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13.4 ROAD TRAFFIC AND INFRASTRUCTURE

13.4.1 Introduction

13.4.1.1 Introduction

In preparing the Traffic Assessment Report reference has been made to the following:-

- The Galway City Development Plan 2011 – 2017;
- Smarter Travel – A Sustainable Transport Future – A New Transport Policy for Ireland 2009 – 2020;
- Smarter Travel – National Cycle Policy Framework;
- Traffic Management Guidelines - 2003; Department of Transport;
- National Cycle Manual - 2011, National Transport Authority;
- Draft Galway City and Environs Walking and Cycling Strategy 2010 – 2017 (Draft Final Rev 3 July 2012);
- Galway City Centre Wayfinding;
- Traffic and Transport Assessment Guidelines – 2007, NRA;
- NRA Addendum to TA 79/99 “Traffic Capacity Of Urban Roads” [and Amendment No. 1 May 1999];
- NRA Addendum to TD 50/04 “The Geometric Layout Of Signal-Controlled Junctions and Signalised Roundabouts”;
- NRA TD 41-42/11 “Geometric Design of Major/Minor Priority Junctions and Vehicular Access to National Roads”;
- NRA TD 9/12 “Road Link Design”;
- NRA TD 27/11 Cross Sections and Headroom”;
- Design Manual for Urban Roads and Streets - 2013, Department of Transport, Tourism and Sport and the Department of Environment, Community and Local Government;
- Guidance on the Use of Tactile Paving Surfaces - , The UK DETR;
- Building for Everyone – External Environment and Approach - 2012; The National Disability Authority.

13.4.1.2 Objectives

The objective of this report is to assess the impact the proposed development will have on the operational capacity of the existing road network, also taking into account any road network improvements proposed in the area. This analysis will calculate the expected volume of traffic that will be generated by the proposed development and will assess the nett impact that this traffic will have on the operational capacity of the road network, both in the vicinity of the development and on the wider city road network.

13.4.1.3 Scoping Process

In order to ensure that this report has taken account of all relevant transportation issues, close liaison with Galway City Council has been maintained throughout the study duration. This has

included a series of meetings with the Galway Transportation Unit (GTU) in order to agree on a number of fundamental assumptions for the report, such as assessment years, number of junctions to be assessed, yearly growth factors and other developments to be accounted for in the analysis. This report has taken into account the issues raised by Galway City Council during these discussions. Further liaison has been carried out with the GTU and MVA Consultancy, Galway City Council's consultants responsible for the provision of the Galway City SATURN model.

Further considerations resulting from the scoping process carried out with An Bord Pleanála have been factored into the preparation of this report. The extent of the study area to be analysed (including a request to assess the impact of the proposed development on the N6 corridor), the selection of other committed developments to be included in the analysis, and future road network arrangement assumptions have been chosen in order to satisfy these requirements.

13.4.1.4 Structure of Report

This chapter is divided into seven sections:

- Section 13.4.1 includes this introduction
- Section 13.4.2 describes the proposed development, and its location. A description of other major proposed developments is also included in this chapter.
- Section 13.4.3 provides an overview of the existing and proposed traffic conditions, explaining how this information was obtained.
- Section 13.4.4 outlines the assumptions that have been made in the calculation of traffic volumes generated by the proposed development and other major proposed developments and the factors used to forecast the future road network traffic.
- Section 13.4.5 explains the methodology used and the results of the analysis performed on the nominated junctions. An investigation into link capacity is also dealt with in this chapter.
- Section 13.4.6 addresses issues relating to road safety, parking provision, pedestrians and access for people with disabilities.
- Section 13.4.7 concludes the sub-chapter.

13.4.1.5 Analysis

It should be noted that the analysis contained within this report was carried out in June 2011. Following the completion of this analysis, a number of amendments to existing junctions in Galway City have been granted planning, or have been constructed, specifically as part of the Bóthar na dTreabh (N6) Multi-Modal Corridor Improvement Scheme (see Section 13.4.3.3). It was not considered appropriate to update the validated Galway City Traffic Model until such time as all junction upgrades are completed, and updated traffic count information is available. Following completion of the SATURN modelling but prior to completion of this chapter, Lynch, Morris, Ffont and Bodkin Roundabouts have been upgraded to traffic signal-controlled junctions and linked to the city's Urban Traffic Management & Control system. Galway City Council are proposing to update the city model in 2014.

Although the anticipated Stage 1 opening is now envisaged to be 2018, with Stage 4 completed by 2023, it should be noted that the analysis assumed an opening year of 2016, with design years of 2021 and 2031. The robust future year growth factors applied to the traffic model (see Section 13.4.4.4) assumed a front-loading of population (and associated traffic) growth in Galway City between 2011 and 2016. Due to the current economic slowdown, it is highly unlikely that such high growth will be experienced in the city. It is therefore considered that the analysis contained within this report is valid.

