposals and their traffic impact will be tested using the N28 Corridor Travel Model.

9.3.13 In addition to the N28 demand management processes, Cork County Council have proposed to extend the existing Mahon to Passage West Cycle Route, to Carrigaline with

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3 "Your Step by Step Guide to Travel Plans" (Travel Planning Guidance for Employers) available from the NTA website: www.nationaltransport.ie)
an extension eastwards to Ringaskiddy village as part of the Cork Cycle Strategy. It is estimated that 17% of commuter trips to Ringaskiddy originate in Carrigaline, a distance of approximately 7km, representing a cycle time of approximately 25 minutes between these locations.

**Douglas Land Use and Transport Strategy and Carrigaline LAP**

9.3.14 The Douglas Land Use and Transport Strategy is currently being prepared by Cork County Council. Among its objectives are targets to reduce car dependency for commuting from Douglas and achieve a mode shift towards walking, cycling, and public transport.

9.3.15 Similar objectives are contained in the Carrigaline LAP, and it will also be included in the objectives of Phase 2 of the N28 Corridor Sustainable Travel Strategy. Carrigaline is a significant contributor to car trips on the N28 especially during peak times and has a very high rate of car use for this journey purpose.

9.3.16 The combined effects of the strategies for Douglas, Carrigaline and Ringaskiddy will be to restrain traffic growth on the N28 and maintain capacity on the infrastructure for strategic traffic such as the freight from the Port and the major (“pharma-chem” and medical devices) manufacturing facilities at Ringaskiddy.

**National Ports Policy**

9.3.17 The National Ports Policy indicates that Cork is one of three Tier 1 Irish core ports in the Connecting Europe Network. The Ringaskiddy site is the primary deep water facility in Cork at present, and expansion of its deep water facilities is essential for the commercial viability and development of the port. The expansion of the deep water facility at Ringaskiddy is in alignment with this national policy objective, will maintain the competitive advantage of the region and meet the needs of Ireland for the foreseeable future. This national policy focus on the strategic deep water role of PoC at Ringaskiddy supersedes the ports policy context at the time of the Oyster Bank application.

**Strategic Infrastructure Upgrades**

9.3.18 A number of significant upgrades to strategic infrastructure are currently proposed. This includes upgrades on the N28 at the Shannon Park and Shanbally junctions. The NRA also have advanced proposals to upgrade Dunkettle Interchange to free-flow and thus remove one of the main bottlenecks cited in the 2008 decision to refuse by ABP. The proposed upgrade of the Dunkettle Interchange which was recently approved by ABP will be a major enhancement to the road network.

**Traffic Levels on Strategic Road Network**

9.3.19 From a sustainable transport perspective there are a number of very important differences relating to the strategic road network between the current situation and the assumptions made at the time of the assessment of the Oyster Bank application. Lower existing traffic levels, a reduced development scenario for Ringaskiddy Port, the implementation of a port Mobility Management plan and the implementation of a
strategy for transport on the N28 are the principal differences. These factors significantly improve the feasibility of the proposed development. The following bullets outline the key changes since the previous application:

- The original proposals for the upgrade of the N28 to dual-carriageway from Bloomfield to Ringaskiddy, to which the Oyster Bank application was linked in terms of growth potential, have been postponed indefinitely due to cutbacks in the national roads programme arising from the economic downturn;

- There have been reductions in traffic levels on the national road network in the Cork region since 2008 which reflect the economic downturn and national trends. The AADT has fallen by over 6% since 2008 on the N25 at Little Island and by over 12% on the N8 at Dunkettle. As such the strategic road network has more capacity currently available to handle future growth than it did in 2008;

- In line with the current economic downturn, the NRA has revised the traffic growth forecasts for the future and these reduced growth rates are incorporated in the NRA National Traffic model. This model was the basis of the traffic growth forecasts presented to ABP by the NRA for the Dunkettle Interchange SID application in November 2012. The growth scenario on which the Dunkettle Interchange infrastructure development was based was the Medium Growth Scenario. It is intended that PoC will use these traffic forecasts and this model as the basis of their traffic assessment for the Ringaskiddy application. This will provide consistency for ABP and address their concerns in relation to traffic impact on the National road network around Cork City; and

- Smarter Travel policy has objectives to prioritise strategic traffic growth on national routes (which includes Port traffic) over commuter traffic growth. Therefore it is reasonable to aspire to utilise the headroom available for traffic growth on the relevant parts of the Cork road network for port expansion within a managed transport context.

- The National Ports Policy Statement published recently reinforces the strategic role of this national Ports infrastructure and the strategic context of the traffic using the port facilities. It highlights the obligation of government and national agencies to ensure that access to these strategic port facilities is safeguarded and upgraded to facilitate the development and improvement of the national ports.
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1. JUNCTION EVALUATION

1.1.1 Junctions represent the major point of conflict between road users, with intra modal (e.g. general traffic to general traffic) and inter modal (e.g. general traffic/ pedestrian/ cyclist) conflict occurring. In terms of the efficient operation of an urban traffic management system, the layout and operation/ management of junctions is essential to ensure that a fair balance is achieved between the competing needs of each transport mode. Given the conflict between road users that exists at junctions, the traffic management arrangements in place determine how well the junction will perform from a safety perspective.

1.1.2 This appendix provides details of 23 junctions which were evaluated during site visits. The junctions reviewed are listed below and their locations are illustrated in Figure 2.

- Jct 1. Dunkettle Interchange;
- Jct 2. Jack Lynch Tunnel;
- Jct 3. Mahon Interchange;
- Jct 4. Bloomfield Interchange;
- Jct 5. N28/Rochestown Road (R610);
- Jct 6. N28/Maryborough Hill;
- Jct 7. N28/Carrigaline Road (R609);
- Jct 8. N28/Carrs Hill
- Jct 9. N28/L6477;
- Jct 10. Shannon Park Junction;
- Jct 11. N28/L2490;
- Jct 12. N28/R610;
- Jct 13. Shanbally Roundabout;
- Jct 14. Entrances to Pfizer;
- Jct 15. N28/Church Road (R613);
- Jct 16. N28/Shamrock Place
- Jct 17. Church Road (R613)/L2492;
- Jct 18. Church Road (R613)/L2490;
- Jct 19. Signalised Junction at R613/R612;
- Jct 20. Signalised Junction at R612/R611; and
- Jct 21. Ballea Road/Church Road (R613)/Cork Road (R611) roundabout
- Jct 22. Tivoli Access at N8/R635 (North Ring Road)
- Jct 23. Entrance to City Quay Port on Albert Quay

1.1.3 Figures 2 – 24 describe the conditions and issues at each junction separately.
Figure 1. Study Area Junction Location Map
DUNKETTLE INTERCHANGE

- Capacity and operational issues exist
- Queuing was noted during the site visits in both the AM and PM peak in all directions. The capacity at the interchange is not sufficient during the peak to withstand the volume of traffic. Traffic flowed well during the off peak with green time sufficient in clearing queues that had built up while waiting.

