5.9 Material Assets (Waste and Transportation)

5.9.1 Waste

This section addresses the issue of waste management at the proposed cruise berth facility. It addresses waste generation during both the construction and operational phases of the proposed development. It has been prepared by AWN Consulting based on the information provided by the project team.

A comprehensive, site specific Construction and Demolition Waste Management Plan (C&D WMP) has been prepared for the construction and demolition phase of the development. A preliminary Operational Waste Management Plan has been prepared for the operational phase of the proposed development. (DLHC currently operate the existing harbour facilities in accordance with their Port Waste Management Plan, 2010. It is likely that the Port Waste Management Plan will be revised by DLHC subject to the evolving needs of the development). This will ensure the sustainable management of wastes arising at the development, in accordance with current best practice and legislative standards. The C&D WMP is provided at Appendix 5.9.1 of this EIS.

5.9.2 Methodology

Waste generation models have been used to estimate waste types and quantities for both the construction and operational phases of the proposed development. Waste composition and generation rates used in the model were obtained from a number of sources including published information from scientific papers and published Irish and US EPA data. Estimates of waste arising from demolition, total area of new build and the nature of the proposed development have been considered, based on the schedule of areas and construction methodology provided by the project team including Waterman Moylan (consulting engineers).

5.9.3 Literature Review

An extensive document review has been completed to assist in identifying current and future requirements for waste management at the development. Documents considered included the following:

National Waste Policy comprising:

- Changing Our Ways; A Policy Statement on Waste Management, DoEHLG, 1998;
- Preventing and Recycling Waste – Delivering Change, DoEHLG, 2002;
- Making Ireland's Development Sustainable – Review, Assessment and Future Action, World Summit on Sustainable Development, 2002;
- Taking Stock and Moving Forward, DoEHLG, 2004;
- A Resource Opportunity, Waste Management Policy in Ireland, Dept. of the Environment, Community and Local Government, 2012;
- Eastern – Midlands Regional Waste Management Plan 2015/2021
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Department of the Environment, Heritage and Local Government (DoEHLG), 2006;
- Construction and Demolition Waste Management – a handbook for Contractors and Site Managers, FÁS and the Construction Industry Federation, 2002;

- Characterisation of Building Uses, US EPA;
- National Waste Database Reports 1998 - 2012, Environmental Protection Agency, Wexford.

EU Legislation such as:

- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of Annex II to Directive 1999/31/EC;
- Council Directive 1999/31/EC, on the landfill of waste;
- European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC);
- Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC).

All legislation arising from MARPOL 73/78 – International Convention for the Prevention of Pollution from ships including:

- EU Directive 2000/59/EC on port reception facilities for ship generated wastes and cargo residues
- European Communities Port Reception Facilities for Ship Generated Waste and Cargo Residues Regulations, 2003 SI 117 of 2003 (and amendment regulations SI 376 of 2009)
- Sea Pollution Act No 27 of 1991 and amendments
- Sea Pollution (Prevention of Oil Pollution Regulations) 2007 SI No 788 of 2007

Statutory Instruments (as amended) such as:

- Waste Management Act 1996 (S.I. No. 10 of 1996) as amended by the Waste Management (Amendment) Act 2001 and Regulations including:
- Waste Management (Facility Permit and Registration) Regulations, S.I No. 821 of 2007 as amended 2008 (S.I No. 86 of 2008);
- Waste Management (Collection Permit) Regulations S.I No. 820 of 2007 as amended 2008 (S.I No 87 of 2008);
- Waste Management (Hazardous Waste) Regulations 1998;
- Waste Management (Packaging) Regulations 2003 (S.I. No. 61 of 2003);
- Waste Management (Licensing) Regulations 2000 (S.I 185 of 2000) as amended 2002 (S.I 336 of 2002);
- Waste Management (Planning) Regulations 1997 (S.I. 137 of 1997);
- Waste Management (Landfill Levy) Regulations 2002 (S.I 86 of 2002);
- Litter Pollution Act 1997 and Regulations;
- Local Government Act 1994 and Regulations;

- WEEE Directive 2002/96/EC and Regulations;

Local Authority Plans such as:

- Dun Laoghaire Rathdown County Development Plan 2010-2016
- Draft Dun Laoghaire Rathdown County Development Plan 2016-2022

The C&D WMP was prepared following the methodology outlined in the Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, published by the Department of Environment, Heritage & Local Government in July 2006. The "Construction and Demolition Waste Management – a handbook for Contractors and Site Managers" published by FAS and the Construction Industry Federation in 2002 was also referenced.

There are presently no guidelines on the preparation of formal operational waste management plans in Ireland. A preliminary operational plan for the proposed development has been prepared by AWN based on our experience and the available information on management of wastes associated with cruise ship activities. It is anticipated that a more detailed plan will be developed as waste generation rates become established at the proposed development. (The preliminary plans are provided at Appendix 5.9.2 of this EIS).

5.9.4 Receiving Environment

The proposed project involves construction of a new cruise ship facility to accommodate direct berthing of existing and next generation cruise ships within Dun Laoghaire Harbour. The facility will principally comprise a new berth capable of handling cruise ships up to "Freedom Class" – this typically means vessels up to 340m in length and with weights of up to c.70 tonnes. The berthing facility will require a number of specified maritime and landside works including the dredging of an approach and inner navigational channel, turning circle and a new 435m long quay to be located in the western area of the harbour. Landside modifications include resurfacing of roads and pedestrian access/walkways, providing additional parking and re-using existing buildings for reception of passengers, access control etc.

Dun Laoghaire Harbour is located on the southern edge of Dublin City. The harbours primary function has been as a ferry port facilitating Stena crossings between Dun Laoghaire and Holyhead in Wales. This service has now ceased. The harbour is also an important recreational and leisure facility. The marina accomodates a number of yacht clubs and berthing facilities for other boats and vessels. In 2011 DLHC published a masterplan with the intention of developing the Harbour area as a major marine, leisure, cultural and tourism destination. The proposed cruise berth is an important aspect of that plan.

The site is located in the Dun Laoghaire Rathdown County Council administrative area. In terms of waste management the receiving waste management environment is characterised by a combination of private waste contractors and local authority infrastructure.

5.9.4.1 Waste Infrastructure

Waste policy for the Dun Laoghaire Region is set out in the Eastern-Midlands Region 2015-2021). Chapter 13 of the DLRCC County Development Plan 2010-2016 sets out the framework for waste management in the DLRCC region.

Significant changes have occurred in wastes management at European and National level since the mid 2000's and as a result traditional landfill disposal in the County is now minimal. In accordance with the requirements of National policy including recent "Waste: A Resource Opportunity" and the revised Waste Framework Directive 2008/98/EC, waste management practices have been moved up the waste hierarchy and a countywide network of Recycling Centres and Bring Centres has been established to maximise the recovery of post consumer recyclables by transferring them to materials recovery or recycling facilities.

The 2010-2016 policy and draft 2016-2022 documents state that "sanitary landfill or other suitable means" remains the preferred waste solution for non recyclables in the DLRCC administrative area. DLRCC also states that in collaboration with the other Dublin Local Authorities that it wil utilitse the facilities of the Waste to Energy facility at Poolbeg. The facility is currently under construction and expected to begin receiving wastes in late 2017.

There is just one EPA licensed landfill in the DLRCC region. The Ballyogan Landfill facility ceased accepting waste to the landfill in 2005 and began baling and transferrring wastes to Arthurstown Landfill in the South Dublin region. Ballyogan Landfill is currently in the aftercare phase with the long term intention of returning it to a public recreation space. The baling activity ceased and Arthurstown landfill closed in December 2010.

In the wider Dublin region, a project to establish a new landfill for the Fingal Region at Nevitt in North County Dublin was abandoned in 2012 due to the high cost and uncertainty around future need for landfill capacity in the region. In the face of diminishing landfill space and higher landfill costs, the practice of exporting treated municipal waste for recovery at waste to energy facilities abroad has increased significantly over the past c.4 years.

In terms of other waste infrastructure, Murphy Environmental (MEHL) have licensed facilities at Hollywood near the Naul Co Dublin (and Gormanstown in Co Meath) for the acceptance of certain wastes including mildly contaminated soils. There are a number of soil recovery facilities permitted in accordance with the Waste Management Facility Permit Regulations 2007 as amended in the Fingal region and greater Dublin region. These facilities typically have a capacity of between 50,000 and 100,000 tonnes per annum.

In relation to infrastructure for disposal of marine and dredging wastes (of particular relevance to this project), the EPA is the regulatory authority tasked with licensing "dumping at sea" activities under the Waste Management Act 1996 as amended. A total of 19 facilities for dumping at sea have been granted permission by the EPA to date for dumping at sea activities in various locations. In the Dublin region, a Dumping at Sea (DaS) permit was issued to Dublin Port Company on 28 July 2011 for dredging and dumping activities at a designated area at the Burford Banks located approximately 5km offshore. It is understood that the Burford Bank site is also in use for disposal of dredging waste from other dredging activities in the Dublin region including Howth Yacht club.

5.9.5 Characteristics of the Proposed Development

The new berth is to be located in the centre of the harbour directly south of the existing harbour mouth. The existing harbour is enclosed within a western pier and eastern pier. Within the harbour there are two breakwaters. These breakwaters shelter the inner waters of the harbour. There are a variety of land uses on the landside of the Harbour i.e. along Harbour Road, Dun Laoghaire. These include the Irish Lights buildings, the Dun Laoghaire Marina (berthing of yachts and other small vessels) and associated recreational facilities.

The new quay structure will extend approximately 450m northwards from a point just west of the Hobbler Memorial on the eastern marina breakwater. The berth will consist of a 120m long by 20m wide concrete quay supported on tubular steel piles, located 180m north of the breakwater, this quay will be connected to the eastern marina breakwater by an approximately 9.1m wide concrete access causeway also supported on tubular steel piles. Ships will berth along the eastern side of the quay.

In order to cater for cruise ships up to 340m in length, sufficient water needs to be provided at the berth and in a navigation channel from the berth seaward. A depth of 10.5m below Chart Datum is required to provide safe naviation for vessels. The propsoed navigation channel for large cruise ships will be 120m wide and will approach from the harbour entrance from deep water to the east, to a turning circle, 550m in diameter and centred approximately 300m north of the harbour entrance. The creation of the channel will require the dredging of a minimum of 710,000m^3 of sediment comprising sand and silt from the seabed. Initial testing has indicated that the material is relatively uncontaminated (with reference to the relevant sediment quality standards set out in Guidelines for the Assesment of Dredge Material for Disposal in Irish Waters, Marin Institute 2006) and should be suitable for disposal at the

existing spoil disposal grounds at Burford Banks. Any disposal of dredged materials will be subject to granting of a Dumping at Sea Permit by the EPA.

5.9.6 Potential Impact of the Proposal

5.9.6.1 Construction and Demolition Phase

The construction phase of the proposed development will primarily comprise;

- Dredging of the Proposed Navigation Channel and Turning Circle (for access into the Berth)
- A shared use pedestrian and private vehicle access zone located adjacent to the existing Marina together with a new boardwalk parallel to this shared area, complete with new feature lighting
- A new pedestrian footpath with high quality concrete pavement along Harbour Road providing linkage with the existing Terminal Plaza complete with new feature lighting
- A 20 coach drop off/ pick up area within a dedicated section of the existing HSS ferry marshalling area
- A coach overflow holding area placed within Accommodation Walk which straddles the Old Quay Bridge at the west of the Harbour
- Local modifications to an existing retaining wall adjoining the car park located adjacent to the Old Quay area also at the west of the Harbour
- Demolition of certain harbour infrastructure such as an RC boundary wall along the HSS Yard boundary, the motorist's administration building, a section of the port cocher canopy structure, plus tree removal and replacement
- Construction of new buried utilities and services, and miscellaneous lighting columns and signage for vehicles and non-motorised users.

Given the nature of the proposed project, the greatest potential impact of the proposed development (in terms of waste) is from the inappropriate disposal of wastes generated during construction and operation. The quantity of dredging waste anticipated during construction represents a significant quantity of wastes. Comparatively the volumes of other wastes generated by the construction and demolition works will be small. Stripping and remodelling of roads will generate quantities of waste tarmacadam/concrete etc

It is considered unlikely that there will be any significant quantity of hazardous wastes generated by the construction and demolition activities. The condition of the marine sediments to be dredged has been assessed as detailed in Chapter 5.3 Soils and Geology.

Predicted Waste Generation - Construction and Demolition Phase

The main waste streams that will be generated by the construction and demolition activities at the site are listed on Table 5.9.1 below together with their European Waste Catalogue (EWC) and Hazardous Waste List codes;

Table 5.9.1 Predicted Waste types by EWC Code

Waste Description	EWC Code
Concrete, Bricks, Tiles, Ceramics	17 01
Wood Glass and Plastic	17 02
Bituminous mixtures, coal tar and tarred products	17 03
Metals (including their alloys)	17 04
Soil and Stones	17 05
Gypsum- based construction material	17 08
Electrical and Electronic Components	16 02
Batteries	16 06
Wood Preservatives	03 02
Liquid Fuels	13 07
Soil and Stones containing dangerous substances	17 05 03
Dredging Spoil containing dangerous substances	17 05 05*
Dredging spoil other than those mentioned in 17 05 05	17 05 06
Other Insulation materials consisting of or containing dangerous substances	17 06 03
Other construction and demolition wastes containing dangerous substances	17 09 03
Paints, Inks, Resins and Adhesives containing dangerous substances	20 01 27

In terms of quantities of wastes likely to be generated, AWN have prepared a preliminary waste generation model for construction and demolition wastes. The estimated quantities are described below and in the waste plans at Appendix 5.9.1 of this EIS.

Construction Waste

The EPA has produced figures for the recorded national C&D waste generation in the *National Waste Database* [7]. This includes a percentage breakdown of the composition of the waste showing the typical percentage of each waste type present in the C&D stream at typical construction and demolition project. As the proposed cruise berth facility is atypical in many ways, when compared to an average land based construction and demolition project, these values are of limited use to this project. The values are relevant to the landside aspect of the development only. (Detailed estimates have been prepared by the consulting engineers in relation to marine dredging wastes and so a combination of these sources of information has been used to generate likely waste generation estimates during construction.)

Table 5.9.2 shows the breakdown of the C&D waste types (from Irish EPA figures) produced on a typical construction and demolition site.

Table 5.9.2 Typical C&D waste generation broken down by %

Waste Types	%
Glass	3
Concrete, Bricks, Tiles, Ceramics	64
Plasterboard	4
Asphalt, Tar and Tar Products	6
Metals	2
Slate	8
Timber	13
Total Waste	**100**

Table 5.9.3 shows the predicted quantities of construction waste generation for the proposed development based on the available information. The predicted waste amounts are based on the information provided by the design team including Waterman Moylan. Note that until final materials and methods of construction have been decided there may be a variation in the quantities of predicted construction waste that will be generated. It is not anticiapted that significant quantities of metals, timber, plasterboard and other wastes will be generated.

Table 5.9.3: Predicted Construction Waste Amounts (main waste types)

Waste Types	Waste (m^3)
Marine Dredging Spoil	710,000
Concrete	1,094
Road Materials (Asphalt, Tar and Tar products)	1,078
Total	**712,172**

As can be seen above the largest volume of wastes likely to arise is dredging spoil generated from construction of the navigation channel. It is estimated that 15,000-20,000m^3 of infill material is required to infill a void close to shore. The remainder will be disposed at the Burford Banks subject to an application to the EPA for a Dumping at Sea permission.

Demolition Waste

Based on the structures proposed to be demolished and their respective floor areas the amount of demolition waste is likely to be minor. Approximate quantities of waste predicted to be generated for the proposed development have been calculated. Table 5.9.4 shows the predicted demolition waste that will be generated and indicative targets for the management of this waste on the site (based on Table 5.9.2). Note this does not include the port cochere sturcture which is of non standard construction so a separate allowance of <100m^3 of metal waste is considered for that aspect of the demolition process.

Table 5.9.4: Predicted Demolition Waste Generation and Targets for the Proposed Development

	Total Waste	**Reuse/Recover**		**Recycle**		**Disposal**	
Waste Types	**tonnes**	**%**	**tonnes**	**%**	**tonnes**	**%**	**tonnes**
Glass	1.1	0	0	85	0.935	15	0.165
Concrete, Bricks, Tiles, Ceramics	22.1	85	18.785	5	1.105	10	2.21
Plasterboard	1.4	0	0	0	0	100	1.4
Asphalt, Tar and Tar products	2.1	0	0	25	0.525	75	1.575
Metals	0.7	5	0.035	80	0.56	15	0.105
Slate	2.8	0	0.0	85	2.38	15	0.42
Timber	4.5	10	0.45	40	1.8	50	2.25
Total	34.7	-	19.27	-	7.305	-	8.125

Actual demolition waste production figures will be calculated prior to work commencing based on detailed assessments of the building by survey, including material types, wall thickness, building heights and depth of foundations.