The analysis contained within this report was based on projected tonnages which were developed in 2011. Since the completion of this analysis, these projections have been amended, with future year tonnages anticipated to be lower than those utilised in this chapter (see Section

13.4.2.3 for details). As such, it is considered that the analysis contained within this report is also conservative in this regard.

13.4.2 Proposed Development

13.4.2.1 Site Location

The proposed Galway Harbour Extension is located to the south of the existing Galway Harbour Enterprise Park, to the southeast of Galway City Centre. The majority of the proposed site is proposed to be reclaimed from Galway Bay through dredging. Figure 13.4.1 highlights the location of the proposed Galway Harbour Extension.

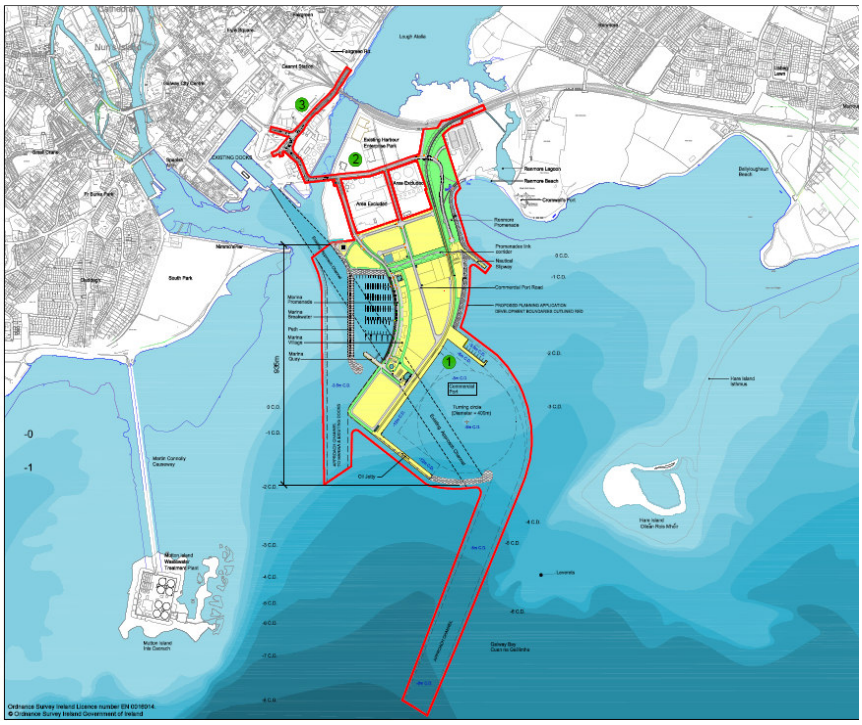

Figure 13.4.1 - Site Location

13.4.2.2 Access to New Port

As part of the project it is proposed to redesign the existing Lough Atalia / Dock Road priority junction as a traffic signal controlled junction in accordance with NRA addendum DMRB TD 50. All harbour related traffic will access the site through this junction. The present arrangement is unsatisfactory in that its non standard geometry does not permit heavy vehicular movements to be executed without vehicles crossing into the lanes of oncoming traffic. In addition vehicles exiting from, or turning right into, the Harbour Road can suffer considerable delays pending the availability of gaps in the traffic stream. The redesign of this junction will ensure traffic can access the development as efficiently as possible. The proposed design incorporates a segregated right-turning lane for traffic accessing the proposed development, which will reduce the impact of turning traffic on straight-through manoeuvres. Controlled pedestrian crossing facilities are also proposed on all arms of the junction, thereby facilitating safer pedestrian movement through the junction. Cycle facilities are proposed at this junction in the form of advanced and set-back stop lines and, where space permits, approach cycle lanes. Details of this junction layout can be found in Drawing Number 2139-2165.

In order to ensure as sustainable a development as possible, a rail link is also proposed between the harbour and the existing Galway to Dublin rail line serving Ceannt Station. This rail line has the potential to transfer haulage-related activities from the road network to rail, thus reducing the impact of the development on the surrounding road network.

It should be noted that any potential rail haulage will be scheduled to avoid conflict with all existing and future planned rail services.

A height restriction is currently in operation at Lough Atalia Bridge, which restricts high sided vehicle movement to the centre of the road, thus restricting 2-way movement at this location. This has the effect of restricting traffic flow during times of moderate two way flow. More importantly it poses a serious collision risk due to the impact / striking of high vehicles with the bridge cast iron arch. Records maintained by CIE indicate that such collisions have occurred on a number of occasions down through the years. In conjunction with the proposed development, it is proposed to lower the vertical profile of Lough Atalia Road under the bridge to allow a clearance in excess of the minimum 5.03 metres plus sag compensation, in accordance with NRA TD27, thus allowing for 2-way movement of large HCVs. The horizontal and vertical realignment of Lough Atalia Road has been designed in accordance with NRA TD9 and the Design Manual for Urban Roads and Streets. Details of this proposed realignment and associated drainage proposals can be found in Drawing Numbers 2139-2168 – 2139-2171.