Picture 1: Dunkettle Interchange on N25 East turnoff
Picture 2: Dunkettle Interchange Jack Lynch Tunnel turnoff

JACK LYNCH TUNNEL

- Capacity and operational issues exist in tandem with the Dunkettle Interchange
- It was observed during site visits that the Jack Lynch Tunnel experienced tailbacks past the tunnel towards the Mahon Interchange on approach to the Dunkettle Interchange in both peaks. Traffic was moving at approximately 5-10kph which subsequently had a knock-on effect on traffic moving towards the Mahon Interchange
- Speed limit 80kph

Picture 1: Jack Lynch Tunnel southbound
Picture 2: Jack Lynch Tunnel northbound
MAHON INTERCHANGE

- No observed operational or capacity issues
- It was observed during both peaks that traffic moved well on the Mahon Interchange. The green times given at signalised junctions seemed sufficient to clear any waiting queues
- Speed limit 100kph

![Picture 1: Mahon Interchange southbound](image)
![Picture 2: Mahon Interchange northbound](image)

BLOOMFIELD INTERCHANGE

- N28 joins with the South Ring Road (N40) at the Bloomfield Interchange
- During the site visits, it was observed that although traffic was heavy in the area, especially during the peaks, the flow of traffic moved well. No major delays were experienced during the AM and PM peaks in either direction
- Speed limit on N40 100kph
- Speed limit on N28 60kph

![Picture 1: Bloomfield Interchange southbound](image)
![Picture 2: Bloomfield Interchange northbound](image)
N28/ ROCHESTOWN ROAD (R610)

- This is an on and off ramp junction for the N28. Rochestown Road merges with the N28 in the northbound direction and the off ramp in is the southbound direction
- No operational issues
- Some capacity issues in the peak as heavy traffic from Rochestown Road merges with northbound traffic on the N28. It was observed as moving relatively well when site visits were undertaken
- Speed limit 60kph

N28/ MARYBOROUGH HILL

- Maryborough Hill merges with a single lane on the N28 in the northbound direction. The southbound direction flows freely without any interference from Maryborough Hill with two lanes
- Experiences capacity issues in the peak as heavy traffic merges with the northbound traffic causing drivers to reduce speed. The reduction in speed has a knock-on effect and traffic tails back for approximately 400 - 500m from the junction. Traffic moves slowly but continuously and clears up after the junction. Southbound flows freely
- The merge lane is only approximately 150m in length. The Rochestown Road junction is quite close and does not allow for the merge lane to be extended which would allow traffic to merge easier without such a dramatic reduction in speed on the N28
- Speed limit: 100kph

Picture 1: Congestion approaching Maryborough Hill in the AM peak

Picture 2: Maryborough Hill merging with the N28
**Figure 8. Junction 7 – N28/ Carrigaline Road (R609)**

**N28/ CARRIGALINE ROAD (R609)**

- This is a free flowing on and off ramp from the N28 onto Carrigaline Road (R609). The N28 northbound continues as a single lane with one lane turning off. One lane merges with the N28 southbound which has a single lane. There is no turnoff in the southbound direction and no merge in the northbound direction.
- No capacity issues
- Speed limit: 100kph

**Picture 1:** Carrigaline Road merging with the N28 southbound

**Picture 2:** The off ramp on the N28 northbound for Carrigaline Road

**Figure 9. Junction 8 – N28/Carrs Hill**

**N28/ CARRS HILL**

- This is a section of the N28 known as Carrs Hill, located between the Carrigaline Road on and off ramp and the T-junction with the L6477. The location is shown in Picture 2.
- Experiences capacity issues in the peak in the northbound direction as drivers slow down as a result of the reduction in lanes. The area narrows quite dramatically from two lanes northbound to one. It was observed on site visits to the area that drivers slowing down had a knock-on effect further back. Traffic moved continuously and eventually cleared once the lanes became wider.
- Speed limit 100kph

**Picture 1:** Congestion in the AM at Carrs Hill in the northbound direction and heavy flow on the southbound

**Picture 2:** Location of photo
N28/ L6477

- T-priority junction
- No operational or capacity issues
- Speed limit on N28 100kph
- Speed limit on L6477 60kph

Picture 1: Approach to Junction 9 in northbound direction on the N28

Picture 2: Approach to Junction 9 in southbound direction on the N28
Shannon Park Roundabout

- Shannon Park is a large three arm roundabout connecting the Cork Road (R611) to the N28.
- Experiences capacity and operational issues.
- There is a constant flow of traffic at Shannon Park Roundabout during both peaks. It was observed during site visits that although traffic flow was heavy throughout, major congestion was only experienced in the evening peak. Between 16:00 and 17:00, traffic was heavy but moving and the majority was moving predominantly from the eastern arm to the northern arm. There were significant levels of traffic on the other arms. There were times when queues were approximately 20-25 vehicles long but tended to clear quickly. Generally, the junction was free flowing within this time.
- Between 17:00 and 18:00 however there was severe congestion on the eastern/Ringaskiddy arm. Picture 1 shows the traffic tailing back from Shannon Park on the eastern arm for approximately 500m past the turn off for the L2490. While considerable numbers turned off from the N28 onto the L2490 to avoid Carrigaline village, some drivers used the Shannon Park Roundabout to turn towards Carrigaline. Those drivers used the hard shoulder to approach the roundabout and then turn left. The majority of congested traffic was therefore northbound traffic.
- Picture 2 shows traffic approaching Shannon Park Roundabout from the north during the morning peak. The junction was observed as being busy during the morning peak without being congested. There was a constant flow throughout this period without major congestion approaching the roundabout on any arm.

Picture 1: Tailback on Ringaskiddy arm approaching the roundabout and cars using the hard shoulder to turn towards Carrigaline.