5.9.6.2 Operational Phase

In order to prepare this portion of the assessment and identify the likely waste streams (and volumes of those waste streams) expected at the proposed development, AWN Consulting reviewed the following documents;

- Waste Management Plan for Dun Laoghaire Harbour Company, 2010
- Published Scientific Papers on wastes generated by Cruise Ships including "The impact of cruise ship generated waste on home ports and ports of call: A Study of Southampton, Nickie Butt, Marine Policy 31 (2007) 591-598

Operational Waste Generation Rates

There are a limited number of published studies on the typical rates of waste generation from Cruise Ships however of those that are available the above referenced Marine Policy Paper pubslihed by Science Direct/Elsevier (Nickie Butt, 2007) is considered most pertinent. Data provided by the Dun Laoghaire Harbour Company has also been considered in the preparation of inputs to the model as have the rates of waste generation detailed in various industry guidance documents and published scientific studies.

Based on our review of the design and operation of the proposed facility as **a Port of Call facility only,** limited storage space is required for the management of wastes (i) arising directly from cruise ships and (ii) from passengers using landside reception/café/washroom facilities.

In summary, modern cruise ships have on board facilities for the incineration of up to 75-80% of the solid wastes generated on board. (The ash generated from incineration is disposed at sea when permitted under the relevant marine legislation including MARPOL 73/78).

International Maritime Organisation estimates indicate that typical waste generation rates of 3.5kg/passenger per day can be expected. This amounts to 50-70 tonnes of waste per week for a cruise ship of 3000 passengers.

Cruise ships have storage facilities on board for wastes which are generally reserved for wastes which require recycling or cannot be disposed at sea (such as plastics). Some have facilities for crushing of glass, compacting of light recyclables such as paper and cardboard etc.

Ballast water and waste water is treated on board in a sewage treatment system. Modern systems include advanced water purification systems. (Other oily wastes associated with maintenance of ships engines and other plant are only typically handled at home ports such as Southampton). Waste water is discharged at sea subject to the relevant regulations.

Typical hazardous wastes generated on board can include wastes from photo processing faciltiies, dry cleaning, printing wastes, lighting wastes and batteries. Again most of these wastes are generally disposed at a home port or by arrangement with hazardous waste contractors rather than at a port of call facility as proposed at Dun Laoghaire.

A designated waste setdown area of $20m^2$ will be located on the quay close to the berth so that waste can be easily transferred from cruise ships. This storage area will be large enough to receive up to 1 days typical waste generation from a large cruise ship pending transfer to the waste collection point at the landside reception/cafe building. A similar area of $20m^2$ is required at this building (please refer to operational waste management plan). It is unlikely that the DLHC berth facility will be required to accept this volume of waste on a regular basis. Nevertheless capacity has been provided to deal with any such scenario should it arise. Waste contractors may also be engaged directly by cruise ships to collect wastes directly from the cruise ships on a need only basis. The location of the designated waste storage area is shown on the drawings accompanying the application.

5.9.7 Avoidance, Remedial or Reductive Measures

This section details the mitigation measures that will be implemented to ensure that waste generated on the site is handled in a legally compliant manner, and that significant levels of reuse, recovery or recycling are achieved.

A site specific Construction and Demolition Waste Management Plan and a preliminary Operational Waste Management Plan for the operation of the proposed development (refer to Appendix 5.9.1 and 5.9.2 of this EIS) have been developed to ensure effective waste management and recycling of waste generated at the site. The operational waste plan will be a live document which will be updated prior to commencement of operation of the facility and throughout the period when operation is becoming established to ensure the necessary management procedures are in place to manage all potential waste streams and volumes.

The disposal of the dredging spoil to the Burford banks will require consideration and a statutory consent from the EPA. This will ensure there will be no adverse impact from the deposition of the dredging spoil at the dumping site.

These plans will ensure the waste arising from the development is dealt with in compliance with the provisions of the Waste Management Act as amended and its associated regulations.

5.9.8 Predicted Impact of the Proposed Development

5.9.8.1 Construction Phase

The management of wastes generated during the construction of the proposed development will be in accordance with the Construction and Demolition Waste Management Plan.

In the worst case scenario, inappropriate disposal of wastes from the construction project particularly the quantum of marine dredging wastes to be deposited at sea has the potential to cause significant environmental consequences. However as long as the construction and waste disposal is completed in accordance with the plan and the requirements of EPA licensing for Disposal at Sea, it is envisaged that the impact of the construction phase will be imperceptible and short term.

There are several facilities with the necessary EPA licences and waste facility permits for construction and demolition waste recovery in the South Dublin and greater Dublin regions. There is more than adequate capacity to receive the relatively minor quantities of wastes likely to be generated by the construction of the lanside aspect of the proposed development.

The disposal of dredging spoil is subject to a DaS permit application to the EPA. The requirements of the EPA permit will ensure that the disposal of the waste will avoid potential impacts on the marine environment.

5.9.8.2 Operational Phase

The operation of the proposed facility will be in accordance with a detailed waste management plan prepared in accordance with its best practice. A preliminary draft of this plan is included in Appendix 5.9.2. This plan will be reviewed and amended as necessary post construction to accommodate any changes in waste management practices, waste generation rates etc at the time. No significant impacts are predicted for the operational phase.

In a worst case scenario where the waste management plans for the development are not fully implemented, significant litter and pollution issues on site, in the harbour or on neighbouring lands as well as health and safety risks could occur. Given that the proposed facility will be operated by DLHC with a stated commitment to environmental compliance this is not considered to be a likely issue.

Contractors appointed by DLHC will service the changing needs of the development and provide monthly reports regarding wastes generated and removed from site and performance to targets for recycling and disposal can be measured.

5.9.9 Monitoring

All wastes arising at the site will be recorded by Dun Laoghaire Harbour staff and waste contractors appointed to manage wastes on their behalf. These records will be made available for auditing and for information purposes for the regulatory authorities as and when required.

5.9.10 Reinstatement

Not applicable.

5.9.11 Transportation

This section of the EIS examines the receiving environment and impacts of the proposed Cruise Terminal on the transportation infrastructure in and around Dun Laoghaire Harbour.

This section should be read in conjunction with the following appendices:

- Traffic Count (Appendix 5.9.3)
- Transport Demand Assessment (Appendix 5.9.4)
- Juntion Assessment (Appendix 5.9.5)
- Traffic Management Plan Queen Mary II (Appendix 5.9.6)

An assessment of the existing transportation facilities has been carried out and a model for forecasting transport demand for the various modes of transport was constructed.

A map indicating the location of the proposed new cruise ship berth land side facilities in relation to the wider Dun Laoghaire Harbour lands is shown in Figure 5.9.1 below.

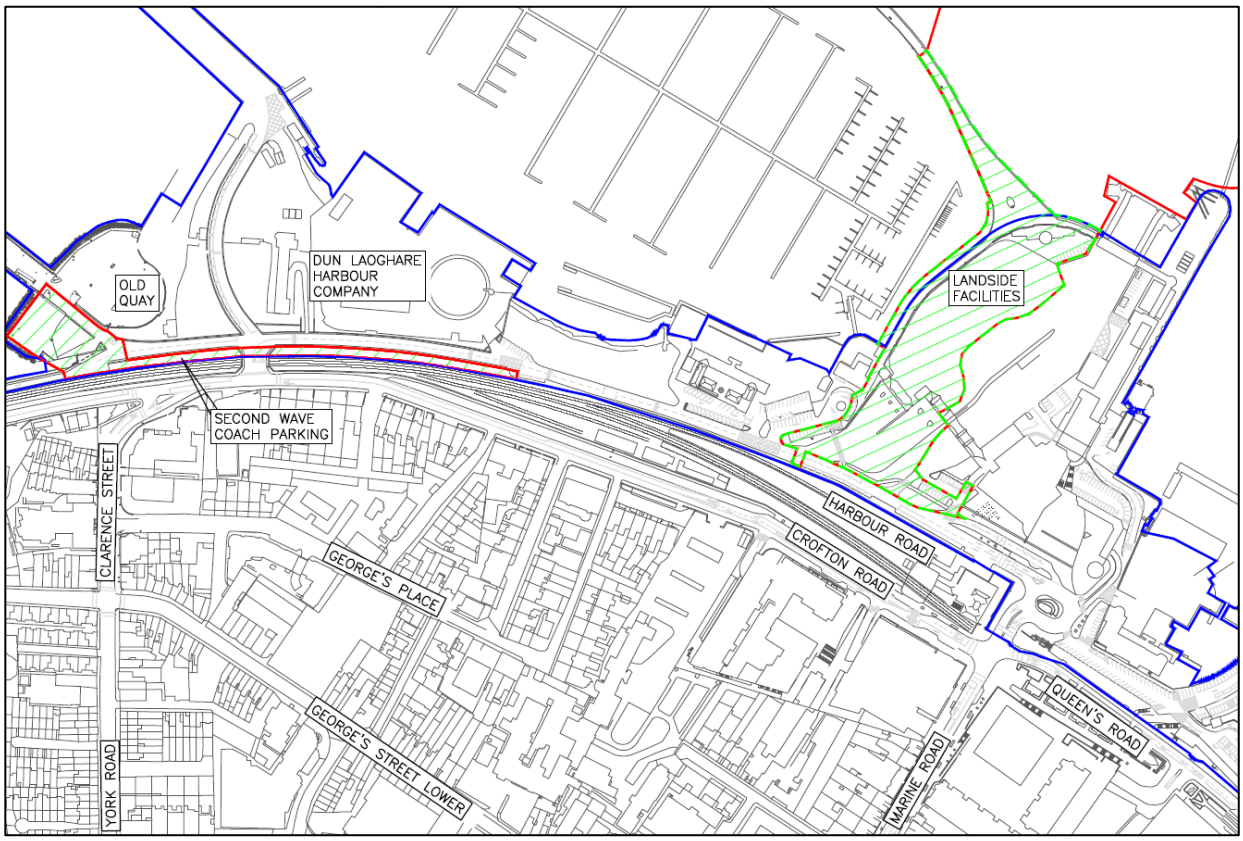


Figure 5.9.1: Site Location

5.9.11.1 Assessment Area

The assessment area of the traffic impact of the proposed development includes two harbour getaway junctions specifically Crofton Bridge / Crofton Road junction and Crofton Road / Marine Road / Queens Road/Harbour Access junction and includes Crofton Road and Harbour Road.

5.9.11.2 National Ports Policy Statement

In 2013, the Department of Transport, Tourism and Sport published the National Ports Policy Statement (NPPS). The policy introduces clear categorisation of the ports sector in Ireland,

into Ports of National Significance (Tier 1), Ports of National Significance (Tier 2) and Ports of Regional Significance.

The Dun Laoghaire Harbour Company has been identified as a Port of Regional Significance. These are ports that serve an important regional purpose and/or specialised trades or maritime tourism. In the context of the long-term international trends in ports and shipping, these ports are limited in their future potential as centres of commercial shipping.

Key points arising from the NPPS which are specifically relevant to this Chapter include:

- The volume of traffic handled at the Dun Laoghaire Harbour has declined in both absolute and relative terms over the past decade.
- Dun Laoghaire Harbour Company is the smallest of the State commercial port companies in terms of overall freight tonnage handled in 2011. However, it remained the third largest passenger ferry port in the State, after Dublin and Rosslare. In recent years the harbour has moved away from commercial port related business and is increasingly viewed as a centre for marine-related tourism.
- The location of the port so close to the centre of Dun Laoghaire town greatly limits its future potential as a major transport hub but it provides significant opportunities. It has become increasingly clear over the past decade that the long-term future of Dun Laoghaire Harbour Company will be in terms of marine leisure, maritime tourism, cultural amenity and urban redevelopment.

5.9.11.3 Dun Laoghaire Harbour Masterplan Existing Uses and Development Strategies

Dun Laoghaire Harbour Masterplan (the Masterplan) was commissioned in October 2011 by Dun Laoghaire Harbour Company (DLHC) in order to provide a long term vision for development for the Harbour. The Masterplan comprises of approximately 75,000m^2 of development including residential, retail, museum/cultural, leisure facilities and cafes. An element of this development will replace existing uses located on the lands.

Key points arising from the Masterplan which are specifically relevant to the new cruise ship berth land side facility development and this chapter include:

- The Masterplan describes the Harbour as a working harbour, a leisure facility and transportation terminal. These different functions are set out in the Masterplan Section 2.2. and summarised here as follows:
    - Stena HSS ferry terminal, this ferry operated between Dun Laoghaire and Holyhead in North Wales. It previously operated up to 5 times per day but more recently its use reduced and the ferry is now terminated. The terminal includes a substantial vehicle standage area, passport controls, Terminal buildings and related functions are located in a central area of the Harbour, close to the DART and Dublin Bus services, and within walking distance of Town Centre.
    - The National Yacht Club located adjacent to East Pier.
    - The RNLI Station, located adjacent to the Queens Road junction.
    - The Royal St George Yacht Club, located between Carlisle Pier and St Michaels Pier/Terminal Building.
    - The Commissioners of Irish Lights, located to the east of the Coal Quay Bridge junction (the facility was extensively redeveloped in the last few years).
    - The Dun Laoghaire Motor Yacht Club, and the Sailing School/Activity Centre are both located at the West Pier (in the former Nautical College).
    - Carlisle Pier (this is the site of the former ferry terminal which was operated by Irish Ferries before the Stena development in the 1990's) which has been considered for redevelopment over a number of years.
    - There are a number of Harbour Cottages and other older buildings accessed from a roadway leading down from the Harbour Access Road where it connects to the

Coal Quay Bridge junction, some of which are in use for various employment/harbour activities.

- The East Pier and West Pier, which are used for leisure and walking activities (with the East Pier attracting most of the activity, particularly at weekends when weather conditions are fair).
- To the west of the West Pier are a number of areas outside the actual Harbour but in the ownership of the Harbour Company or the County Council/others, including a scrap yard, storage and former factory, open space and a sewage pumping station.
- A large marina has been developed inside the breakwater to the west of the ferry terminal, with an ancillary marina building providing facilities and gangway access to the pontoons.
- The harbour is within walking distance to the recently upgraded Metals. This area has been recently reconstructed by Rathdown County Council and included the covering of the existing railway line to create a new plaza and to join the town frontage with the Harbour area. The construction of the plaza over the railway line provides extensive restaurant, coffee and leisure facilities within walking distance of the town and of Dun Laoghaire Harbour.

- Chapter 3 of the Masterplan sets out strategic objectives. The strategic objective number 10, 11, 12, 13 and 14 set out strategy for movement, connections and accessibility as follows:
  - 10. Promote a high density of development close to the DART station in order to maximise the use of public transport.
  - 11. To promote sustainable modes of transport, including public transport, cycling and walking.
  - 12. Develop a parking strategy to serve the Harbour area and complement existing strategies within the town centre.
  - 13. Ensure a high standard of pedestrian permeability throughout the area and provide for appropriate pedestrian connectivity to the town centre.
  - 14. Facilitate the Sutton to Sandycove (S2S) cycleway through the harbour area.

- Chapter 7 of the Masterplan discusses 'Access and Transport', the main points discussed in this chapter are as follows:
  - A preliminary estimation of the number of vehicle trips attracted to the Masterplan development indicated that an additional 106 inbound trips in the AM peak will be generated, with 97 outbound trips, while in the PM peak 115 inbound trips will be attracted to the development, with 142 outbound trips.
  - The trips will be split between the existing three access points located at the signalised junctions of Crofton Road/Clarence Street/Dunleary Road and Marine Road/Crofton Road/Queen's Road and the priority junction of Queen's Road.
  - The analysis indicated that, with the robust estimation of trips generated by the development, the junctions in the area will function within capacity.

- Chapter 8 of the Masterplan discusses transport in terms of sustainability, the main points discussed in this chapter are as follows:
    - Public Transport

      Dun Laoghaire is already well served by public transport with both the railway line and a number of Dublin Bus services. The Aircoach also travels to Dun Laoghaire.

      Dun Laoghaire Harbour is directly served by the DART, as well as commuter train services, with the station located on Crofton Road, adjacent to the ferry terminal.

      In total, over 500 buses stop at Dun Laoghaire adjacent to the ferry terminal each day. There is also a good level of service on Saturdays, and a more reduced service on Sundays. The Aircoach, a private bus service to Dublin Airport, also serves Dun Laoghaire, with 29 services per day in each direction, operating 24 hours a day.

    - Walking and Cycling

      Pedestrian movements are already high in the vicinity of the harbour lands and in the region of the access points to the lands, due in part to the high volume of public transport stops/terminating services in Dun Laoghaire as well as the leisure element of the harbour.

      The plan proposes to provide for the S2S cycleway as it moves through the harbour lands in and east west direction.

A copy of the Dun Laoghaire Harbour Masterplan 2011-2030 is appended to this EIS.

5.9.11.4 Background to the Cruise Industry

The following information is based on a review of the *Industry Local Action Plan City of Dublin July 2011 and Cruise Industry Ireland Presentation to Comity Maritime International Dublin Symposium 2013.*

The largest cruise ships currently in operation are from 310 to 362 meters long, Royal Caribbean Cruises Ltd. (RCCL) vessels, with maximum capacity from 3,807 to 6,296 passengers. Cruise ships currently under construction range from 330 to 362 metres with maximum capacity from 4,100 to 6,360 passengers.

It is envisaged that the proposed Dun Laoghaire Harbour berth facilities will accommodate the largest types of cruise vessels.