13.4.2.3 Phasing of Development

The Galway Harbour Extension will be broken down into 4 stages. The stages of development are as detailed below:

Stage 1

Commercial Port formed including:

- Reclamation of 19.86hA of quay areas and back up land;
- Formation of 400m quay – 30m wide;
- Formation of 200m quay – 20m wide;
- Dredging of channels to -3.5m (-6.4m O.D.) and -8m depth;
- Dredging of 400m diameter turning circle to –8m (-10.9m O.D.) depth;
- Dredging of a -12m (-14.9m O.D.) Berth pocket immediately adjacent to the proposed Quays;
- Full new oil and bitumen handling facility on new 20m pier.

Stage 2

- Formation of reclamation bund wall for Lagoon 7 allowing for the reclamation of 3.21hA of additional back up land;
- Construction of rail embankment;
- Formation of 60m quay – 20m wide (0.12 ha);
- Formation of Pier head breakwater.

Stage 3

- Marina breakwater formed;
- Reclamation of 3.09hA of back up land and 0.7hA as fishing pier and slipway areas;
- Dredging of future Marina to –3.5m C.D;
- Construction of Fishing Pier;
- Construction of Slipway;
- Construction of rail lines.

Stage 4

- Western Marina with 216 No. berths.
- Reclamation of 0.12 ha of Marina Quay.

It is anticipated that the Stage 1 will be completed by 2018, with Stage 4 completed by 2023., however the assessment years in this report will remain at 2016, 2021 and 10 years after completion at 2031 (refer to section 13.4.1.5).

For the purposes of this report, the projected tonnages for the proposed harbour for the assessment years are as follows:

- 2016 – 1,417,500 tonnes;
- 2021 – 1,697,500 tonnes;
- 2031 – 2,102,000 tonnes.

A sensitivity analysis has also been undertaken for the following:

- 2031 sensitivity – 2,630,000 tonnes.

Since the completion of the 2011 SATURN modelling runs, the projected tonnages for the proposed harbour have been revised as follows:

- 2018 – 969,000 tonnes;
- 2023 – 1,932,000 tonnes;
- 2033 – 1,932,000 tonnes.
- 2033 high scenario – 2,162,000 tonnes.

As can be seen above, the maximum projected tonnage used in the SATURN modelling runs are higher than current projected tonnages for the proposed harbour. It is therefore considered that the results contained in this chapter are conservative.

13.4.2.4 Other Major Developments

In order to provide a robust assessment of the road network which took account of cumulative impacts, it was necessary to include generated traffic from other major developments proposed in Galway City in the analysis of this Transport Assessment. The most significant committed developments (i.e. development granted planning permission but not yet constructed) in Galway City at the time of the analysis were as follows:

- Galway Shopping Centre (Planning Ref: 05/33, granted permission by An Bord Pleanála in 2009) (located on the Headford Road near the former Bodkin Roundabout);
- Crown Site Development (Planning Ref: 06/223, E.O.D. on Planning Permission Ref: 12/277) (located on lands bordered by Tuam Road, Wellpark Road and Connolly Avenue,)

All information relating to traffic volumes has been obtained through an online search of planning documentation via the Galway City Council website. Generated traffic and junction arrangements proposed as part of these developments have been incorporated in the SATURN model utilised in this chapter. For robustness of the analysis it was assumed that both developments would be fully operational by 2016.

In addition to the above committed development, two other major developments are planned in Galway City, namely:

- Ceannt Station Quarter (CSQ) Redevelopment;
- Galway Harbour Village Development.

It should be noted that both of the above projects are at the preliminary stages of planning, and will be subject to their own statutory processes prior to approval. However for the purposes of this report, the scale and phasing of both developments have been evaluated and included in the assessment and has been agreed with Galway City Council to be a sound basis for analysis.

A significant amount of consultation has been carried out between the stakeholders of both the CSQ and Galway Harbour Village redevelopments to ensure that these adjacent developments will complement each other. An important objective of this liaison was to ensure that pedestrian,

cyclist and vehicular links between the developments would ensure ease of access between the two sites and to Galway City in general.

Ceannt Station Quarter is a proposed mixed-use urban quarter located on CIE-owned lands at the existing Ceannt Rail and Bus Station in Galway City. The proposed development currently comprises:
A world-class multi-modal transport interchange, incorporating 4 train platforms and 24 bus bays;

- 46,014m2 Retail Space;
- 23,051m2 Office Space;
- 176 Residential Units;
- 974m2 Crèche;
- 959m2 Community Centre;
- 15,624m2 Hotel.