Picture 2: Heavy traffic and some queuing on the northern arm at the roundabout in the AM.
### N28/ L2490

- T-priority junction
- No capacity or operational issues
- There is a steady stream of traffic on this road during both peaks predominantly from the N28 as drivers look to avoid Carrigaline village
- Speed limit on N28 80kph
- Speed limit on L2490 60kph

![Picture 1: Approach to Junction 11 on the eastbound approach on the N28](image1)

![Picture 2: Junction 11 approach on the L2490](image2)

### N28/ R610

- T - priority junction
- No capacity or operational issues
- During the peak there can be queues of up to 10 cars trying to get on to the N28. They generally clear quite quickly as there is a short merging lane onto the N28
- Speed limit on N28 100kph
- Speed limit on R610 60kph

![Picture 1: Junction 12 approach on N28 eastbound](image1)

![Picture 2: Junction 12 approach on the R610](image2)
SHANBALLY ROUNDABOUT

- Shanbally Roundabout is a small three arm roundabout connecting the L2492 to the N28
- It does not experience any operational issues
- During site visits, congestion issues were observed, mainly during morning peaks (in particular just before 08:00 and at 08:45 at school opening). There was a constant heavy traffic flow during both peaks. The entry treatment approaching the village, in particular reduction in speed limit, had an effect on traffic congestion. Also the number of vehicles turning right towards Church Road, and turning right from Church Road, sometimes added to congestion

- Picture 1 shows Shanbally Roundabout and the constant stream of traffic coming from Shannon Park Roundabout
- Picture 2 shows traffic queuing back from the Shanabally Roundabout in the morning peak past the turnoff for the R610. Although the road was congested, traffic moved continuously
- The location of the school at the roundabout and its associated drop-off causes significant congestion for a short period during the morning peak, as shown in Picture 3
- Pedestrian facilities, including footpaths and pedestrian refuges, are shown in Picture 4

Picture 1: Heavy but free flowing traffic at Shanbally Roundabout in the AM

Picture 2: Tailback of traffic as a result of the change in speed approaching the Shanbally Roundabout

Picture 3: Congestion at Shanbally Roundabout during school drop-off period

Picture 4: Pedestrian facilities, including footpaths and pedestrian refuges
PFIZER ENTRANCES

- There are four entrances into Pfizer Biologics; two are for employees, one for visitors and one entrance was closed at the time of the survey.
- No operational or capacity issues at any junction or entrance.
- The main entrance is a three arm roundabout that runs smoothly. During the site visits no congestion or queuing was observed. The other open entrances, both priority T-junctions were also observed as being queue free.

Picture 1: Main Entrance

Picture 2: Other employee entrance

N28/ CHURCH ROAD (R613)/ PORT OF CORK ENTRANCE

- This junction is a staggered crossroads along the N28 with Church Road first and then Port of Cork access after, when coming from Shanbally.
- No operational issues.
- There is some queuing during the peak which clears quickly.
- Speed limit along N28 60kph.

Picture 1: Approach to staggered crossroads on the N28 westbound

Picture 2: Approach to staggered crossroads on the N28 eastbound
N28/SHAMROCK PLACE/L2545/RINGASKIDDY FERRY TERMINAL ENTRANCE

- Cross roads
- No operational issues
- There is little to no queuing during the peaks. Some of the major employers use the Shamrock Place arm to access their sites such as DePuy and Hovione.
- Haulbowline Naval Base and the National Maritime College of Ireland are located down the L2545
- Speed limit on Shamrock Place is 50kph
- Speed limit on L2545 50kph

Picture 1: Junction 16 looking towards L2492
Picture 2: Junction 16 approach from L2492

CHURCH ROAD (R613)/ L2492

- T - priority junction
- No operational issues
- There is some queuing during peaks, as many of the major employers are accessed along Church Road. Queuing clears quickly. The L2492 is one of the major routes used by drivers to access some of the major employers on Church Road such as GSK and Novartis
- Speed limit on Church Road (R613) 60kph
- Speed limit on L2492 50kph

Picture 1: Junction 16 looking towards L2492
Picture 2: Junction 16 approach from L2492
**CHURCH ROAD (R613)/ L2490**

- T - priority junction
- No operational issues
- During the PM peak there is a reasonably heavy flow and subsequent queuing as drivers looks to avoid Carrigaline village and the Shannon Park Roundabout. The queuing clears quickly
- Speed limit on Church Road (R613) 50kph
- Speed limit on L2490 50kph

**CHURCH ROAD (R613)/ L2490**

- Signalised crossroads
- It was observed during site visits that there were capacity issues with this junction during the peak. There were significant queues on all arms with the southern arm having tailback as far as the LIDL roundabout. However, all queueing clears during green times.
- Speed limit 50kph

Picture 1: Junction 17 looking at Rock Road/ L2490

Picture 1: Traffic building on the south arm of the signalised crossroads

Picture 2: Junction 18 on the east arm
SIGNALISED JUNCTION R612/ R611

- Signalised T junction
- Operational and capacity issues exist
- A set of pedestrian lights which are located in close proximity to the junction cause northbound traffic to become congested. This can be seen in Picture 1. This congestion continues through the village
- Speed limit 50kph

Picture 1: The set of pedestrian lights, with traffic queuing back into the signalised junction, preventing the junction clearing and causing congestion

Picture 2: Junction 19 on the R612 approach

BALLEA ROAD/ CHURCH ROAD (R613)/ CORK ROAD (611) ROUNDABOUT

- Small four arm roundabout where Ballea Road and Church Road (R613) meet the Cork Road (R612)
- Capacity issues. The roundabout becomes congested at peak times, as shown in Picture 1 and 2. The congestion in the village adds to congestion at this roundabout
- The roundabout operates efficiently during off peak
- Speed limit 50kph

Picture 1: Heavy traffic flow at the roundabout heading in the direction of the village in the PM

Picture 2: Congestion on the arm leading back towards the village in the PM
**TIVOLI ACCESS AT N8/R635**

- Access to Tivoli Estate from North Ring Road overbridge
- Ramp access runs parallel to N8
- Pedestrian footpaths and signals provided

![Picture 1: Ramp entrance to Tivoli Port – view from N8 (west of Tivoli)](image1)

![Picture 2: Tivoli Entrance from North Ring Road overbridge](image2)

**ENTRANCE TO CITY QUAY PORT ON ALBERT QUAY**

- Access to City Quay Port from Albert Quay, at junction with Victoria Road
- Informal access – no designated footpaths
- Parking provided on site

![Picture 1: Access to City Quay Port looking towards Albert Quay](image3)

![Picture 2: Parking provided at City Quay Port](image4)
APPENDIX 8.3 POC STRATEGIC TRAFFIC MODEL
POC STRATEGIC TRAFFIC MODEL
PORT OF CORK STRATEGIC DEVELOPMENT

POC STRATEGIC TRAFFIC MODEL

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1.BACKGROUND

1.1 Introduction

1.1.1 SYSTRA was appointed by Port of Cork (PoC) in March 2013 to assist them with the preparation of a Strategic Infrastructure Development (SID) application to be submitted to An Bord Pleanála (ABP), for the provision of a new container terminal and the expansion and upgrading of Port facilities at Ringaskiddy. This proposed development would accommodate the relocation of Port facilities from Tivoli and City Quays to Ringaskiddy.

1.1.2 In 2007, the PoC submitted an SID application to ABP for a container terminal and multipurpose berth at Ringaskiddy - Oyster Bank in order to cater for future expansion of the total handling capacity of the POC facilities, as part of its Strategic Development Plan.

1.1.3 ABP refused the application in 2008 on two grounds. Firstly, it was considered that the traffic arising from the level of development proposed would generate adverse impacts on the strategic road network in and around Cork City, and specifically at the Bloomfield, Dunkettle and Kinsale Road Interchanges, and at the Jack Lynch Tunnel. The lack of a rail option/connection to transport freight from the site was the second reason for refusing the application.