According to the Local Action Plan City of Dublin published in July 2011 and the Cruise Industry Ireland Presentation to Comity Maritime International Dublin Symposium 2013;

- In the Dublin Port 54% of cruise ships carry over 2000 passengers, 20% carry between 1001 – 1999, 26% carry less than 1000.
- 70% of cruise passengers take shore excursions in Cork and 35% in Dublin.
- 55% of passengers are over 60, 25% are 45-49 and 17% are 18-44.
- Shopping is the most popular activity of passengers disembarked at Irish ports.
- Shuttle buses and train services are used heavily where available.
- Almost three in ten passengers (29%) engaged in a tour while disembarked.

- The shore excursions are generally a half day (4 hours duration) or a full day activity (usually 7hours duration).
- Passengers place greatest emphasis on the proximity of the town / city / tourist site to the port. Having interesting tourist attractions, the availability of a shuttle service available and the look of the port are also considered important.

In 2013, 100 cruise ships called at Dublin Port. Regularly two or three cruise ships are accommodated within the Port in one day. A cruise ship in Dublin Port can typically generate:

- 30-40 coaches arriving before AM peak hour period and normally departing after the peak hour period.
- 20 private cars arriving prior to the AM peak hour period.
- Approximately 20 taxis waiting to pick up passengers.

5.9.11.5 Transportation Scoping

A desk top study was carried out to establish the scope of the transport assessment in the area. This study included reviews of the following:-

- Ordinance Survey of Ireland Mapping
- Dun Laoghaire Harbour Masterplan – Transport Assessment –AECOM, June 2011
- Traffic and Transport Assessment Guidelines – National Roads Authority, May 2014
- Traffic Management Guidelines – NDP, DoELG, DTO, DoT
- Design Manual for Urban Roads and Streets – Department of Transport, Tourism and Sport, March 2013
- Various public transport service providers timetables and route maps

A topographical survey of the local road network and junctions was undertaken by Baseline Surveys in 2013 using UAV Photogrammetry data capture and ArcMap CAD model.

A 24 hour traffic count was carried out by NDC commencing on Monday 19.00 till Tuesday 19.00 on 3 December 2013.

Traffic reviews and movement patterns were also recorded for cruise ships visiting Dun Laoghaire Harbour during 2013. These ships were anchored in deep water outside the harbour and were served by shuttle boats delivering passengers to Old Quay. A short term manual traffic count was undertaken during cruise ship visits on 7th of August 2013. In addition the traffic patterns resulting from the arrival and departure of the Hollyhead to Dun Laoghaire ferry on 28 December 2013 was recorded.

A detailed inspection of the harbour and surrounding road network was carried out during the design development by Waterman Moylan.

During the scoping study for the EIS, an assessment of the requirements for a Traffic and Transport Assessment was carried out as follows:-

Table 1.4 of the Traffic Management Guidelines (NDP, DOELG, DTO, DOT) sets out the thresholds for the scale of developments above which a Transport Assessment is required (See also Table 2.1 of the National Road Authority *Traffic and Transport Assessment Guidelines,* May 2014).

1. Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road.
2. Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive.
3. Residential development in excess of 200 dwellings.

4. Retail and leisure development in excess of 1000m^2.
5. Office, Education and Hospital development in excess of 2,500m^2.
6. Industrial development in excess of 5,000m^2.
7. Distribution and warehousing in excess of 10,000m^2.

Traffic generation forecasts were carried out to establish if the proposed development may fall within the NRA guidelines for thresholds criteria for a traffic and transport assessment. These traffic generation assumptions were based on observations of similar cruise ship visits to Dun Laoghaire in 2013.

Following the review as set out above the proposed development and on the NRA guidelines Section 2.1 and 2.2 it was concluded that the proposed development is below the thresholds for a formal Traffic and Transport Assessment.

However, due to the importance of the proposed development and its potential impact on the existing road network, an assessment of the potential traffic that may be generated by the development and its impact on the local road network has been carried out.

5.9.12 Transportation Assessment Methodology

The methodology for transportation impact assessment is as follows:

- Prepare a baseline review in relation to the existing traffic situation and establish the existing traffic levels.
- Determine the trip generation, modal split, assignment and distribution of the proposed development.
- Determine background traffic growth for future years, 2017 and 2032, using NRA Medium Traffic Growth factors.
- Undertake the traffic modelling to assess base year and future year scenarios, with the proposed development ('Do-something') and without the proposed development ('Do-Nothing') in place.
- Identify and analyse any traffic impacts.
- Propose mitigation measures if required.
- Determine any residual impacts.

Do-nothing relates to a situation where the proposed development does not proceed. This includes two scenarios, the predicted opening year traffic levels scenario and the predicted future traffic levels scenario.

Do-something relates to a situation where the proposed development proceeds as expected. This includes two scenarios, the predicted opening year traffic levels scenario and the predicted future traffic levels scenario.

The results of the transportation impact assessment are set out in the EIS sections below.

5.9.13 Existing Conditions

Dn Laoghaire harbour is located on the south side of Dublin Bay approximately 11-12 km from Dublin City Centre within the administration area of Dun Laoghaire Rathdown County Council. The Harbour is part of the core of Dun Laoghaire town forming the terminal junction of Marine Road which links the harbour to Dun Laoghaire Main Street. As such the harbour forms an integral part of the town.

5.9.13.1 Existing Transportation Facilities at Dun Laoghaire Harbour

The harbour is well served by three connections to the national road network and by excellent public transport facilities including DART and Dublin Bus. Refer to Figure 5.9.2 below.

1. Existing Road network

The harbour is connected to the local public road network via three junctions which are marked 1 to 3 on Figure 5.9.2 and are as follows:

1. Crofton Bridge harbour access / Dunleary Road / Crofton Road / Clarance Street

   Signal controlled access to west harbour which forms the main access to the Stena ferry service.

2. Harbour Road roundabout.

   Priority controlled roundabout access to the east harbour linking the harbour to the local road network.

3. Crofton Road / Marine Road / Queens Road / Harbour Access

   Signal controlled junction.

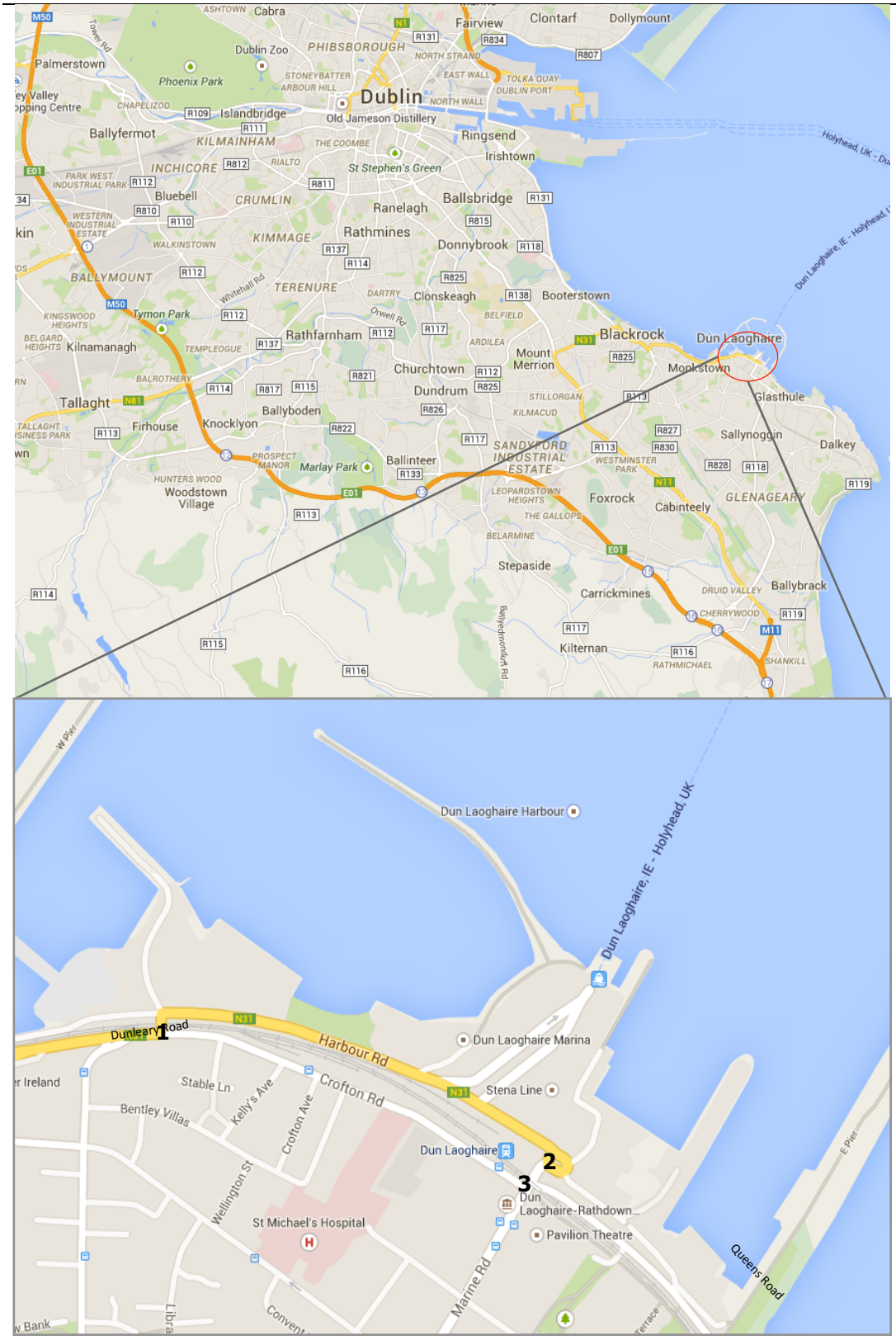


Figure 5.9.2: Existing Road Network

Junction 1 Crofton Road/Clarence Street/Dunleary Road/Harbour Road

The layout of this junction is that of a staggered junction, which operates in two sections, with a short section of the east-west roadway between the two minor arms. All arms have a single lane approach, with the exception being the Harbour Road which flares out to two lanes on the bridge.

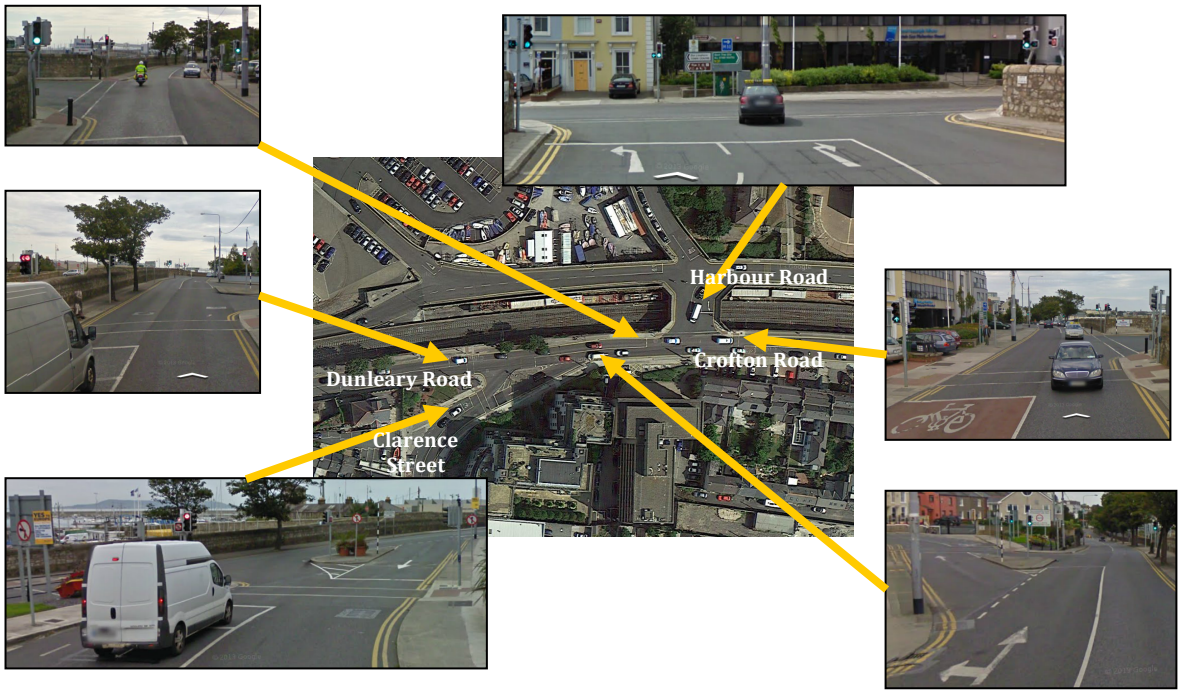


Figure 5.9.3: Crofton Road/Clarence Street/Dunleary Road/Harbour Road Junction (no. 1)

Junction 2 Harbour Road roundabout

This junction is a priority roundabout which consist of five arms each allowing single vehicle at the entry. It is under the control of Dun Laoghaire Harbour Company. It provides access to the east harbour parking areas and connects Harbour to the Dun Laoghaire town and public road network. The roundabout can accommodate large coaches and is currently used by Dublin Bus as a bus turning area.

Junction 3 Crofton Road/Marine Road/Queens Road/Harbour Road Junction

This junction operates under signal control, and has pedestrian crossing facilities on all four arms. There is a dedicated right turn lane from Crofton Road to Marine Road, and a left turn lane from Marine Road to Crofton Road.

This junction caters for significant volumes of traffic throughout the day, with access to car parks on Marine Road and Queens Road serving the Town Centre retail core area through this junction, along with access to both the Hospital and County Hall from Crofton Road, to the west of the junction.

Description of Dunleary Road and Crofton Road

Dunleary Road and Crofton Road form part of the N31, a national primary route, which connects Dun Laoghaire Ferry Terminal to the N11 via Blackrock Bypass and Mount Merrion Avenue.

In the vicinity of Dun Laoghaire this route is generally a two-lane single carriageway road. The route varies in width, being narrowest in the area of the Coal Quay Bridge (Junction 1), but wider nearer to the DART Station with provision of parallel on-street public parking and bus stops. Footpaths are provided on both sides of the road. There are no dedicated cycle lanes on the road.

Figure 5.9.4: Crofton Road

Description of Harbour Road

Harbour Road is under the control of Dun Laoghaire Harbour Company and provides access to the piers, yacht clubs, businesses and parking areas located within Dun Laoghaire Harbour. The Harbour Road is linked to the public road network via Coal Quay Bridge (Junction 1) and via harbour roundabout (Junction2) to Marine Road (Junction 3). It has a narrow continuous footpath along the south side of the road and on-street public and Dublin Bus parking. Along the north side of the road a standard width footpath starts at the Ferry terminal and continues to the roundabout.

2. Public Transport

The harbour is well served by public transport. The DART and a number of Dublin Bus Routes operates between the Dublin City Centre and Dun Laoghaire.

The DART service provide access to Howth and the City Centre Connolly Station. The Connolly Station connects Dublin to Sligo, Belfast and the Rosslare Europort in Wexford. The DART frequency between the City Centre and Dun Laoghaire is one every 4/5 minutes from the City Centre and one every 6/10 minutes from Dun Laoghaire during peak periods.

The Dublin Bus routes number 46A, 63, 75 serving the Harbour provide access to Dublin Airport and the City Centre. The bus frequency between the City Centre and Dun Laoghaire is one every 5/6 minutes in both directions during peak period. The DART feeder bus number 111 provides access to Loughlinstown through Sallynoggin during peak periods. The harbour is also served by the Aircoach connecting the Harbour and Dublin Airport by its 24 hours service. The bus frequency is one every hour both direction.

In addition to the these services, it is the Dun Laoghaire – Rathdown County Council policy to implement the Quality Bus Network measures, as set out in Transport 21 and in the DTO Strategy 'Platform for Change', and extend the bus network. New Quality Bus Network (QBN) schemes will link to existing Quality Bus Corridors (QBC) and are expected to lead to an increase frequency and efficiency of bus service.

New QBN schemes in the area include:

1. Blackrock Feeder Routes – including Monkstown Road- Deansgrange Road

2. Kill Avenue – Mountown Lower – York Road – Clarence Street – Crofton Road – Dun Laoghaire

3. Wyattville Dual Carriageway - Church Road – Sallyglen Road – Lower Glenageary Road – Upper Glenageary Road - Dun Laoghaire (including Graduate & Deerhunter Roundabouts)

For details please refer Figure 5.9.5 the Quality Bus Network Map 2008-2011.

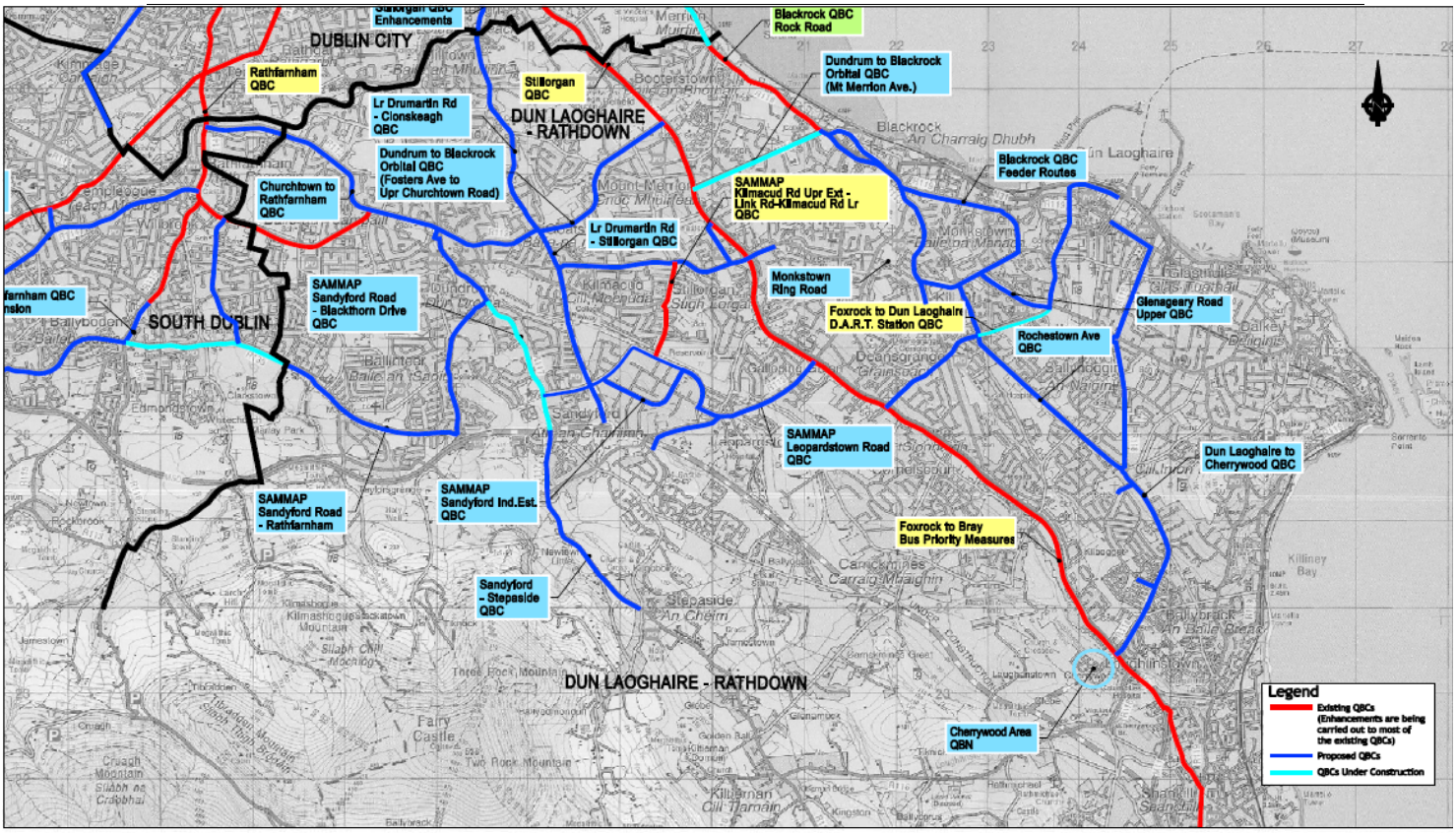


Figure 5.9.5: New Quality Bus Network

3. Pedestrian Facilities

The harbour is well served by pedestrian facilities providing pedestrian connectivity from the harbour to existing DART station, bus stops and to Dun Laoghaire town.

A pedestrian crossing point is located on Harbour Road outside the frontage of the harbour Arrival/Departure Terminal building, ensuring safe crossing for pedestrians. The pedestrian facilities along the Marine Road and Crofton Road as far as the DART Station are shown in Figure 5.9.6 below.

The harbour walking potential isochrones have been set out by using estimated walking speed of 5kph as defined in the NRA Project Appraisal Guidelines, Unit 13.0 Walking and Cycling Facilities, 2011 and DTO Road User Monitoring Report, 2006. According to the DTO report the walking speed of 5 kph includes junction delays.

Figure 5.9.6: Pedestrian Facilities

Pedestrian 2, 4, 6, minutes isochrones are outlined in Figure 5.9.7 below.

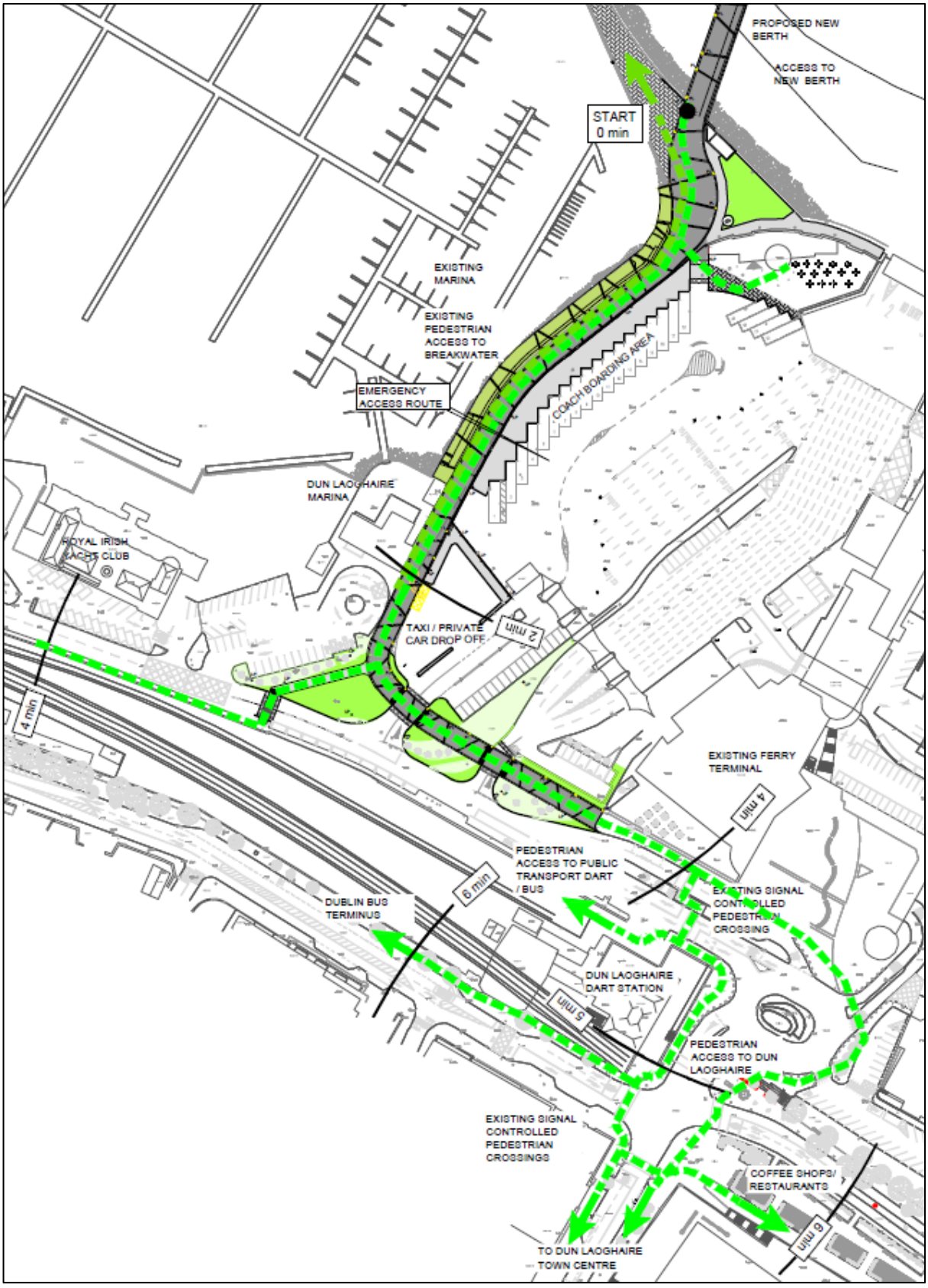


Figure 5.9.7: The New Berth Walking Potential Isochrones

4. Cycling Facilities

Dun Laoghaire-Rathdown County Council's cycle network map excerpt in Figure 5.9.8 below shows the existing cycling facilities in the vicinity of the harbour. There are bicycle parking facilities in the vicinity of the DART station and Queens Road. There are no roads with dedicated bicycle lanes. However, The Metals along the Queens Road and the Harbour Road along the Old Harbour is categorised as being *'Pedestrian/cycle route suitable for all users'*.

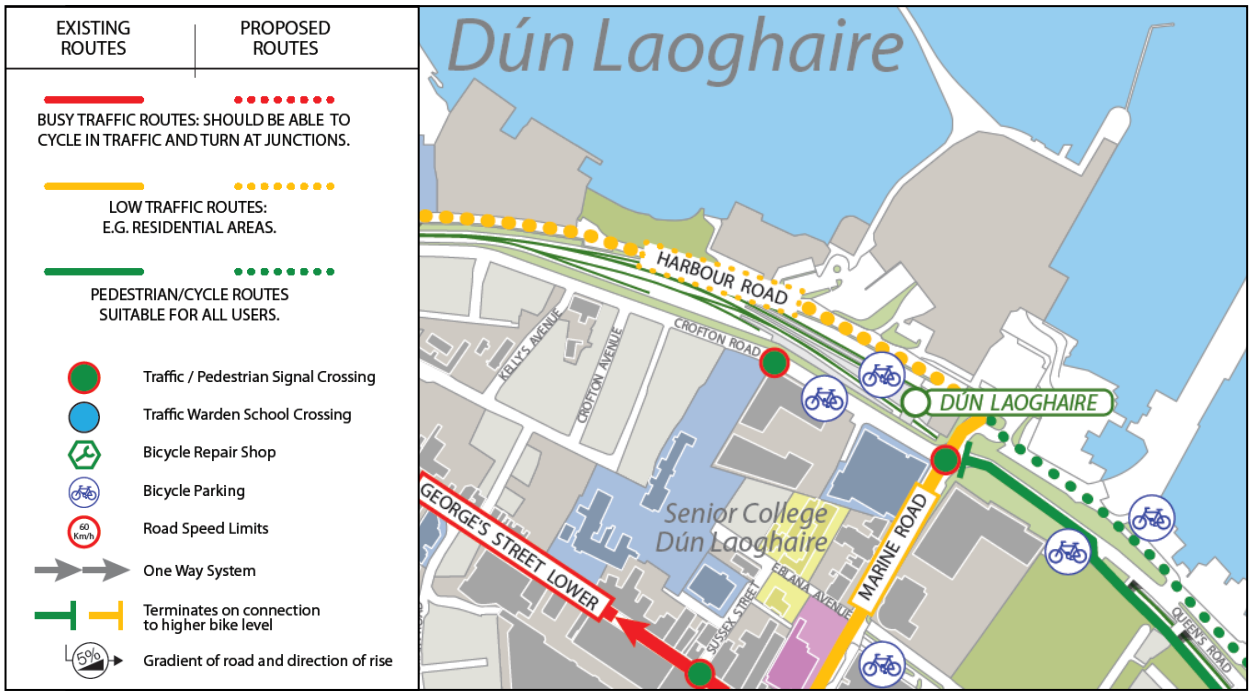


Figure 5.9.8: Existing cycle facilities

5. Parking Facilities

The harbour company provides for surface and underground commercial car parks at various locations around the harbour. The following is a summary of parking spaces available within the harbour for public use.

Table 5.9.5: Harbour car parking spaces

Location	Number of parking spaces
The Gut	118
Old Harbour	240
St. Michael's Pier	205
Carlisle Pier	128

Source: DLH Masterplan 2011

5.9.13.2 Existing Traffic Conditions

Waterman Moylan Engineering Consultancy commissioned traffic survey to undertake 24 hour turning counts at strategic junctions along the Dun Laoghaire Harbour in December 2013. The supporting traffic survey information commissioned by Dun Laoghaire Harbour Company in June 2011 has also been provided.

Figure 5.9.9 indicates the directional volume of Annual Average Daily Traffic (AADT) at Dun Laoghaire Harbour.

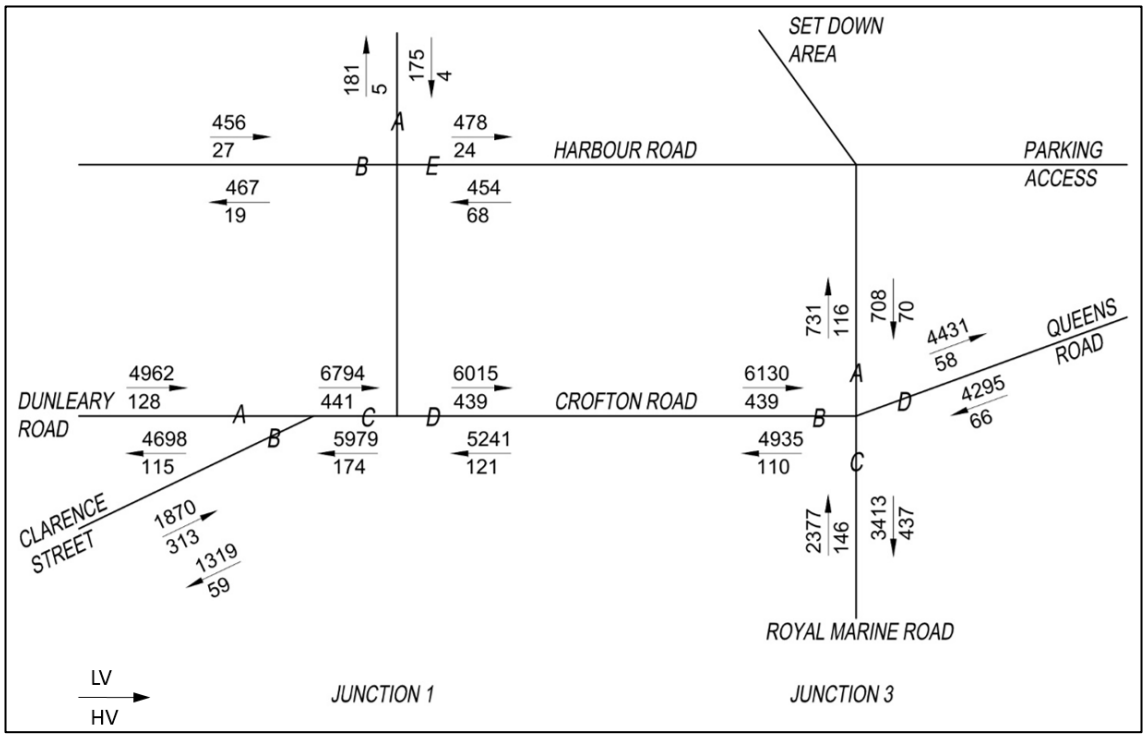


Figure 5.9.9: Existing Link Traffic Flows AADT

For the purpose of this transport impact assessment, two junctions are considered critical. Junction 1; Crofton Road west / Crofton Road East / Harbour Access and Junction 3; Crofton Road / Harbour Access / Queens Road / Marine Road.

The traffic survey and Excel model of the existing traffic flows was used to identify AM and PM peak hour period. The existing peak hour periods for the surveyed junctions at Dun Laoghaire Harbour are; AM peak hour from 08:15 to 9:15 and PM peak hour from 15:00 to 16:00. There is also a midday peak hour from 11:45 to 12:45. See figures below for details.