1.1.4 Following the 2008 decision by ABP, the PoC undertook a fundamental review of its Strategic Development Plan and completely re-examined the future growth of its activities. As a consequence of this strategic review, which took full account of the ABP’s reasons for refusal, proposals have now been developed for a smaller scale development at Ringaskiddy.

1.1.5 The Port expansion at Ringaskiddy is intended to complement a reduction of Port operations at the existing Tivoli and Cork Docklands, now being rebranded as Cork City Harbour sites, which cannot handle large vessels due to physical constraints. The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (Docklands being within 750m, and Tivoli, on the commuter Railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal / non-industrial uses. These are mutually supportive objectives and are part of the Cork Area Strategic Plan (CASP) Strategy and the local Cork City Development Plan, which target future population and growth within the Cork Metropolitan area, with a strong reliance on the redevelopment of Cork City Harbour sites to achieve the projected growth. Furthermore, the removal of container handling facilities from the Cork City Harbour site at Tivoli would also have the benefit of reducing the number of HGVs which pass through the City Centre road network. The relocation of handling facilities for bulk goods from City Quay areas and for containers from Tivoli to Ringaskiddy are thus a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in such well-located City areas.

1.1.6 The study area is shown below in Figure 1.
1.2 Report Overview

1.2.1 In this report we describe the model development process used for the base year PoC Strategic Traffic Model, including a detailed description of the calibration process and validation statistics. Also described is the type of traffic modelling software used and the methodology used to develop the base year model. The final chapters of this report will describe the initial tests undertaken with the model and modelling results.

1.2.2 At this stage a definition of what is actually meant by Calibration and by Validation should be given, as follows.

**Calibration** involves the correction of network and demand errors to reduce discrepancy between measured data and modelled outputs. For the purposes of forecasting it is assumed that the parameters changed during calibration remain constant over time.

**Validation** tests the ability of the model to predict observed travel behaviour. Validation involves testing independent count and journey time data against flows obtained from the calibrated model.

1.2.3 The following sources on traffic model calibration/validation guidance have been used to inform the model development process and model robustness and reporting:

- Highway Capacity Manual 2000 (US);
1.3 Report Structure

Chapter 2 – PoC Strategic Traffic Model Description

Chapter Two provides a high level overview of the modelling software platform employed and model dimensions such as the study area, time periods and vehicle types modelled within the PoC Strategic Access Corridor model.

Chapter 3 – Model Development

In Chapter Three the PoC Strategic Traffic Model development process is described in detail. We describe the survey data used to calibrate the model and how the road network in the area is redefined to the appropriate level of detail required by the transport assessment.

Chapter 4 – Demand Data Development

Chapter Four describes the use of Census data in developing suitable trip matrices.

Chapter 5 - Model Calibration Process and Results

Chapter Five outlines the calibration process adopted and the accuracy achieved. The calibration methods employed to ensure the PoC Strategic Traffic model is ‘fit for purpose’ are presented.

Chapter 6 - Validation

Chapter Six presents the validation statistics which demonstrate that the model is a suitable and robust tool for use in the transport assessment of the PoC Strategic Access Corridor area. The validation uses independent count and journey time data sets.

Chapter 7 – Summary and Conclusions

Finally, Chapter Seven provides a summary of the key points of this modelling report.
2. POC STRATEGIC TRAFFIC MODEL DESCRIPTION

2.1 Introduction

2.1.1 This Chapter describes the PoC Strategic Traffic Model with reference to the various aspects below:

- Modelling software platform used;
- Extent of the model area;
- Time periods modelled;
- Vehicle types modelled; and
- The appropriateness of this model for the analysis required by the Transport Study.

2.2 Model Software Platform: SATURN

2.2.1 The model software used is the SATURN (Simulation Assignment of Traffic to Urban Road Networks) suite of transportation modelling programs.

2.2.2 SATURN has 6 basic functions:

1) As a combined traffic simulation and assignment model for the analysis of road-investment schemes, ranging from traffic management schemes over relatively localised networks (typically of the order of 100 to 200 nodes) through to major infrastructure improvements where models with over 1000 junctions are not infrequent;

2) As a "conventional" traffic assignment model for the analysis of much larger networks (e.g., up to 6000 links in the standard PC version, 37500 in the largest);

3) As a simulation model of individual junctions;

4) As a network editor, data base and analysis system;

5) As a matrix manipulation package for the production of, for example, trip matrices; and

6) As a trip matrix demand model covering the basic elements of trip distribution, modal split, etc.

2.3 Determination of modelled time periods

2.3.1 The standard model time period for traffic simulation and assignment models is one hour, as per the guidelines listed in Section 1.2.3 above. As such, two peak-hour models were developed for the full CASP area:
AM Morning peak period: 08:00 to 09:00;
PM Evening peak period: 17:00 to 18:00;

2.3.2 The trip demand matrices for these time periods, representing a base year of 2012, were developed for the PoC Strategic Traffic Model using large amounts of survey data collected in 2012 (as described in Chapter Three of this report). The demand matrices are segregated into two vehicle types (or user classes), as follows:

**User Class One** - Light Vehicles (LVs). All cars, 4 wheel drive, utility and light vans; and

**User class Two** - Heavy Goods Vehicles (HGV’s). This user class is comprised of articulated / rigid trucks and buses with two/three or more axles.

2.4 **PoC Strategic Traffic Model Study Area**

2.4.1 Figure 2 below illustrates the Electoral Divisions (ED) which make up the PoC Strategic Traffic Model study area. The area taken into consideration for the construction of the model expands well beyond the study area, and takes into account movements originating both within Cork County and City. Chapter Four explains in detail the extent of the model network and how the origin-destination matrix was developed.
2.5 Appropriateness of the model for Strategic Assessment

2.5.1 For any model it is important to demonstrate that it is an appropriate tool for assessing the full range of traffic impact assessment types it is designed for. It is planned that the PoC Strategic Traffic Model will be used to assess the impact of both local and strategic interventions. It is therefore crucial that the traffic model incorporates the level of detail required for localised analysis and that it demonstrates the anticipated responses to interventions upon their realisation.

2.5.2 This modelling report will demonstrate that the model is an appropriate tool for assessing the Port of Cork Strategic Development:

- Detailing that the model calibration achieved is of an acceptable standard; and
- Validating the calibrated model against independent counts and measured journey times.

2.5.3 Within the context of the range of analysis required of the model, it must be understood that there is no one source that establishes the validation requirements of a general-purpose model. Each such model must be considered within the context for which it will be used and validated accordingly, without sacrificing any of the desirable responses listed above in return for the perfect reproduction of observed volumes on link flows.
3. NETWORK DEVELOPMENT

3.1 Introduction

3.1.1 The goal in developing the PoC Strategic Traffic Model was to develop a traffic model that accurately reflects current traffic conditions in the study area for the 2012 base year, and to a sufficient level of detail to allow assessments to be made on both local and strategic interventions. To achieve this goal the model must be defined in terms of road network and trip demand representation.