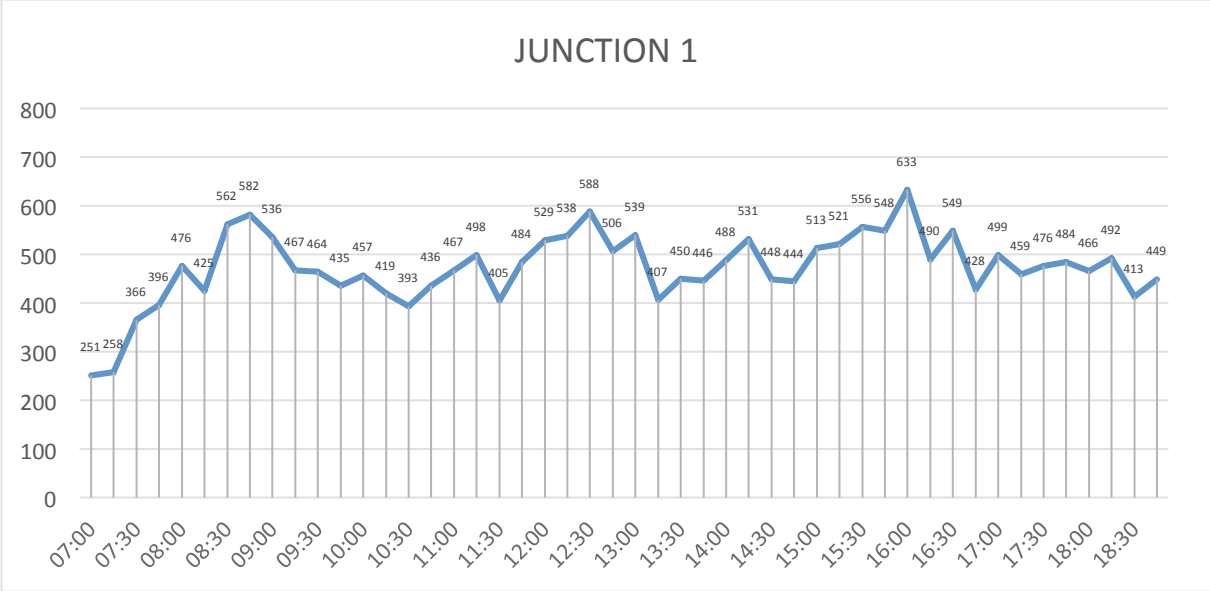


Figure 5.9.10: Daily Traffic Profile Junction 1

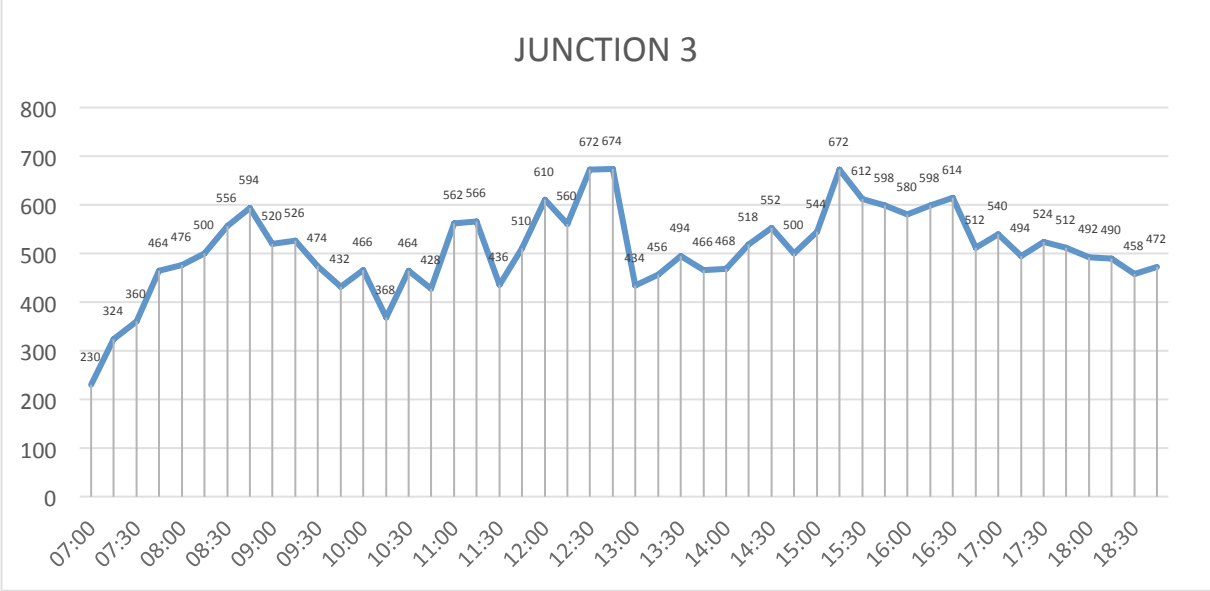


Figure 5.9.11: Daily Traffic Profile Junction 3

A summary of the existing AM and PM peak traffic volumes at Junction 1 and Junction 3 is presented in Figure 5.9.12 below.

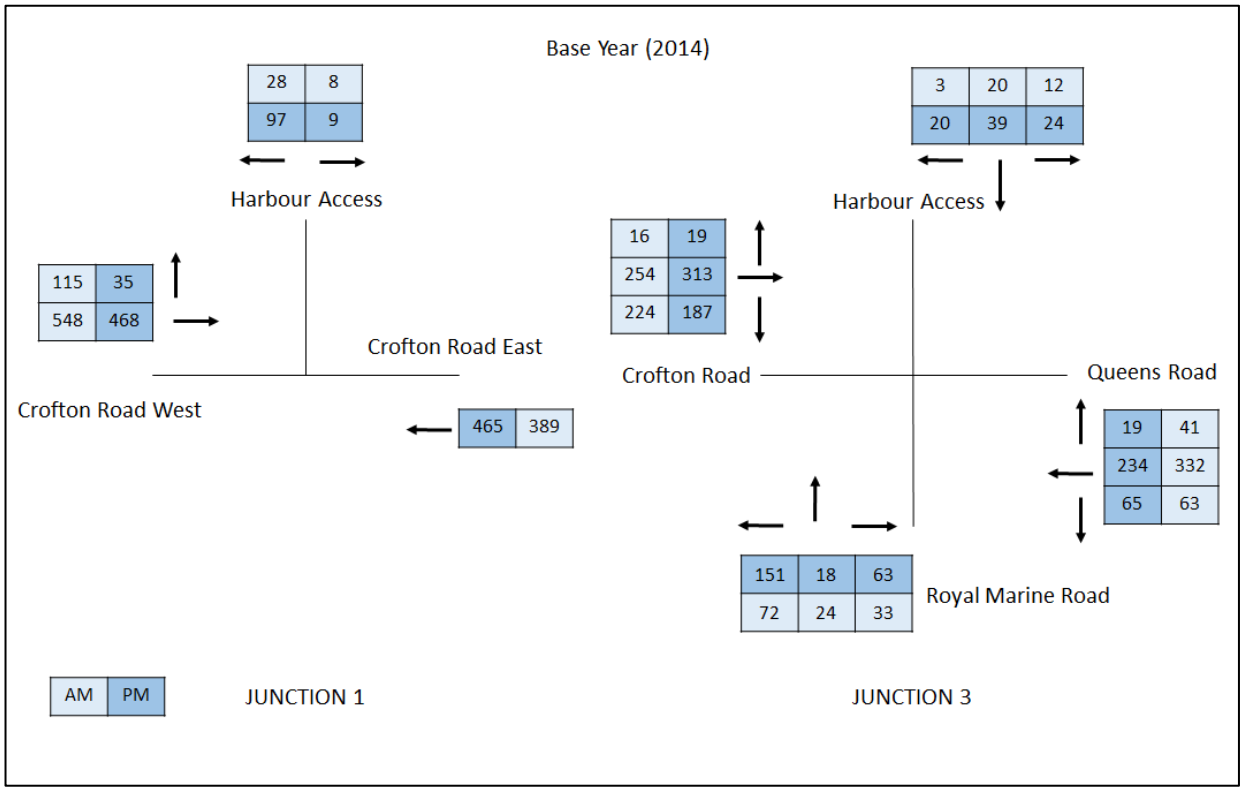


Figure 5.9.12: Existing AM and PM Peak Hour Traffic Flows

5.9.13.3 Key performance indicators

Performance of the critical junctions is assessed by using the following key performance indicators:

Degree of Saturation (DoS) is the ratio demand flow to capacity for a particular stream of traffic. Also known as ratio of flow to capacity (RFC). If this value is over 100%, the stream is over-capacity.

Maximum Queue Length (MQL) is the maximum queue length in number of vehicles (pcu) at the end of a red phase.

Practical Reserve Capacity (PRC) is a measure of junction available spare capacity. It is the difference between the capacity of a transportation facility and the traffic demand. This gives the percentage by which the arrival rate on the stream could increase before the stream would be at practical capacity. The junction PRC is the lowest stream PRC. A junction that has a PRC of 100% can cope with double the amount of traffic, and junction with a PRC of 0% is handling the maximum acceptable amount of traffic.

5.9.13.4 Base Year performance of critical junctions

An analysis of the critical junctions was carried out for the Base Year using Oscady 5 junction analysis system. This is an industry standard method of analysing signal controlled junctions and the details of the analysis carried out are included in the Appendices.

Analysis of the critical junctions show that both critical junctions currently operate well within the capacity. For details please refer to the table below.

Table 5.9.6: Base Year performance of critical junctions

2014		AM Peak 8:15 to 9:15	PM Peak 16:00 to 17:00
Junction 1	DoS (%)	64.5	48.0
	MQL (pcu)	9.8	7.2
	PRC (%)	39.6	87.7
Junction 3	DoS (%)	44.1	42.0
	MQL (pcu)	4.1	2.9
	PRC (%)	104.3	114.4

5.9.13.5 Hollyhead - Dun Laoghaire Ferry Service

The Hollywood ferry route is operated by Stena using a Fastcraft ship 127m long with a capacity of 360 vehicles.

The traffic generated by the arrival and departure of the Stena Ferry at Dun Laoghaire Harbour was recorded on 28 December 2013.

The trips generated by the arrivals and departure of the Stena Ferry are outlined in the table below.

Table 5.9.7: Trips generated by the arrival and departure of the Stena Ferry

	11.00-12.00	12.00-13.00	13.00-14.00	Total no. of trips
Arrivals at the ferry	200	100	0	300
Departures from the ferry	0	150	150	300
Total two way trips both directions	200	250	150	600

As a result of the traffic generated by the arrival of the Stena Ferry queues at the Junction 1 formed. However, traffic lights at this junction have been designed to give more green time when demanded to help the queues dissipate quickly.

As of the year 2015 Stena car ferry service has been discontinued and at the time of writing there is no ferry service in Dun Laoghaire.

5.9.14 Future Environment

There is an increasing demand for short term visits to the east coast of Ireland by tourists from large modern cruise ships.

Cruise ships will typically call to the port for one day, normally arriving in early morning and departing for the next port in the evening of the same day. Vessels will typically arrive on berth between 6am and 8am, with passenger disembarkation commencing almost immediately once berthing is completed.

Passengers going ashore from cruise ships at Dun Laoghaire will undertake one or more of the following:

- Coach tours (full day or half day)
- Car hire and self-tour
- Taxi to Dun Laoghaire, Dublin city centre or other destination
- DART or public bus to Dublin city centre or elsewhere
- Visit to Dun Laoghaire town centre by foot or shuttle bus

Passengers will be in a position to come ashore, or return to the ship, at any time during the day.

The land side facilities required to serve these cruise ships consists primarily of a coach loading and unloading facility and pedestrian routings to key trip destinations within the harbour and Dun Laoghaire environs.

This section sets out a brief outline of the general operating characteristics of the land side facilities required to serve the cruise ships. Full details including passenger numbers and modal splits is contained in later sections of this chapter.

5.9.14.1 Characteristics of the Proposal

The proposed development includes the construction of a new quay to accommodate passengers of the latest cruise vessels. The proposed development also provides for the land side facilities to accommodate disembarking passengers for coach tours to Dublin and Wicklow and for pedestrian and free passengers who wish to take independent day tours to Dun Laoghaire Town and the surrounding areas.

The land side facilities include:-

- Provision of coach facilities to load and unload passengers taking organised coach tours of Dublin and the surrounding area.
- Provision of taxi and set down facilities for private car to accommodate free passengers who wish to travel independently.
- Provision of pedestrian links from the quay to the existing Harbour Road pedestrian facilities connecting to linkages to Dun Laoghaire Town centre and to public transport node at Dun Laoghaire Train Station.

The development is not planned to provide any significant servicing or passenger turnaround facilities.

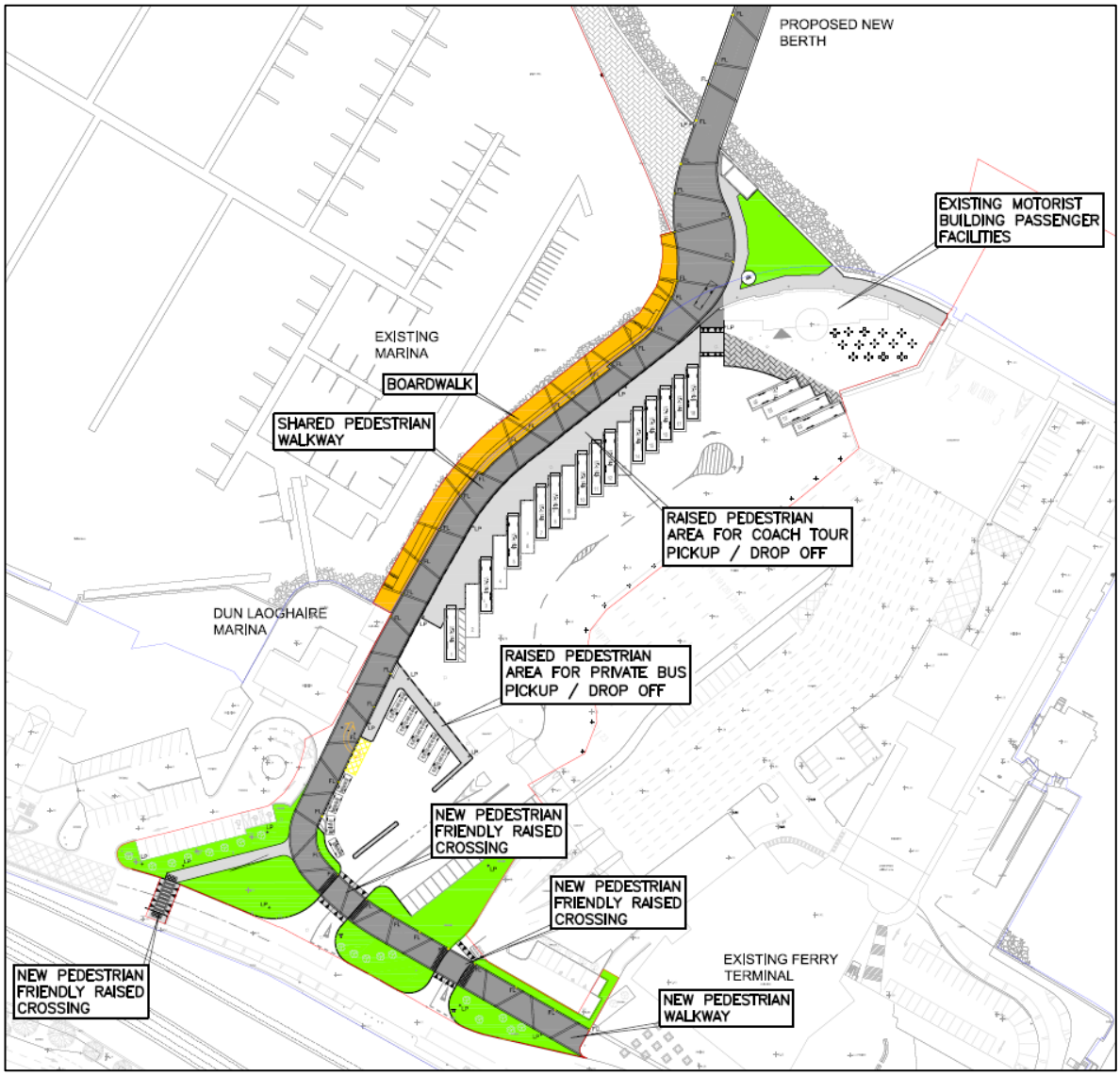
A coach park for pick up and drop off of passengers taking coach tours into the Dublin/Wicklow area is to be provided.

An upgraded pedestrian route to public transport links and to Dun Laoghaire Town Centre is an integral part of the proposed development. The objective is to provide a pleasant

pedestrian experience for passengers and to link them as closely as possible to the tourist and commercial attractions in Dun Laoghaire town.

The upgraded pedestrian linkages will be available to both cruise passengers and the general public.

See figure below for details.



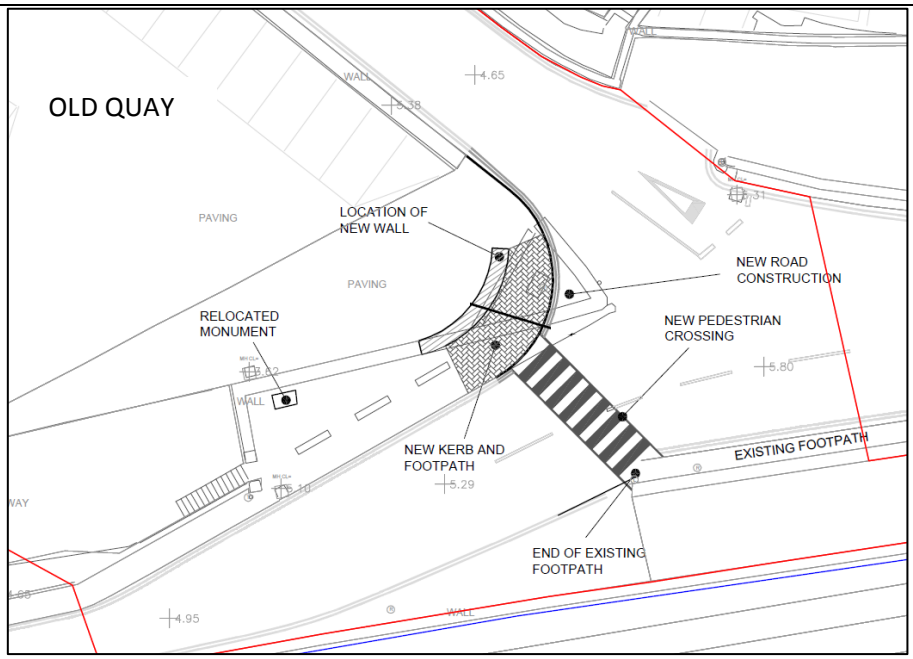


Figure 5.9.13: Proposed Landside Layout

During the arrival of a cruise vessel, Dun Laoghaire Harbour Company will implement a comprehensive traffic management plan and will provide marshals to monitor and supervise coach and other traffic arriving and departing the harbour area. Marshals directing and assisting pedestrian traffic will also be provided at key locations within the harbour.

5.9.14.2 Transportation Demand

Cruise passengers will be offered a range of organised pre-booked coach tours (Dublin City Centre, Guinness Hopstore, Book of Kells, Glendalough, Powerscourt Gardens, etc) or will be free to visit Dun Laoghaire town centre and surrounding areas.

Coach Tours Passengers

Coach tours are arranged and organised at the site by specialist tour operators who will have a full complement of staff on site to ensure an efficient transfer of passengers from the ship to the waiting tour coaches.

These tours are pre-booked on the cruise ship, and those passengers signing up to a coach tour will disembark at pre-determined times to link with the appropriate tour bus. Coaches will be allocated a guide and will be numbered with the tour name on the front window. They will be lined up in the Coach Parking area as per the dispatch sheet provided by the ship's staff and will be numbered in tour order.

Coaches will leave as soon as their allocation of passengers is landed so there is no concentration of departing coaches. The schedule is updated regularly as passengers book coach tours with the final schedule becoming available the evening before the ship's arrival.

The Cruise Berth facilities will include provision of a total of 22 no. coach parking bays on site and 5 no. additional parking slots for private mini-coaches or buses.

In addition, parking within the siding road parallel to the railway at Old Quay is also available for a second wave of tour coaches if demand warrants additional coaches.

Free Passengers

'Free' passengers (i.e. those not taking an organised tour) are only allowed ashore when 'Tour' passengers have cleared.

Shuttle service

To accommodate free passengers a shuttle service from Old Quay to the Royal Marine Hotel will be provided. This will consist of a single 30 seat bus. It will travel between the proposed new berth and the Royal Marine Hotel via Harbour Road, with a stop at the Ferry Terminal Building for Dart and Dublin Bus access. A shuttle bus stop will be provided with in the existing Marina car park.

Taxi / Private car

Taxis and private hire cars will attend the landing location at the existing car park and a new drop off and pick up point. Taxi Companies will be notified in advance by the cruise operators of the potential for taxi demand during the morning of the cruise ship stay at Dun Laoghaire, and taxis will arrive at the taxi loading area in a prearranged manner as passengers disembark spread over the period of stay of the vessels. For details refer to Drawing LS-011 prepared by Waterman Moylan Engineers that is included in this application.

Pedestrians

Significant pedestrian traffic accessing public transport and visiting Dun Laoghaire locally are expected in particular in good weather when a high proportion of passengers are expected to disembark without having booked a coach tour. The proposal includes upgrades of the existing pedestrian routes.

Staff

Staff parking will be provided in existing parking facilities within the harbour area remote from the cruise berthing facility.

5.9.14.3 Possible future car ferry service

The possible re-introduction of a ferry service to Dun Laoghaire has been considered. The potential service envisaged as being commercially realistic would be a LYNX 111 vessel with a maximum capacity of 153 vehicles. This service would generate significantly less traffic then the discontinued Stena service.

In the event that a car ferry service is re-introduced in Dun Laoghaire it is anticipated that the arrival and departure times will not coincide with peak hour background traffic or the peak coach traffic that will be generated by the proposed development.

5.9.14.4 Modal Split

Assessment of the proposal demand on the harbour transport infrastructure during operational phase was based on joined arrival of two cruise vessels the 340m Freedom class vessel with maximum capacity of 3,780 passengers and the 200m vessel with maximum capacity of 312 passengers.

An assessment of the modal split was carried out for two scenarios, upper and average estimate of passengers disembarking during the combined arrival of vessels with a combined total of 4,092 cruise passengers on board. The upper estimate has been established in order to determine the busiest possible loading on each mode of transport. The average estimate has been established in order to determine the expected loading on each mode of transport. The expected modal split for both scenarios is outlined in the table below.

Table 5.9.8 Expected modal split for the upper and the average scenario

Modal split	Upper Estimate			Average Estimate		
	% of total passengers	Persons	Vehicles	% of total passengers	Persons	Vehicles
Total number of passengers		4092			4092	
Passengers disembarking	90%	3683	-	60%	2455	-
Quay Side Shuttle	40%	1512	82	30%	1134	61
Guests on Coach Tours	55%	2079	50	35%	1323	32
Guests Shuttle to / from Dun Laoghaire	15%	567	61	10%	378	41
Walking to Dun Laoghaire	35%	1432	-	20%	818	-
Taxi / private car	15%	567	153	10%	378	102

As the percentage for each mode of transport is assessed based on the numbers of passengers expected to use this mode independently of the other modes available the percentage of the total passengers will not total 100% for each mode but will be considerably higher reflecting the variations that may occur in practice.

The Upper and Average Estimate approach was considered as useful enabling an assessment of the facility under expected conditions and under extreme conditions to establish the worst case scenario for each mode of transport.

5.9.14.5 Transport Demand during Disembarking

Arrival of cruise liners will generate a significant number of pedestrians at the cruise terminal. Several modes of transport will be provided to accommodate the passengers and to ensure that the passengers have an enjoyable experience at Dun Laoghaire and its environs.

The following transport demand calculation on each mode was based on upper estimates which represents the worst case scenario. It is expected that the passenger disembarkation and embarkation will be spread out over the period of the stay of the vessels. The spread of demand over time for each mode of transport is expressed as a percentage and a number of passengers in Table 5.9.9 and Table 5.9.10 below.

Table 5.9.9: Transport Demand by Time during Disembarking

	08-10	10-12	12-14	14-16	16-18	08-18
Total Disembarking	55%	10%	20%	10%	5%	100%
	2,026	368	737	368	184	3,683
Quay Side Shuttle From Vessel	60%	5%	20%	10%	5%	100%
	49	4	17	8	4	82
Coach Tours Out	65%	0	35%	0	0	100%
	30	-	20	-	-	50
Shuttle to Dun Laoghaire	20%	25%	25%	25%	5%	100%
	12	15	15	15	3	61
Walking to Dun Laoghaire	20%	25%	25%	25%	5%	100%
	286	358	358	358	72	1,432
Taxis / Private Car Out	25%	20%	25%	25%	5	100%
	38	31	38	38	8	153

Table 5.9.10: Transport Demand by Time during Embarking

	08-10	10-12	12-14	14-16	16-18	08-18
Total Embarking	5%	10%	20%	10%	55%	100%
	184	368	737	368	2,026	3,683
Quay Side Shuttle To Vessel	5%	10%	20%	5%	60%	100%
	4	8	17	4	49	82
Coach Tours Return	0%	0%	35%	0%	65%	100%
	-	-	18	-	33	50
Shuttle from Dun Laoghaire	5%	10%	20%	25%	40%	100%
	3	6	12	15	25	61
Walking from Dun Laoghaire	5%	10%	25%	25%	35%	100%
	72	143	358	358	501	1,432
Taxis / Private Car In	5%	20%	20%	25%	30%	100%
	8	31	31	38	46	153

In addition to the above identified trips there will be trips generated by both shuttles and coaches which will be departing or arriving empty.

It is envisaged that half of the empty coaches will arrive before the AM and after PM peak hour period and that the other half will arrive during the AM and PM peak hour.

Quay side shuttle service within the harbour area will have no impact on the local road network and therefore is excluded from the further assessment.

5.9.14.6 Trip Generation

1. Coach Traffic

It is envisaged that half of the empty coaches will arrive before 08.00 and wait the disembarking passengers remaining half will arrive between 08:00 and 10:00. Similarly it is envisaged that half of the returning coaches in the evening will depart the site after 18.00 and remaining half will depart the site between 16:00 and 18:00.

Tour coaches will leave as soon as their allocation of passengers have boarded so there is no concentration of departing coaches. For the purpose of this traffic assessment, it is assumed that the departure and the arrival of coaches will be evenly spread over a time period. Coach trips generated by the development are indicated in table below.

Table 5.9.11 Total Number of Coach Trips Two Ways

	Morning		Lunch		Evening		
	06-08	**08-10**	**10-12**	**12-14**	**14-16**	**16-18**	**18-20**
Tour Coach Trips In and Out	0	30	0	38	0	33	0
Coaches Arriving / Departing Empty	15	15	2	0	0	16	17
Total Trips Generated	15	45	2	38	0	49	17
Total trips in pcu*	30	90	4	76	0	98	34

*1 light vehicle = 1pcu, 1 heavy vehicle = 2pcu

2. Shuttle Traffic

To accommodate free passengers, shuttle bus services will be provided. The shuttle bus service will operate via Harbour Road and will stop at the Ferry Terminal Building for Dart and Dublin Bus access and at Royal Marine Hotel in Dun Laoghaire town. Free passengers who may use the shuttle bus service will generally disembark after the coach tours have departed.

Shuttle bus service frequency to Dun Laoghaire will be one service per 8 minutes during AM peak hour and one service per 4 minutes during PM peak hour. It is envisaged that during the AM peak hour the shuttle bus service will generate 15 trips and during the PM peak hour 25 trips both direction (to and from the proposed development). Converting this to pcu, where 1 shuttle bus vehicle is equal to 2 pcu, the proposed development will generate 30 pcu trip during the AM peak hour and 50 pcu trips during the PM peak hour.

3. Pedestrian Traffic

With the pleasant aspect on landing in Dun Laoghaire, it is expected to see pedestrian numbers increase. As many as 1431 passenger may explore Dun Laoghaire locally on foot, either before or after they intend to take half day tours or public transport to Dublin. This will add new pedestrian trips on to the existing pedestrian facilities in the area.

The peak in pedestrian movement is expected from 12:00 to 16:00. This will result in an average pedestrian loading of 358 persons per hour on Harbour Road pedestrian facilities.

All pedestrians will pass via Harbour Road to their intended destination which is most likely to be one of the following:

- Dun Laoghaire town
- Different parts of Dun Laoghaire Harbour
- The Metals
- DART station
- Dublin Bus stop

Pedestrian trips generated by the proposed development are indicated in table below.

Table 5.9.13: Total Number of Pedestrian Trips Two Ways

	Morning		Lunch		Evening
	08-10	**10-12**	**12-14**	**14-16**	**16-18**
Total Pedestrian Trips (two ways)	358	501	716	716	573

4. Taxis and Private Cars

Taxis and private hire cars will attend the landing location at the designated taxi rank, as is necessary.

Taxis will be arranged locally by the specialist tour operator staff on site for passengers requiring taxis. For the purpose of this traffic assessment it is assumed that the arrivals and departures of taxies and private cars will be evenly spread over time. Refer to table below for details.

Table 5.9.14: Total Number of Passenger Car Trips Two Ways

	Morning		Lunch		Evening
	08-10	**10-12**	**12-14**	**14-16**	**16-18**
Total Taxis and Private Cars Trips (two ways)	46	62	69	76	54
Cars Arriving / Departing Empty	30	0	7	0	38
Total Car Trips	76	62	76	76	92

5.9.14.7 Trip Assignment and distribution

Directional split

Base on the location of tourist attractions it is assumed that 80% of the total vehicular trips generated will take place in the Dublin direction and 20% of the total trips generated will take place in the Wicklow direction.

It is assumed that the vehicles travelling in the Dublin direction are likely to leave the harbour via Junction 1 and the vehicles travelling in the Wicklow direction are likely to leave the harbour via Junction 3.

Dun Laoghaire Shuttle bus will operate via Junction 3.

Refer to figures below for details.

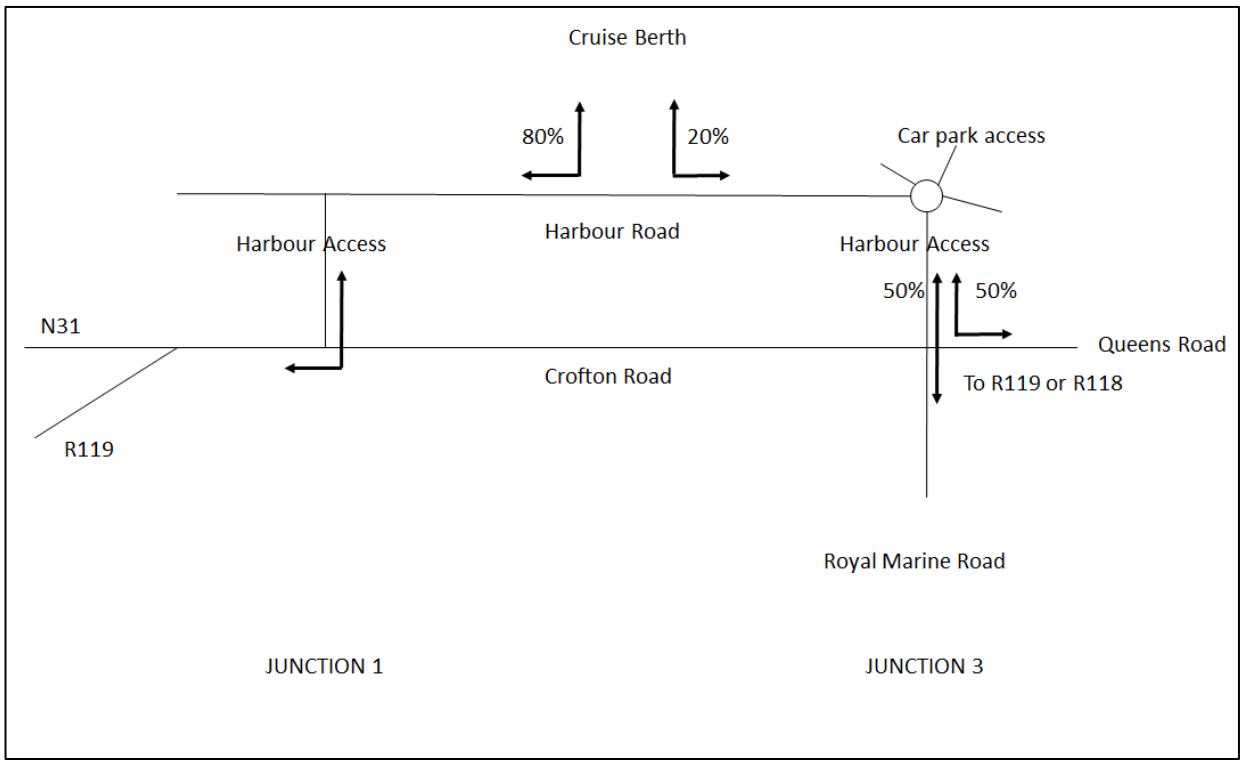


Figure 5.9.14: Tour coaches, taxis and private cars directional split

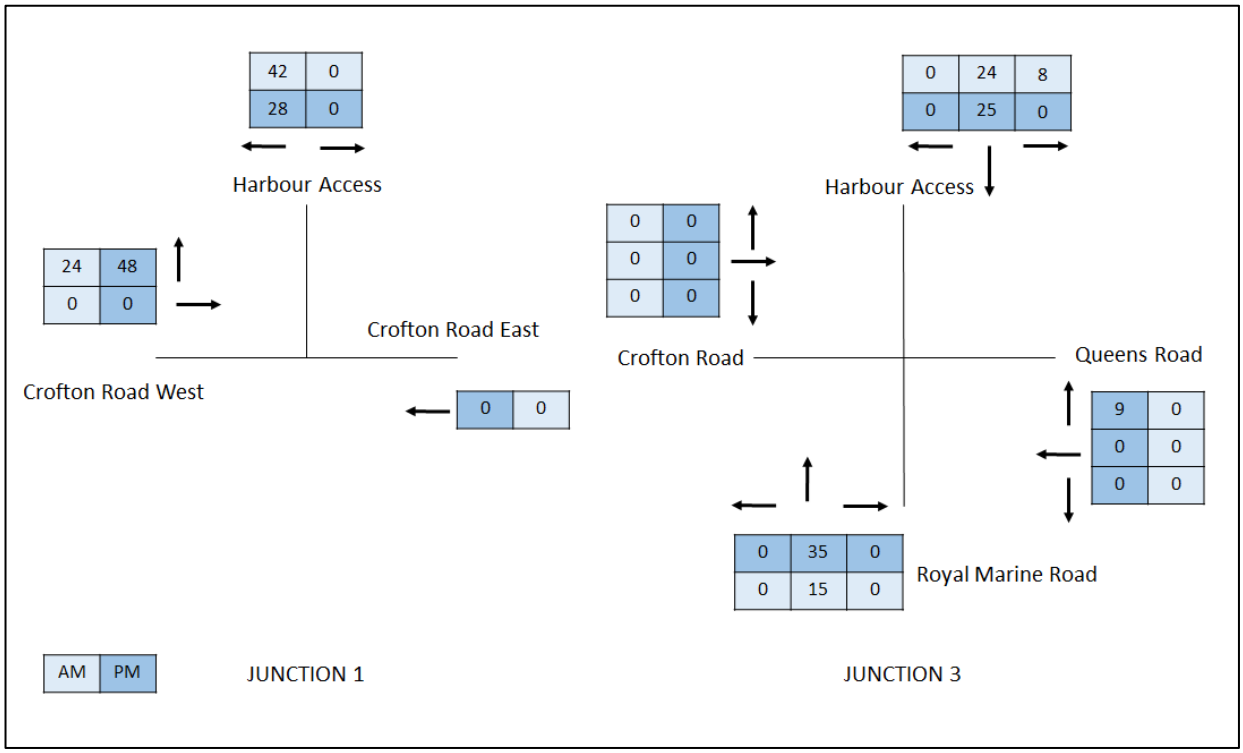


Figure 5.9.15: Total vehicular trips generated by the proposed development during AM and PM peak hour in pcu

As can be seen from the figure above the trips generated by the proposed development are well below the trips generated by the Stena Ferry service to Holyhead. It is estimated that the proposed development will generate 145 trips in total during the PM peak hour which is 55 trips less than observed during the Stena Ferry arrival on 28 December 2013.