3.1.2 Accurate survey information that describes the road network and traffic observations are crucial inputs to the calibration and validation process. At the outset of the calibration process the following data inputs were obtained:

- **Road Network Data:** Initial base network data was gathered using digital mapping systems such as Google Earth to obtain a high level view of the network. Following this, detailed data was gathered from site visits. Junction layout details, such as permitted or banned turns, junction priority, and signal phase timings, were collected for all junctions within the simulation network of the model.
- **Survey Data:** Comprehensive survey data gathered for other projects within the study area, such as the Douglas Land Use and Transportation Study (DLUTS) and the CASP model upgrade, were used in conjunction with commissioned counts in the study area in order to fully understand traffic conditions as they currently exist.
- **Site Visits:** To facilitate an understanding of the transport environment and the general traffic conditions experienced, a series of site visits was undertaken from 10th - 13th April 2013. During the site visits, the following actions were undertaken:
  - detailed observations of current traffic management arrangements and how they affect each mode of transport;
  - an examination of the conditions experienced by each road user type, i.e. pedestrians (including school children), cyclists, cars, buses, heavy goods vehicles and so on;
  - an examination of travel behaviours of people travelling within the study area;
  - observations of local land uses and their influence on traffic and transport arrangements; and
  - an extensive set of photographic records.

3.1.3 In addition to the site visits detailed above, the following traffic survey information was utilised to develop an understanding of existing traffic conditions:

- Traffic surveys at Tivoli and Ringaskiddy ports, including turning counts at the Ferry Terminal, conducted in May 2012;
- Road Side Interviews at Tivoli and Ringaskiddy and observations at City Quays, conducted in May 2012;
Journey Time surveys along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- Automatic Traffic Counter (ATC) surveys at Bloomfield Interchange and along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- ATC surveys along the N28 and other roads in the vicinity of Douglas/Rochestown, conducted April 2012;
- Manual Classified Counter (MCC) surveys along roads in the vicinity of Douglas/Rochestown, conducted April 2012;
- MCC surveys near Dunkettle and Cork City undertaken as part of the CASP model update in November 2012;
- NRA traffic counters along the N25; and
- MCC surveys commissioned as part of this study, April 2013, at:
  - Cork Road / Church Road
  - Cork Road Bypass / Church Road

3.1.4 This data is primarily used to inform the development of the POC Strategic Access Corridor Traffic Model and to provide further information on the current traffic conditions along the corridor.

3.1.5 The survey locations are illustrated in Figure 3 below. Turning counts were taken at key junctions and give us an exact knowledge of movements within a specified junction.

3.1.6 The locations of ATC (Automated Traffic Count) surveys provide a record of traffic on the N28 along with vehicles entering and exiting at key locations. Incorporating this information enables an accurate representation of traffic flows along the N28, N40 and N8.
3.1.7 The journey time surveys were conducted on the 15th of May 2012 and the routes surveyed are shown below in Figure 4. The journey time surveys were taken in both directions for the four routes. The results of the surveys are used to validate modelled journey times against observed journey times to ensure the model is outputting reliable results.
3.2 Highway Network Development

3.2.1 The Cork Area Strategic Plan (CASP) SATURN network, which was upgraded in 2010 for the Dunkettle interchange study, was used as a base for developing the highway network. All the inputs, as listed above in Section 3.1, were then used to enhance the network to ensure it represented, as accurately as possible, the existing Road Network.

3.2.2 The model network and area covered for the PoC Strategic Traffic Model are illustrated in Figures 5 to 7 below.
Figure 5. PoC Strategic Access Corridor Model Full Area Coverage
3.2.3 As can be seen above, a very detailed highway network has been developed for the PoC Strategic Access Corridor. To ensure full network coverage and route choice all roads in the modelled area have been taken into account, from the national primary routes to minor residential streets.

3.2.4 A detailed zoning system has been put in place to connect to the network. Major trip production / attraction zones such as housing estates, shopping centres, schools, car parks and employment locations have all been designated as individual zones to provide detail in trip distribution between zones and destination choice.

3.2.5 Combined, the detailed network and zoning systems interact to provide a high level of detail, choice and accuracy in the model.
4. TRIP MATRIX DEVELOPMENT

4.1 Introduction

4.1.1 As with the network development, The Cork Area Strategic Plan (CASP) SATURN demand matrix, which was also upgraded in 2010 for the Dunkettle interchange study, was used as a base for developing the PoC Strategic Traffic Model demand Matrix. The 2010 CASP Dunkettle Model Matrix was combined with information from Site visits, Surveys and 2011 Census data to generate prior matrices for the PoC Strategic Traffic Model.

4.2 Zonal Aggregation and Disaggregation

4.2.1 Improvements to the network are not valuable unless accompanied by a finer representation of trip demand through the use of smaller zone sizes in the study area. Large zones within the study area were broken up based on the identification of different land uses within the zone. Each land use is then given its own distinct zone to represent a proportion of trips from the disaggregated zone.

4.2.2 As this study is particularly interested in the trips generated in the Ringaskiddy area, each of the different employers, schools, housing estates, etc. was allocated its own zone. This involved the disaggregation of the two zones which represented Ringaskiddy in the CASP Dunkettle Model into a total of 31 zones. Similarly, the zones representing Carrigaline were disaggregated to give a finer level of detail.

4.3 Pinpoint Zone Allocation

4.3.1 As mentioned in the previous section, a detailed disaggregation of zones in the study area was undertaken to ensure a comprehensive zonal system for the model. The allocation of trips to the correct zones was as equally important as the zone disaggregation.

4.3.2 In order to allocate trips to zones, the geo-coded locations of each employment destination were superimposed over a zone map of Ringaskiddy. Using land use and employment / population data for the area we were able to accurately identify the primary employment (attraction) and residential (production) zones for which to allocate large numbers of trips during the calibration stages.

4.4 Port Traffic

4.4.1 Particular attention was paid to traffic generated by the Port of Cork sites in Ringaskiddy, Tivoli and City Quays. Ringaskiddy Port was assigned two zones in the model, one representing the deep water berth and associated traffic and one representing the ferry terminal. Tivoli and City Quays were both represented by their own specific zones.

4.4.2 To ensure that an accurate level of base year traffic was allocated to the Port sites, the number of trips to and from these zones in the base year was based on a series of
Automatic Traffic Counters (ATC’s) and Manual Classified Counts (MCC) which were carried out over a period of two weeks in November 2012, as described in Section 3.

4.5 PM Trip Matrix Development

4.5.1 As the majority of trips in the PM peak are usually the reverse of AM peak trips (i.e. work to home versus home to work), the PM peak demand matrix was derived by transposing the AM demand matrix. This is a standard modelling technique for developing PM matrices and converts all I-J trips in the AM matrix to J-I trips in the PM matrix and vice versa. This transposed matrix was then further refined using PM peak count information in a matrix estimation process.

4.5.2 Further details on the matrix estimation process are explained in the following chapter of this report.

4.6 Summary

4.6.1 The construction of the base year prior matrices was simplified and enhanced through use of Census data to accurately reflect the population and employment in each of the model zones. These matrices were further refined using a series of traffic count data, for the study area, in a matrix estimation process which is described further in the following chapter.
5. MODEL CALIBRATION PROCESS AND RESULTS

5.1 Calibration Process

5.1.1 Calibration is intended to improve agreement in the model between observed and modelled traffic characteristics.

5.1.2 Generally, the components of the model that may be adjusted on the demand side are the trip distribution and trip production and generation rates. This adjustment usually involves trip matrix estimation.

5.1.3 On the supply side (network), modelled junction and link characteristics may be altered if sufficient new information is available to justify changes to the existing network.

5.1.4 Other aspects of the calibration are also detailed in this chapter, such as model convergence results, which determine the stability of modelled flows with respect to successive assignment iterations.

Initial Calibration Steps

5.1.5 As an initial calibration step, all modelled movements with a corresponding turning counts were examined to determine if the count exceeded modelled capacity. Remedial steps were then taken to permit realistic flows in the model.

5.1.6 Similarly the capacity and speeds of modelled links were also checked to ensure they were broadly in line with survey information.

5.1.7 As the PoC Strategic Traffic Model was coded based on a calibrated model, and used information gathered during extensive site visits in the area, it was felt that the network coded was an accurate and up-to-date representation of the existing road network, and so, did not need to be altered significantly during the calibration process. As a result of this, the most significant calibration adjustments taken were on the demand side, i.e. adjustments to trip distribution and trip production / generation. If required however, the following model parameters could be adjusted if there is clear reason for doing so:

Network Adjustment Possibilities

- Junction type (Priority, Signalised, Roundabout);
- Road lengths;
- Signal timings;
- Link free flow travel speed;
- The number of approach lanes at each junction arm;
- Traffic lane width per junction approach, and the lane discipline adopted (including prohibited turns);
- Saturation flow through junctions;
- Assumed road capacities;
- Link based flow-delay relationships;
5.2 Trip Demand Adjustment (Matrix Estimation)

5.2.1 The prior matrix is adjusted only after all options for improving the network are exhausted. Any matrix adjustment must significantly improve the match between observed and modelled flows, and not introduce more trips into a zone than could realistically be expected. Controls are placed on zones to ensure that the trip demand generated by zones is sensible and in line with census population and employment statistics.

AM Matrix

5.2.2 Trip demand is adjusted according to count data, so that there is an improved agreement between counts and modelled flows. For the AM time period the AM prior matrix (described above in Chapter Four) is fed into a SATURN programme called ME2. ME2 then adjusts origin-destination patterns to produce a trip demand matrix that better replicates traffic counts when assigned to the network. When this replication is satisfactory the matrix is said to be calibrated.

PM Matrix

5.2.3 For the PM time period a transposed AM matrix was used as the prior matrix in the ME2 Process. As with the AM matrix, ME2 then adjusted origin-destination patterns to produce a trip demand matrix that better replicated PM count data when assigned to the network. Again controls were put in place to ensure that trip demand generated was sensible and that a representative number of trips were made to the shopping centres and streets in the Study Area. A number of iterations of the ME2 process were completed until the replication was satisfactory and meets guideline standards.

5.3 Matrix Adjustment Constraints

5.3.1 The algorithm driving the ME2 estimation process tends to favour reducing long trips above chains of short trips (especially when counts are spread over the entire area), which may not fully reflect reality.

5.3.2 Constraints are therefore placed on the adjustment process to protect the number of movements and the distribution of the through trips contained within the original car trip matrix. By restricting the reduction of such long through trips, the matrix adjustment algorithm is forced to create or re-distribute short trips.

5.3.3 Detailed constraints were developed using Census data and land use information. By applying standard trip rates to the land uses in each model zone it was possible to determine a range of the likely amount of trips that will originate or end in each zone.
5.4 Traffic Flow Accuracy Measure: GEH

The GEH statistic is a measure that is used to assess the accuracy of modelled data. It considers both absolute and proportional differences in flows. Thus for high levels of flow a low GEH may only be achieved if the percentage difference in flow is small. For lower flows, a low GEH may be achieved even if the percentage difference is relatively large. GEH is formulated as:

\[
GEH = \frac{(observed - modelled)^2}{0.5 \times (observed + modelled)}
\]

The reason for introducing such a statistic is the inability of either the absolute difference or the relative difference to cope over a wide range of flows. For example an absolute difference of 100 pcu/h may be considered a big difference if the flows are of the order of 100 pcu/h, but would be totally unimportant for flows of the order of several thousand pcu/h. Equally a 10% error in 100 pcu/h would not be important, whereas a 10% error in, say, 3000 pcu/h might mean the difference between building an extra road lane or not.

5.4.2 In general the GEH parameter is less sensitive to the above statistical biases since a modeller would probably feel that an error of 20 in 100 would be roughly as bad as an error of 90 in 2,000, and both would have a GEH statistic of roughly 2.

5.4.3 As a rule of thumb in comparing assigned volumes with observed flows, a GEH parameter of 5 or less would be an acceptable fit, while GEH parameters greater than 10 would require closer attention.

5.4.4 Two primary guideline documents, the British Design Manual for Roads and Bridges (DMRB) Volume 12a and the NRA Project Appraisal Guidelines Appendix 3, were used as a basis for assessing the appropriateness of the highway model for traffic appraisal. The DMRB Volume 12a guidelines are a widely accepted standard in Ireland with the NRA basing their guidelines on this document that provides extremely robust validation criteria to which certain types of highway models should adhere.

**DMRB Guidance on GEH Distribution**

5.4.5 DMRB sets a guideline that 85% of links (when measured in vehicles per hour) should have GEH less than 5. In addition, it is commonplace to establish that 90% of assessment links have a GEH of less than 10 and that 100% of validation links have a GEH less than 20.
5.5 Link Count Calibration

5.5.1 For the calibration process, the corresponding model junction was identified for each turning movement count survey site. Each individual turning movement was used in the calibration, forcing the ME2 estimation process to derive a trip matrix that would fit each surveyed turning movement.

5.5.2 The locations for the turning movement and ATC counts are outlined above in Figure 3. As illustrated in the map, a large proportion of the study area is covered by counts, which allows for a high degree of control in the matrix estimation.