5.9.14.8 The Masterplan development 2026

A traffic assessment was carried out by AECOM in support of the Masterplan for Dun Laoghaire harbour which include mixed use development which was estimated to generate 106 inbound and 97 outbound trips in AM peak and 115 inbound and 142 outbound trips in PM peak. Figure below shows the Masterplan 2026 trip distribution on the key junctions.

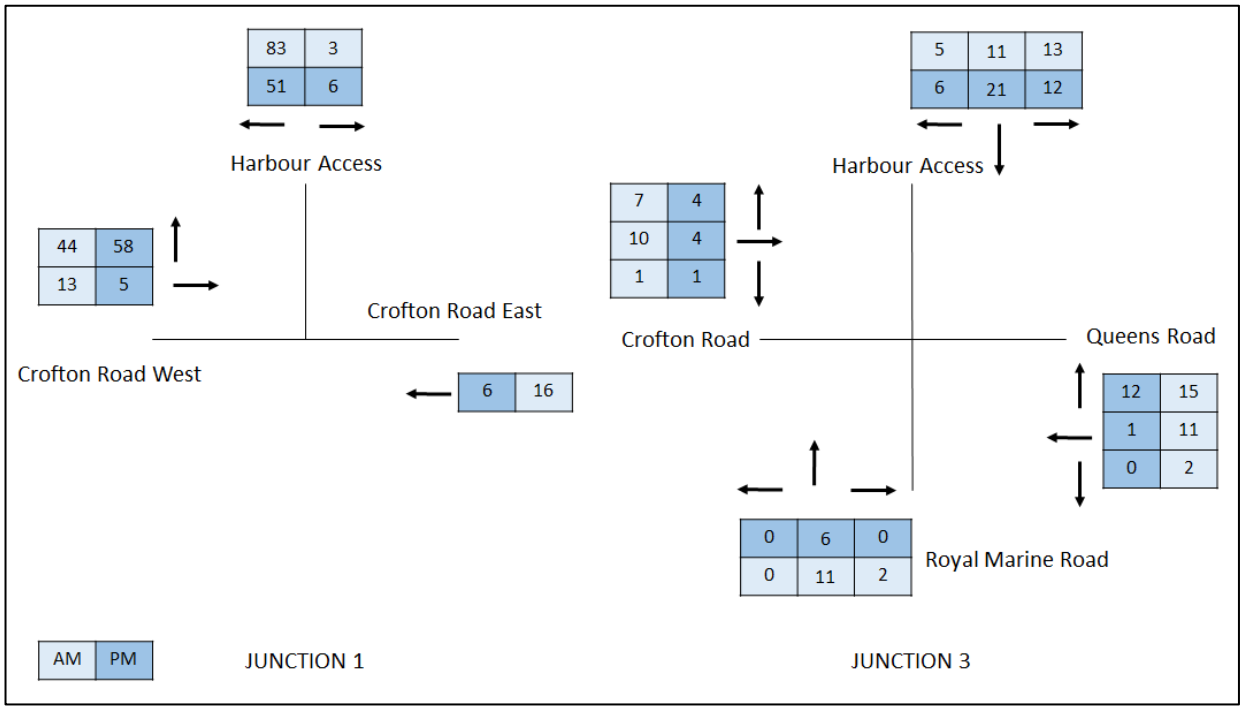


Figure 5.9.16: Trip generated by the Masterplan 2026 development (AECOM 2011)

5.9.14.9 Proposed Road Improvements

The proposal provides for significant upgrades to the pedestrian network in the harbour area.

No road improvements are required by the proposed development to accommodate traffic to and from the development other than a minor adjustment to the geometry at Old Quay for coach storage.

The existing arrangement of an adjustment to the timing of the traffic signals at Coal Quay Bridge to accommodate the Stena Ferry traffic is not considered to be required for this development. However, in the event that excessive queues resulting in delays to coach traffic were to occur during a peak period an adjustment to the signal controls similar to the existing arrangement for the ferry traffic may be considered.

5.9.14.10 Cycling Facilities

The Sutton to Sandycove Promenade and Cycleway Project

The vision of S2S is to provide a continuous promenade and cycleway approximately 22 kilometres in length, around Dublin Bay from Sutton to Sandycove linking existing and proposed cycle and walking routes.

In the vicinity of the harbour the S2S route will comprise concrete slabs/blocks and a timber boardwalk. It is proposed, as part of the S2S Route, to provide segregated, off road two-way cycle tracks along the Harbour Road and the Queens Road and to improve the Crofton Road/Marine Road junction by the provision of signalised pedestrian and cyclist crossing points. At the Coal Bridge the preferred option is to avoid the bridge altogether and to provide pedestrian/cyclist underpass. In addition to the above the S2S also proposed to provide a bicycle hire facility within the existing terminal plaza.

With the above scheme in place it is reasonable to expect that more people, especially leisure users, will choose to cycle or walk to Dun Laoghaire harbour.

5.9.14.11 Construction Phase

The construction phase consists of two stages;

1. Site clearance

2. Construction of the coach/pedestrian facility.

This will include the following:-

1. Site clearance will involve the removal of:

- the existing reinforced concrete wall structure
- the security accommodation
- canvas awning structure at the entrance to the vehicular holding area
- excavation of the existing surfacing to a depth not expected to be greater than 500mm (other than at local obstructions)
- removal and relocation of some existing utilities and drainage to accommodate the development
- removal of the existing retaining wall adjoining the car park located adjacent to the Old Quay area at the west of the Harbour

The demolition of the existing structures would be achieved using excavators, mobile crane, large diameter circular saws and percussive mobile rock breakers to obtain more easily transportable segments. The cut segments will be removed from the site using suitable truck transport to the disposal site. The disposal site will be a licenced tip for waste. Refer to the figure below for details.

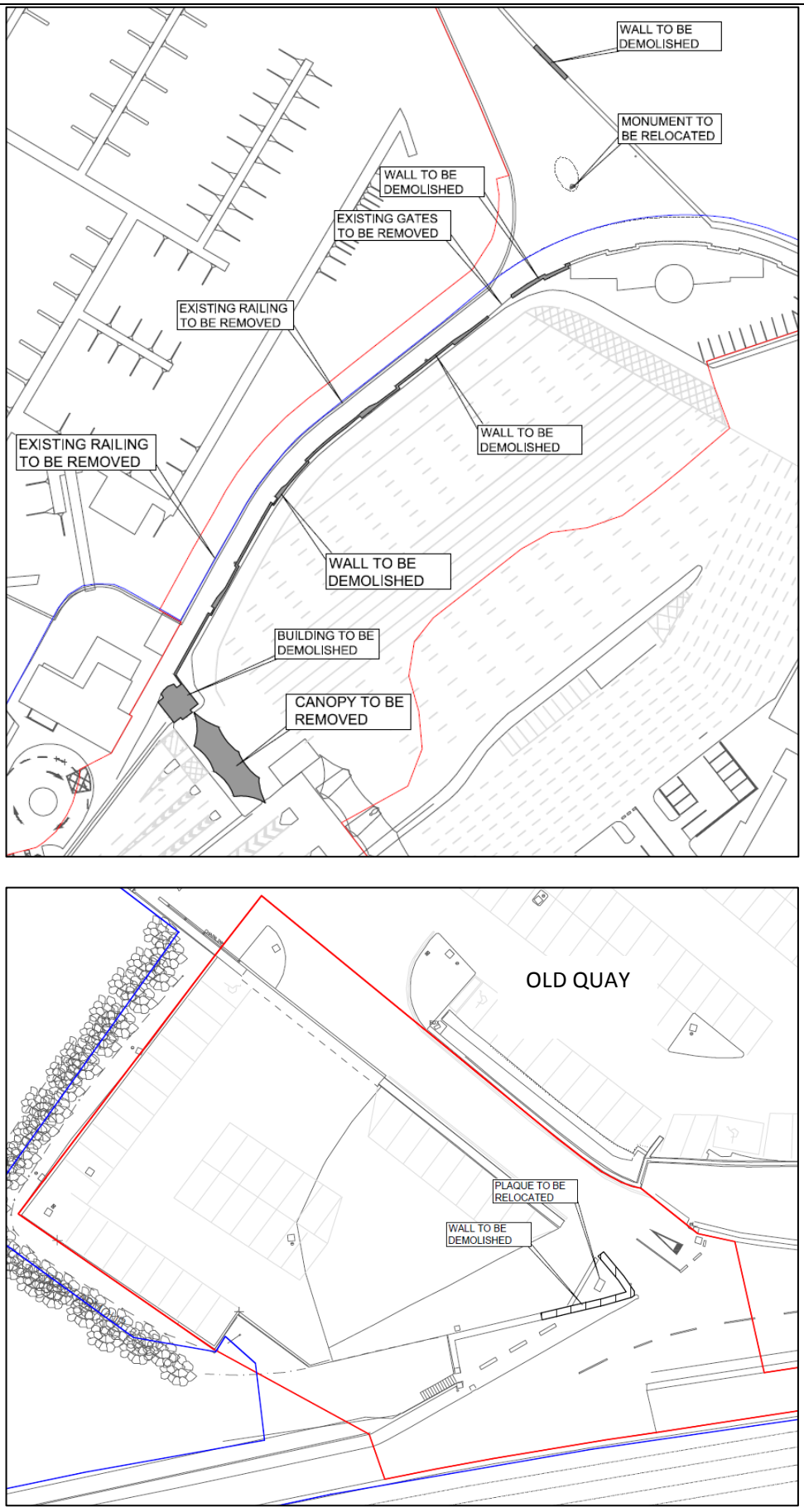


Figure 5.9.17: Structures to be demolished as part of the site clearance works

2. Construction works of the Coach/Pedestrian facility include:

- The provision of buried of utilities and services using shallow trench and backfilled with imported material.
- The construction of a new wall between the landside coach facilities and the existing Stena vehicular holding area.
- Removal and importation of materials from and to the development area generating construction traffic during the construction phase.
- Adjustments and additional drainage connections to existing surface and waste water drains.
- Provision of ducting for utilities including water mains, power, telecommunication, cctv and public lighting ducts.
- Laying of new paving on the coach route and the pedestrian facility.
- Construction of improved footpaths along Harbour Road.
- Construction of the proposed Boardwalk along the Marina.
- Extension of the existing retaining wall adjoining car park located adjacent to the Old Quay area at the west of the harbour.
- Traffic associated with material deliveries intended for the proposed marine quay structures.

No deep excavations are envisaged as part of the land side works.

5.9.14.12 Transportation demand during construction

Construction works will require the importation of construction materials and the removal of waste materials from the development site. Transport will also be required for construction operatives during the construction phase.

Construction activities for the proposed coach facility comprised mainly of removal of paving materials and replacement with compacted granular fill material imported by road via Harbour Road.

Similarly the construction of a lean-mix concrete base followed by block paving will involve the importation of construction materials and equipment during the construction phase.

The provision of buried utilities and services would be by using shallow trench backfilled with imported material all delivered by road.

The construction traffic will arrive and depart the site via Harbour Road. Based on the worst case scenario of six working days per week, all materials arriving by land, it is predicted that the construction phase will generate maximum 6 vehicles per hour, two way.

5.9.15 Traffic Assessment

5.9.15.1 Assessment years and scenarios

The traffic effects of the proposed development have been assessed on base year of 2014, an assumed opening year of 2017 and an assessment year of 2032, 15 years after the year of opening. The assessment year 2032 takes into account trips generated by the 2026 Masterplan development.

It is envisaged that there will be a medium growth in the background traffic in the vicinity of the site between opening year of 2017 and the assessment year of 2032. The total traffic growth between 2014 and 2032 is expected to be as follows;

- 2014 – 2017 1.015 or 1.5% (Opening Year)
- 2017 – 2026 1.041 or 4.1% (Opening Year + 9 years)
- 2026 – 2032 1.028 or 2.8% (Masterplan + 6 years)
- 2014 – 2032 1.086 or 8.6% (Base Year + 18 years)

The growth factors were obtained from the prediction for regional roads included in the NRA Project Appraisal Guidelines, Unit 5.5 Link-Based Traffic Growth Forecasting, published in January 2011.

The assessment of the potential impacts, of the operational phase, has been undertaken on the basis of the following scenarios:

- Scenario 1 (S1): Do Nothing (Opening Year)
- Scenario 2 (S2): Do Something (Opening Year + Development)
- Scenario 3 (S3): Do Nothing (Assessment Year + The Masterplan)
- Scenario 4 (S4): Do Something (Assessment Year + The Masterplan + Development)

The assessment does not take into account factors such as changes in modal split.

The assessment is based on the 'worst case scenario' i.e. upper estimate.

Following are the details of peak traffic flows on critical junctions for each scenario.

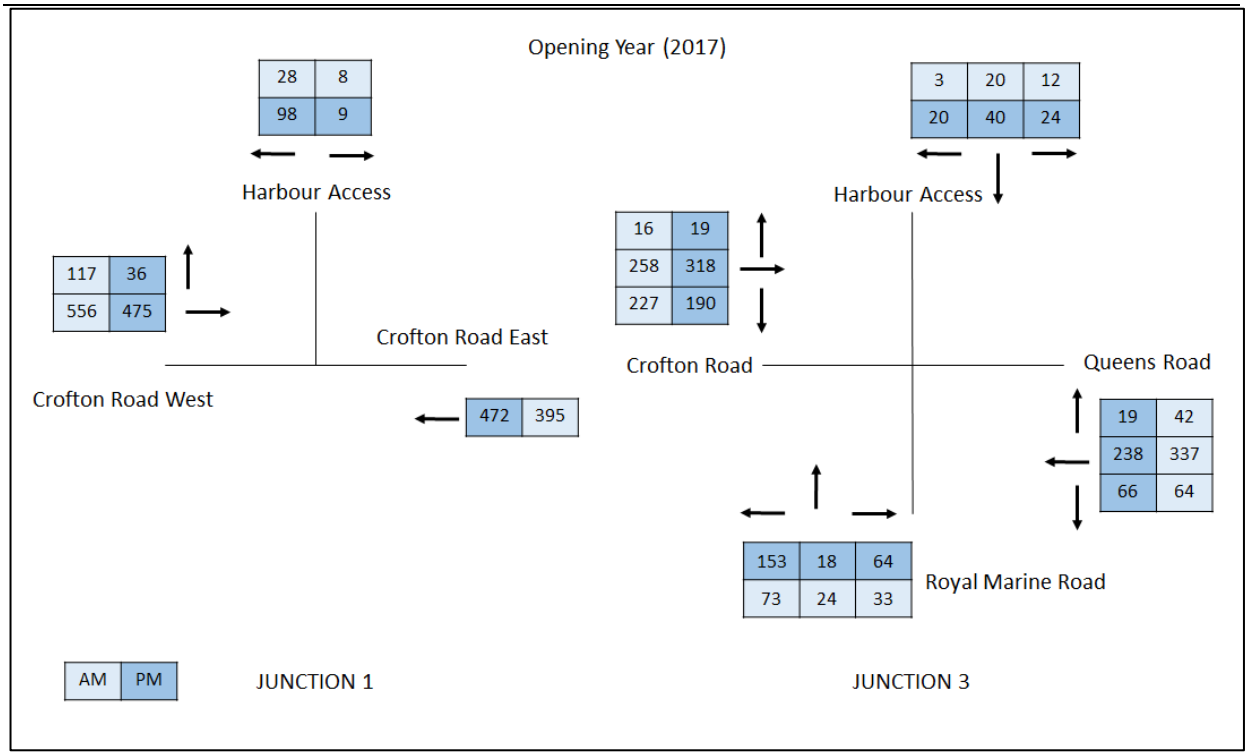


Figure 5.9.17: Peak Traffic Flows 2017 without development (Scenario 1)