5.6 Model Fit to Counts (Prior to Calibration)

5.6.1 An initial test was performed to determine how well the existing disaggregated demand matrices assigned to the DTM replicated observed traffic volumes. Table 5.1 below details the model fit prior to undertaking the calibration process for each of the time periods modelled.

<table>
<thead>
<tr>
<th>GEH</th>
<th>AM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEH &lt; 5</td>
<td>36%</td>
<td>59%</td>
</tr>
<tr>
<td>GEH &lt; 10</td>
<td>69%</td>
<td>83%</td>
</tr>
<tr>
<td>GEH &lt; 20</td>
<td>98%</td>
<td>100%</td>
</tr>
<tr>
<td>Overall Average GEH</td>
<td>7.5</td>
<td>5.5</td>
</tr>
</tbody>
</table>

5.6.2 The percentage of total traffic at all count locations with a GEH less than 5 is low at 36% in the AM and 59% in the PM; this falls far short of DMRB guidelines.

5.6.3 The remaining course of action to improve the fit between model flows and assigned volumes was therefore to perform controlled adjustments to the prior matrix using matrix estimation techniques (as described above in Section 5.2).

5.7 GEH Statistics for Calibrated Model

5.7.1 Table 5.2 below summarises the GEH calibration results for the model after the matrix estimation process, for each of the two modelled time periods.

<table>
<thead>
<tr>
<th>GEH</th>
<th>AM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEH &lt; 5</td>
<td>89%</td>
<td>90%</td>
</tr>
</tbody>
</table>

Table 5.2 Count Validation Statistics (Post-Calibration)

Consent of copyright owner required for any other use.
The figures demonstrate that an excellent calibration has been achieved in the model for the morning and evening peak periods, with both time periods having an overall GEH of over eighty five percent, falling well within DMRB Standards.

5.8 Linear Regression of Counts and Modelled Flows

5.8.1 DMRB recommends a further check on flow validation: to fit a linear regression line through the origin with observed flow as the independent variable and modelled flow as the dependent variable. The slope and R² measure of goodness of fit pre-calibration and post-calibration are presented in Table 5.3 and Table 5.4.

5.8.2 DMRB guidance is that the slope of the regression line is in the range 0.9 to 1.1 and that R² is greater than 0.85.

<table>
<thead>
<tr>
<th>MEASURE OF FIT</th>
<th>AM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope</td>
<td>0.77</td>
<td>0.92</td>
</tr>
<tr>
<td>R²</td>
<td>0.78</td>
<td>0.95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEASURE OF FIT</th>
<th>AM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope</td>
<td>0.98</td>
<td>1.00</td>
</tr>
<tr>
<td>R²</td>
<td>0.99</td>
<td>0.99</td>
</tr>
</tbody>
</table>

5.8.3 Both slope and R² criteria are met in the post-calibration regression analysis.

5.8.4 The following charts show the correspondence between count and modelled flow data sets, with the best fit linear match plotted on each graph. The two graphs shown are for the prior and post calibration data sets, to show how the relationship between observed and modelled flows is improved by calibration.

5.8.5 Figures 8 to 11 illustrate the fit achieved between the modelled and measured link flow for the pre-calibration and post-calibration trip matrices for each of the time periods modelled. The data points are distributed closely to the y = x straight line without any
significant outliers. This uniformity is reflected in the $R^2$ values detailed in Table 5.4 above.

Figure 8. Pre-Calibration Fit of Observed Vs Modelled AM-Peak Flows
Figure 9. Post-Calibration Fit of Observed Vs Modelled AM-Peak Flows

Figure 10. Pre-Calibration Fit of Observed Vs Modelled PM-Peak Flows
Figure 11. Post-Calibration Fit of Observed Vs Modelled PM-Peak Flows
5.9  Model Convergence

5.9.1  The parameter used by Saturn to monitor the rate of convergence is the percentage of link flows which vary by less than a specified percentage between loop n and loop n-1.

5.9.2  The values used in each assignment during calibration are that 98% of links should differ by less than 5% between subsequent iterations.

5.9.3  This convergence criterion is achieved for all assignments carried out in calibrating the model.

5.10  Trip Length Distribution

5.10.1  A further calibration step is to compare trip length distributions for the prior and post calibrated matrices to ensure they have not been distorted in any way by the ME2 process.

5.10.2  Trip length distribution is compared below for the Light Vehicle matrix for the AM and PM peak periods. The number of trips made is shown on the y-axis. Distance bands are shown on the x-axis. The data shows that there is little difference evident in terms of how trip distribution was adjusted by the overall matrix adjustment process.

5.10.3  The trip length distribution of the prior (red line) and post-calibration (blue line) matrices for both the AM and PM peak period are shown below in Figures 12 and 13. The data shows that the ME2 process has added some trips to the matrix. These trips represent other non-work related trips which would have been absent from the initial prior matrix and so it is considered that the Matrix estimation has worked correctly in this instance and 'in-filled' missing trips that were absent from the original prior matrix.
Figure 12. LV trip length distribution in AM Peak

Figure 13. LV trip length distribution in PM Peak
5.11 Summary of Calibration Actions

5.11.1 To improve the agreement between the observed and modelled traffic characteristics, a number of calibration steps were taken for the PoC Strategic Traffic Model.

The first and most significant of these was to carry out a matrix estimation for each of the modelled period matrices to ensure origin-destination patterns in the model were consistent with those observed during traffic count surveys.

Following on from the matrix estimation process, a link count calibration was carried out. During this stage, modelled flows for each time period were compared with actual flows. The results of these comparisons (outlined in Table 5.4) show an excellent calibration between modelled and observed flows with all time periods falling well within DMRB and NRA Project Appraisal guidelines.

Further calibration checks carried out on the PoC Strategic Access Corridor Traffic Model include linear regression analysis and trip length distribution analysis. All of which demonstrated that the model is very stable and meets all DMRB criteria for model calibration.
6. **VALIDATION**

6.1 **Introduction**

6.1.1 This section sets out additional comparative measures by which the robustness of the calibrated model may be judged. The following model performance characteristics are detailed:

- Comparison of modelled traffic flows to each individual survey location; and
- Comparison of modelled journey times to observed journey times

6.2 **Individual Survey Location Validation**

6.2.1 Modelled flows were compared with 97 AM and 97 PM link flows. These junctions were chosen to provide a wide geographical spread of validation locations around the modelled area of interest.

6.2.2 DMRB presents additional guidelines for traffic flow validation. These guidelines are that 85% of modelled links should satisfy the following criteria when comparing with observed data:

- flows within 100 for links with flow less than 700 vehicles per hour;
- flows within 15% for links with flow between 700 and 2,700 vehicles per hour; and
- flows within 400 for links with flow over 2,700 vehicles per hour.

6.2.3 The results in Table 6.1 below were obtained when testing all individual link counts throughout the model under the three criteria set out above.

<table>
<thead>
<tr>
<th>DMRB CONDITION</th>
<th>AM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow &lt; 700; modelled within 100</td>
<td>90%</td>
<td>89%</td>
</tr>
<tr>
<td>700 &lt; Flow &lt; 2750; modelled within 15%</td>
<td>89%</td>
<td>94%</td>
</tr>
<tr>
<td>2750 &lt; Flow; modelled within 400</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

6.2.4 All of the alternative DMRB criteria are entirely satisfied for the post-calibration trip matrix.

6.3 **Journey Time Validation**

6.3.1 Travel time surveys were obtained by SYSTRA as part of this study. Survey times were taken along four routes in both directions. Along each route, the journey time was taken at a series of different survey points in order to properly observe the journey time along stages of the route.
6.3.2 The journey time survey routes are illustrated in Figure 14 below and were as follows:

**Light Blue Route:** N28 Shannonpark Roundabout to N28/Ferry Terminal

**Pink Route:** N28 Shannonpark to N28 Bloomfield Interchange

**Blue Route:** N28 Bloomfield Interchange to N20/North Ring Road

**Red Route:** N20/Blackpool shopping centre to N28 Bloomfield Interchange

![Figure 14. Journey Time Survey Routes](image)
AM Journey Times

6.3.3 Table 6.2 below summarises the journey travel times against the model times for these four routes in the AM peak modelled periods.

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>OBSERVED TIME (SECONDS)</th>
<th>MODELLED TIME (SECONDS)</th>
<th>% DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Blue Route WB</td>
<td>367</td>
<td>325</td>
<td>11%</td>
</tr>
<tr>
<td>Light Blue Route EB</td>
<td>346</td>
<td>415</td>
<td>20%</td>
</tr>
<tr>
<td>Pink Route SB</td>
<td>308</td>
<td>348</td>
<td>12%</td>
</tr>
<tr>
<td>Pink Route NB</td>
<td>532</td>
<td>462</td>
<td>13%</td>
</tr>
<tr>
<td>Blue Route SB</td>
<td>995</td>
<td>1037</td>
<td>4%</td>
</tr>
<tr>
<td>Blue Route NB</td>
<td>1265</td>
<td>1005</td>
<td>20%</td>
</tr>
<tr>
<td>Red Route SB</td>
<td>1256</td>
<td>1131</td>
<td>9%</td>
</tr>
<tr>
<td>Red Route NB</td>
<td>1299</td>
<td>1144</td>
<td>12%</td>
</tr>
<tr>
<td>Routes Combined</td>
<td>6368</td>
<td>5964</td>
<td>6%</td>
</tr>
</tbody>
</table>

6.3.4 The DMRB guidelines advise that modelled journey times should be within 15% of the observed time. Seven out of nine of the routes surveyed in the AM peak satisfy these criteria.

6.3.5 The first of the routes which does not meet the DMRB criteria is the Light Blue Route eastbound which has a modelled time 20% greater than the observed journey time, indicating that modelled flows on this route are slower than those observed during the journey time surveys. However, during a number of site visits to the area significant levels of queuing were observed eastbound through Shanbally Village which are not represented in the original journey time surveys. Therefore it was concluded that the extra delay in the model was realistic and representative of the delay that occurs on this section of the N28 during the AM peak.

6.3.6 The second route to fall outside the DMRB guidelines was the Blue Route northbound. Closer analysis of this route (shown below in Figures 15 and 16) showed an excellent correlation between observed and modelled journey times on the section of the route covering the N40 and N27. The difference between observed and modelled journey times on this section was only 4%. The journey times on the section of the route which
passes through Cork City Centre are faster in the model than those observed. However, as this model focuses on the PoC Strategic Access Corridor, it was decided that results on the section not corresponding directly to the study area were not as significant as those inside the study area, so these differences are considered to be acceptable.

![Figure 15. Blue Route NB – Section 1 Journey Times](image1)

![Figure 16. Blue Route NB – Section 2 Journey Times](image2)
PM Journey Times

6.3.7 Table 6.3 below summarises the journey travel times against the model times for the same routes for the PM peak modelled period.

Table 6.3 Observed Vs Modelled Journey Times during the PM Peak

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>OBSERVED TIME (SECONDS)</th>
<th>MODELLED TIME (SECONDS)</th>
<th>% DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Blue Route WB</td>
<td>395</td>
<td>354</td>
<td>10%</td>
</tr>
<tr>
<td>Light Blue Route EB</td>
<td>335</td>
<td>319</td>
<td>4%</td>
</tr>
<tr>
<td>Pink Route SB</td>
<td>380</td>
<td>337</td>
<td>11%</td>
</tr>
<tr>
<td>Pink Route NB</td>
<td>352</td>
<td>358</td>
<td>1%</td>
</tr>
<tr>
<td>Blue Route SB</td>
<td>1012</td>
<td>1099</td>
<td>8%</td>
</tr>
<tr>
<td>Blue Route NB</td>
<td>1221</td>
<td>984</td>
<td>19%</td>
</tr>
<tr>
<td>Red Route SB</td>
<td>1249</td>
<td>1052</td>
<td>15%</td>
</tr>
<tr>
<td>Red Route NB</td>
<td>1218</td>
<td>1068</td>
<td>12%</td>
</tr>
<tr>
<td>Routes Combined</td>
<td>6162</td>
<td>5571</td>
<td>9%</td>
</tr>
</tbody>
</table>

6.3.8 The DMRB guidelines have been met for eight out of nine of the routes surveyed in the PM peak. The one route which just misses out on reaching the DMRB criteria is the Blue Route northbound. Similar to the AM peak there is a good level of correlation between the observed and modelled flows on the section of this route which is within the study area (7% difference between modelled and observed in this case).
7. CONCLUSIONS

7.1 Overview

7.1.1 This report documents the development, calibration, and validation of the PoC Strategic Traffic Model for a base year of 2012.

7.1.2 Two one-hour models were calibrated and validated. These are the AM peak period from 08:00 to 09:00 and the PM peak period from 17:00 to 18:00.

7.1.3 Traffic flow calibration and validation indicates that the correlation between modelled and observed flows is excellent for the PoC Strategic Traffic Model area for all periods modelled.

7.1.4 The traffic flow validation of 97 AM and 97 PM individual link flows is acceptable using both the standard guidelines and the alternative criteria outlined by the DMRB. The regression analysis also indicates that there is no strong bias in the modelled flows.

7.1.5 The resulting conclusion is that the highway assignment model is fit for purpose. It represents AM and PM peak period base year traffic conditions well, as demonstrated statistically in Chapters Five and Six. It provides a robust basis for assessing impacts on the road network with the introduction of large scale developments for the following reasons:

- The model realistically represents journey times;
- The study area is covered by a large number of counts for both calibration and validation; and
- Regression analysis indicates a high correlation between modelled and observed flows and no strong biases.
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APPENDIX 8.4 MOBILITY MANAGEMENT PLAN
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