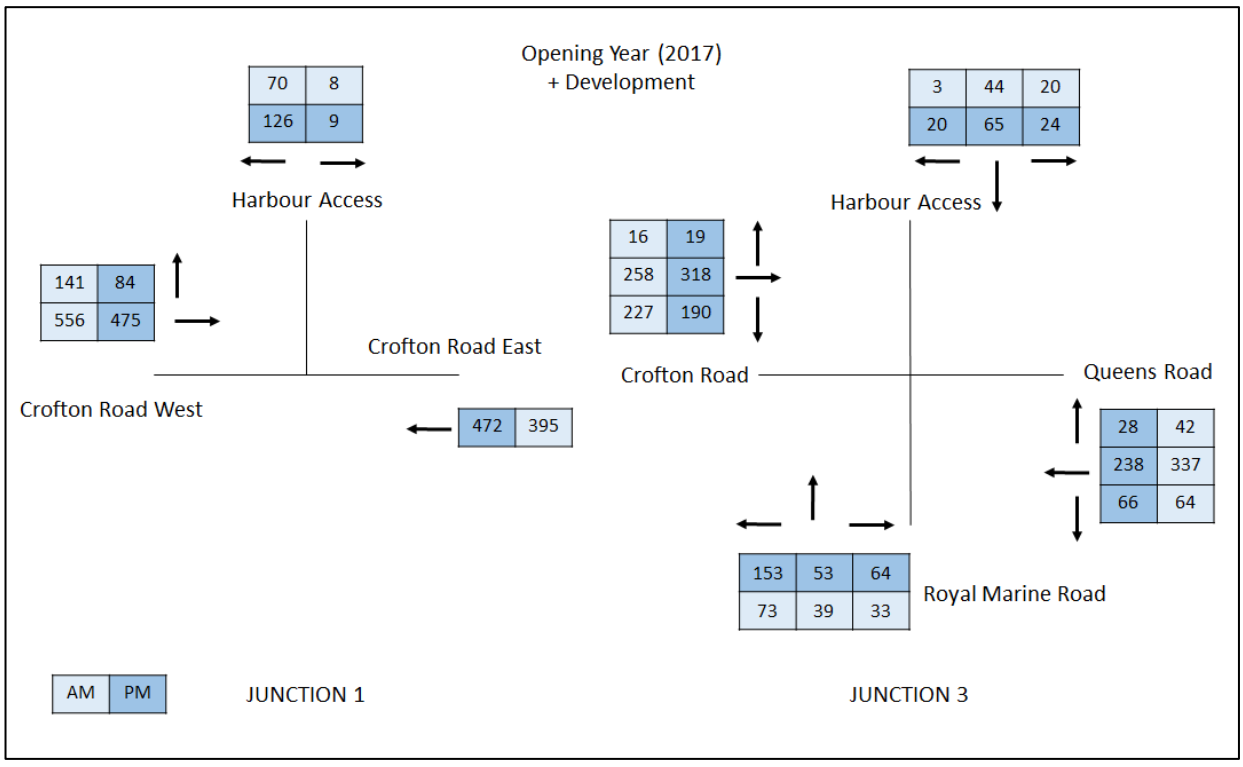


Figure 5.9.18: Peak Traffic Flows 2017 with development (Scenario 2)

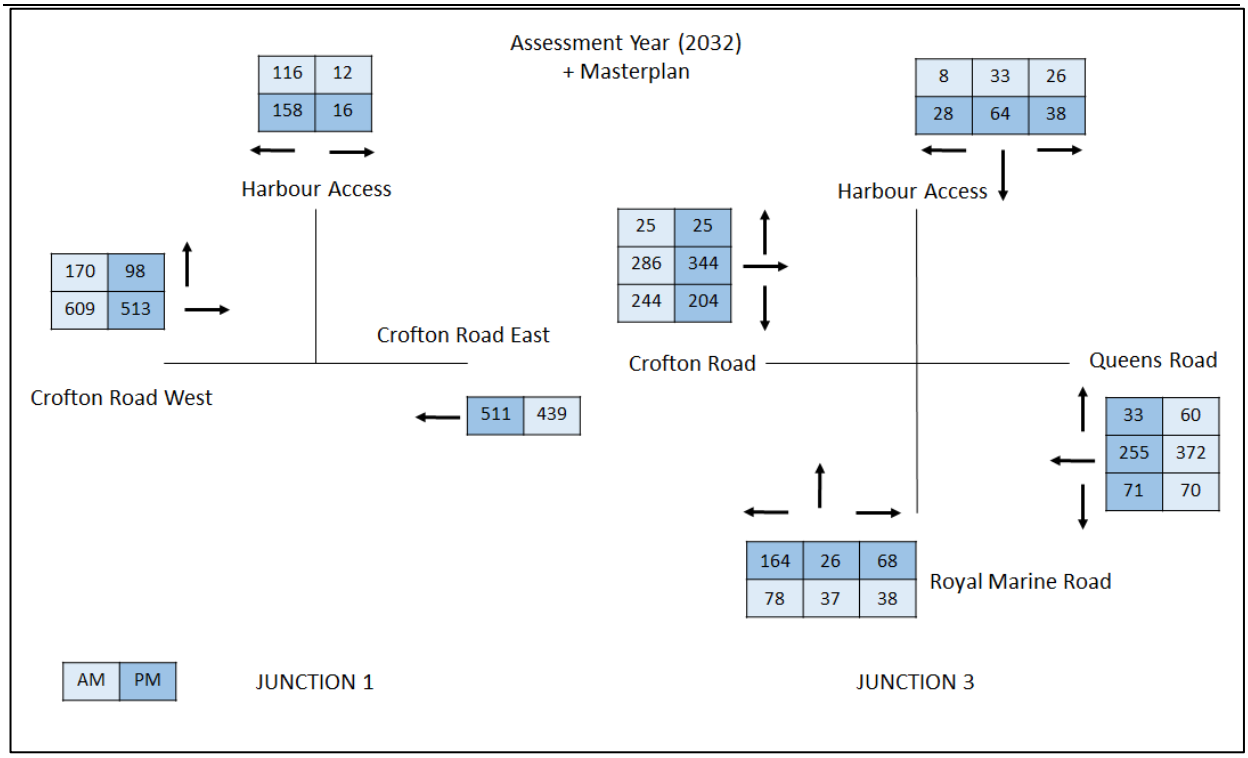


Figure 5.9.19: Peak Traffic Flows 2032 with the Masterplan only (Scenario 3)

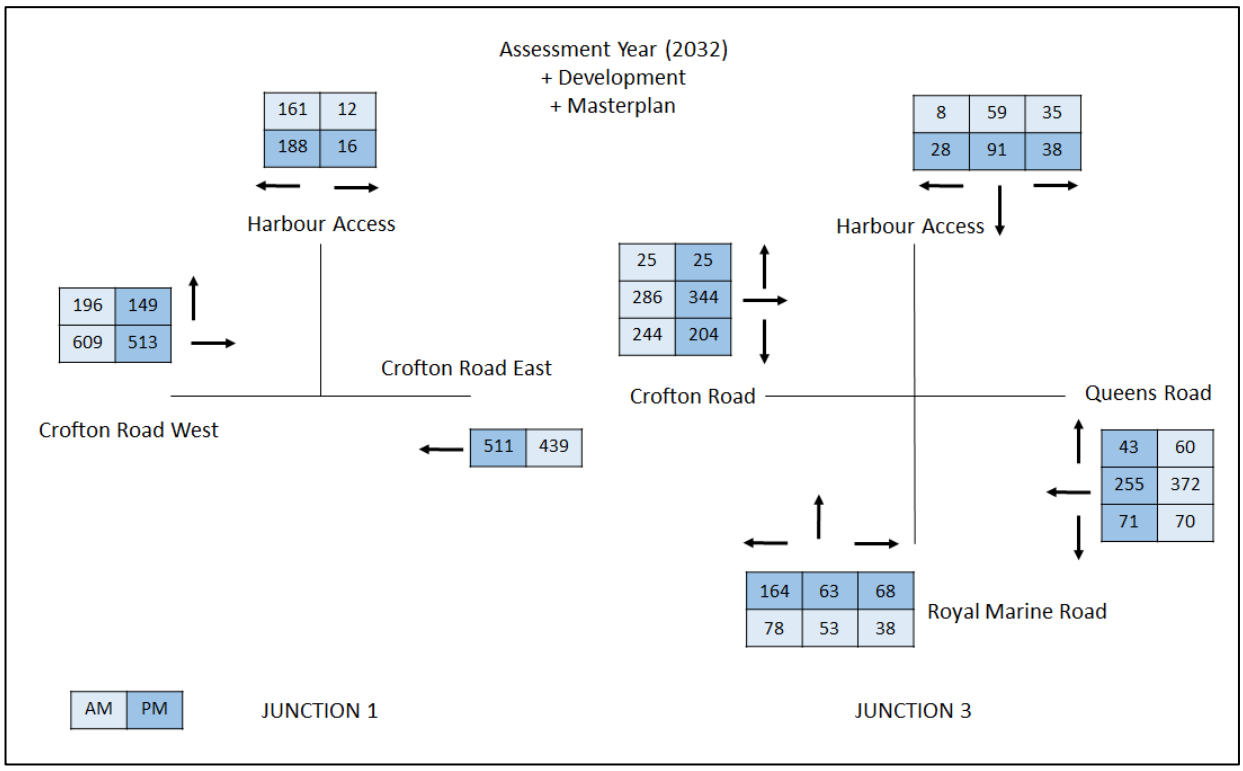


Figure 5.9.20: Peak Traffic Flows 2032 with the Masterplan and development (Scenario 4)

5.9.15.2 Impacts Rating

According to the TFL Traffic modelling guidelines 2010, delay begins to increase exponentially above approximately 85% degree of saturation (DoS). At junctions operating close to approximately 90% DoS, small reductions in capacity can result in a significant increase in delay. For this reason a DoS of 90% represents an upper limit of practical capacity for signalised junctions.

Based on the above the following impact scale to rate impact of the development on the critical signalised junctions has been developed.

Table 5.9.15: Impact on Degree of Saturation (DoS) at Critical Junctions

	Do Something DoS			
Do Nothing DoS	<80%	80-85%	85-90%	>90%
<80%	Neutral	Moderate	Significant	Significant
80-85%	Positive	Slight	Significant	Significant
85-90%	Positive	Positive	Slight	Significant
>90%	Positive	Positive	Positive	Slight

As can be seen from the table above the impact of the development is represented by the difference in junction performance between the base conditions (Do-nothing) and the development phase condition (Do-something).

5.9.15.3 Volume over capacity at harbour access junctions

Operational Phase

Table 5.9.16: AM Peak Hour Volume over Capacity Results

AM		Opening Year 2017			Assessment Year 2032			
	Scenario	S1: Do Nothing	S2: Do Something	Impact		S3: Do Nothing	S4: Do Something	Impact
Junction 1	DoS (%)	65.5	68.2	Neutral	DoS (%)	76.4	79.4	Neutral
	MQL (veh/lane)	10	10.4		MQL (veh/lane)	12.2	12.9	
	PRC (%)	37.5	32.0		PRC (%)	17.8	13.4	
Junction 3	DoS (%)	44.7	44.7	Neutral	DoS (%)	49.4	49.4	Neutral
	MQL (veh/lane)	4.1	4.1		MQL (veh/lane)	4.6	4.6	
	PRC (%)	101.2	101.2		PRC (%)	82.1	82.1	

Table 5.9.17: PM Peak Hour Volume over Capacity Results

PM		Opening Year 2017			Assessment Year 2032			
	Scenario	S1: Do Nothing	S2: Do Something	Impact		S3: Do Nothing	S4: Do Something	Impact
Junction 1	DoS (%)	48.6	54.1	Neutral	DoS (%)	59.3	65.1	Neutral
	MQL (veh/lane)	7.3	8.1		MQL (veh/lane)	8.9	9.8	
	PRC (%)	85.2	66.3		PRC (%)	51.8	38.3	
Junction 3	DoS (%)	43.9	51.1	Neutral	DoS (%)	48.4	54.5	Neutral
	MQL (veh/lane)	3.5	3.7		MQL (veh/lane)	3.9	4.1	
	PRC (%)	104.9	76.0		PRC (%)	85.8	65.0	

5.9.16 Potential Traffic Impact

5.9.16.1 Construction Phase

Do Nothing

In the event that the project does not proceed the site will continue to be used as a carpark and public pedestrian route. The harbour accessibility by cruise liners will remain unchanged.

Do Something

For the duration of the construction phase of the development, there is a potential for adverse impacts arising from traffic generated from the removal of demolition spoil, waste and excavated material together with the delivery of construction material and plant. The truck traffic generated by the construction process is estimated at a peak hour of 6 vehicles and should not affect traffic patterns on the surrounding road network.

The construction traffic may result in spillages of materials and mud on the road network.

Construction of the proposed development will require diversion of pedestrians and some local traffic management but is not envisaged as requiring a road closure.

Proposed upgrade of the existing pedestrian facilities will require the diversion of pedestrians, and traffic during construction phase. It is envisaged that no more than one lane of the roadway will be closed at any given time.

It is noted that the construction impacts are temporary only.

5.9.16.2 Operational Phase

Do Nothing

In the event that the project does not proceed the site will continue to be used as a car park and public pedestrian route. The harbour accessibility by cruise liners will remain unchanged.

Do Something

The impact of the development will be on the road network as a result of the generation of additional trips, on parking provision as a result of the coach tours demand and on the pedestrian facilities in the vicinity of the harbour as a result of "free" passengers visiting Dun Laoghaire town.

The arrival of cruise ships at the proposed berth will result in an increase in pedestrian traffic in and around the proposed quay and on pedestrian routes to Dun Laoghaire as well as some additional vehicular traffic accessing the harbour area.

The estimated volume of traffic generated by the arrival of cruise ship vessels will have neutral impact on junctions assessed. This means that the proposed development will result in an impact on the degree of saturation of the junctions assessed but will be of insufficient magnitude to affect the traffic flows.

As part of the proposed development a coach tour pick up/drop off area and an overflow temporary parking area will be provided for coaches attending landing.

The overflow parking area will cater for the temporary parking of coaches before they proceed, only when required, along Harbour Road to the proposed coach tour pick up/drop off

area. As a result the number of coaches waiting to pick up guests at the quay coach facilities is minimised. The coach storage facilities will not impact on the public road network.

The estimated volume of pedestrians generated by the arrival of vessels will result in increased demand on the existing pedestrian facilities. The Stage 1 road safety audit identified several hazards for pedestrians along the existing pedestrian route. As part of the proposed development the pedestrian facilities will be improved and the hazards identified by the Stage 1 road safety audit will be removed. As a result the proposed development will have a positive impact on the pedestrian facilities in the area.

The proposed improvement of the pedestrian facilities and provision of the new pedestrian friendly raised crossing will require the relocation of one on street parking space on Harbour Road and nine pay-and-display parking spaces at the ferry terminal plaza car park adjacent to Harbour Road. As a result of the proposed development, nineteen new car parking spaces will be provided which will result in a net addition of nine new pay-and-display parking spaces off Harbour Road.

To summarise, the net addition of 9 pay-and-display parking spaces off Harbour Road will result from the relocation of 10 existing spaces, all as indicated on Drawing LS-0110 prepared by Waterman Moylan Engineers and included in this application.

5.9.17 Avoidance, Remedial or Reductive Measures

5.9.17.1 Construction Phase

The construction works will be phased to minimise disruption to pedestrians, cyclists and traffic at any given time.

The construction stage traffic management plan will be prepared and implemented in accordance with 'Guidance for the Control and Management of Traffic at Roadworks', by the Department of Transport and 'Guidelines for Working on Roads' by the Health and Safety Authority.

Measures to minimise mud and debris on the public road network will be undertaken including covering waste, wheel wash, and road sweepers.

Deliveries of materials will be stored within the harbour area and will not make use of the public road network for waiting or storage.

Live road traffic and pedestrians will be separated from the workplace by temporary hoarding for the period of demolition and reconstruction.

5.9.17.2 Operational Phase

Dun Laoghaire Harbour Company already has experience in the management of pedestrian and vehicular traffic resulting from the arrival of a cruise ship at Dun Laoghaire.

A transport management plan has been prepared by the Harbour Company and has been successfully implemented during the arrival of Queen Mary II and other vessels. An example of the Transport Management Plan is included as an Appendix to this EIS.

A specific traffic management plan will be developed to incorporate any additional requirements of management at the proposed new berthing facility. This plan will include management at the proposed coach loading area and the new pedestrian routing and the

coach movements required to enter the staging area at Old Quay which will be monitored and supervised by a traffic marshal at all times when coach movements are taking place.

5.9.18 Predicted Impact of the Proposal

5.9.18.1 Construction Phase

During the construction phase of the proposed development no perceptible impact is expected on the junctions assessed. A slight, short-term impact is expected during pedestrian facilities upgrade and watermain connection works that may require diversion of pedestrians and some local traffic management along the Harbour Road.

5.9.18.2 Operational Phase

The estimated volume of traffic generated by the arrival of cruise ship vessels will be of insufficient magnitude to affect the traffic flows on the harbour gateway junctions for all scenarios assessed.

A positive impact on the environment is expected as a result of the proposed upgrade of pedestrian facilities which will remove hazards identified by the Stage 1 road safety audit.

5.9.18.3 Worst case impact

The worst case scenario would arise when the arrival of cruise vessels in the port coincides with local festivals and events. However, these are thought to be seasonal and of short duration.

Given the conservative junction assessment (based on the upper estimate of passenger demand on each mode of transport), the spare capacities at junctions assessed and Dun Laoghaire Harbour Company previous experiences in traffic management and event organising, it is expected that the impact will be short-term in duration and of insufficient magnitude to have any significant impact on the junctions assessed.

A nominal short term increase in queue formation can be expected in the medium term at the junctions assessed but without significantly affecting its performance.

During the coinciding arrival of festival visitors and cruise visitors (whose disembarkation and embarkation will be spread over the period of stay of the vessels) the Dun Laoghaire Harbour Company will implement a comprehensive traffic management plan and will provide marshals to monitor and supervise coach and other traffic.

Coaches will leave as soon as their allocation of passengers have boarded so there is no concentration of departing coaches.

In an unlikely event an adjustment to the existing arrangement of the timing of the traffic signals at Coal Quay Bridge, although not currently to be required for cruise purposes, may be considered so as to manage queue lengths during festivals to avoid delays to coach traffic.