Upon appointment of the developer, some changes in the development schedule may arise due to the particular requirements of the successful developer. However as this information is not currently available, in order to provide an assessment of the road network, the current development schedule, obtained from CIE, was used in the analysis in this report.

The Galway Harbour Village project will entail the redevelopment of the lands made available by the proposed relocation of Galway Harbour activities. As part of the consultations conducted by the stakeholders involved in the CSQ and Galway Harbour Village developments, the land uses associated with the Galway Harbour Village were chosen to compliment those proposed within the CSQ and ensure both developments would interact in a sustainable and holistic manner. It should be noted that this development will be subject to its own planning application, and is subject to changes in development breakdown.

For the purposes of this report, it has been estimated that the Galway Harbour Village development will comprise 200,000m^2 GFA of the following uses:

- Residential Units;
- Hotel;
- Energy Centre (R&D Industry)
- Offices;
- Hospitality;
- Arts / Culture;
- Retail.

It should be noted that construction of this development can only commence following the relocation of harbour related activities. Due to the scale of the development, it is anticipated that construction of the full site will take place over a number of years. It is now anticipated that by 2020 10% of the total development will be constructed, by 2025 30% will be constructed, while by 2035 70% of the development will be operational.

An outline of the estimated traffic generation for both developments can be found in Section 13.4.4.

13.4.3 Existing and Proposed Traffic Conditions

13.4.3.1 Traffic Model

In order to determine the magnitude of the existing traffic flows, the Galway City 2011 SATURN Model, prepared by MVA Consultancy on behalf of Galway City Council was used. It was agreed that this would ensure a consistent approach to the analysis contained within this chapter, and would ensure that the full effects of both the inclusion of the proposed harbour extension and any junction or network improvements external to the site would be determined throughout the road network. SATURN is an industry-standard tool used in the strategic assessment of road networks.

The 2011 SATURN model for Galway City covers the weekday AM & PM peak hours, 08:00 – 09:00 and 17:00 – 18:00 respectively.

MVA Consultancy has provided a summary SATURN Model Validation Report (2011) to the City Council, which outlines the accuracy of the model. This validation report has stated that the Galway City 2011 SATURN Model is fit for purpose in the analysis of large scale developments such as the new harbour in Galway, Ceannt Station Quarter and Galway Harbour Village.

13.4.3.2 Existing Road Network

The existing road network surrounding the development is that of Galway City Centre. All vehicular traffic generated by the development will travel on this network. The speed limit at all analysed junctions, excluding Junctions 13, 14 and 15, is currently 50km/h. The main junctions in the vicinity of the proposed development are described below.

- Junction 1 –Three arm priority junction between Lough Atalia Road, Dock Road and the Harbour (the location of the proposed development).
- Junction 2 – Three arm traffic signals junction between Lough Atalia Road and Fairgreen Road.
- Junction 3 – Four arm traffic signals junction between College Road, Moneenageisha Road, Well Park Road and Dublin Road (Moneenageisha Cross).
- Junction 4 – Four arm traffic signals junction between Lough Atalia Road, College Road and Loyola Park.
- Junction 5 – Traffic signals crossroads junction between Fairgreen Road, College Road, Forster Street and Bóthar Ui Eithir.
- Junction 6 – Junction between Fr. Griffin Road, Wolfe Tone Bridge, Claddagh Quay and Ravens Terrace (now a T junction).
- Junction 7 – Four arm traffic signals-controlled junction between the N6, Sean Mulvoy Road and Headford Road (formerly Bodkin Roundabout).
- Junction 8 – Traffic signal-controlled crossroads junction between N6, N59 and Lower Newcastle Road.
- Junction 9 – 5-arm roundabout junction between the N6, N59, Seamus Quirke Road and UCHG (Browne Roundabout).
- Junction 10 – 5-arm roundabout junction between the N6, N84, Sandy Road and Castlelawn Heights (Kirwan Roundabout).
- Junction 11 – 4-arm traffic signals-controlled junction between N6, N17 and Tuam Road (formerly Ffont Roundabout).
- Junction 12 – 4-arm traffic signals-controlled junction between N6, Ballybane Road and Ballybrit Industrial Estate (formerly Morris Roundabout).
- Junction 13 – 4-arm traffic signals-controlled junction between N6 and R339 Monivea Road (formerly Lynch Roundabout).

- Junction 14 – 3-arm roundabout junction between N6 and M6 motorway.
- Junction 15 – 4-arm roundabout junction between N6, R338 and R446 (Martin Roundabout).

Figure 13.4.2 highlights the locations of the analysed junctions.

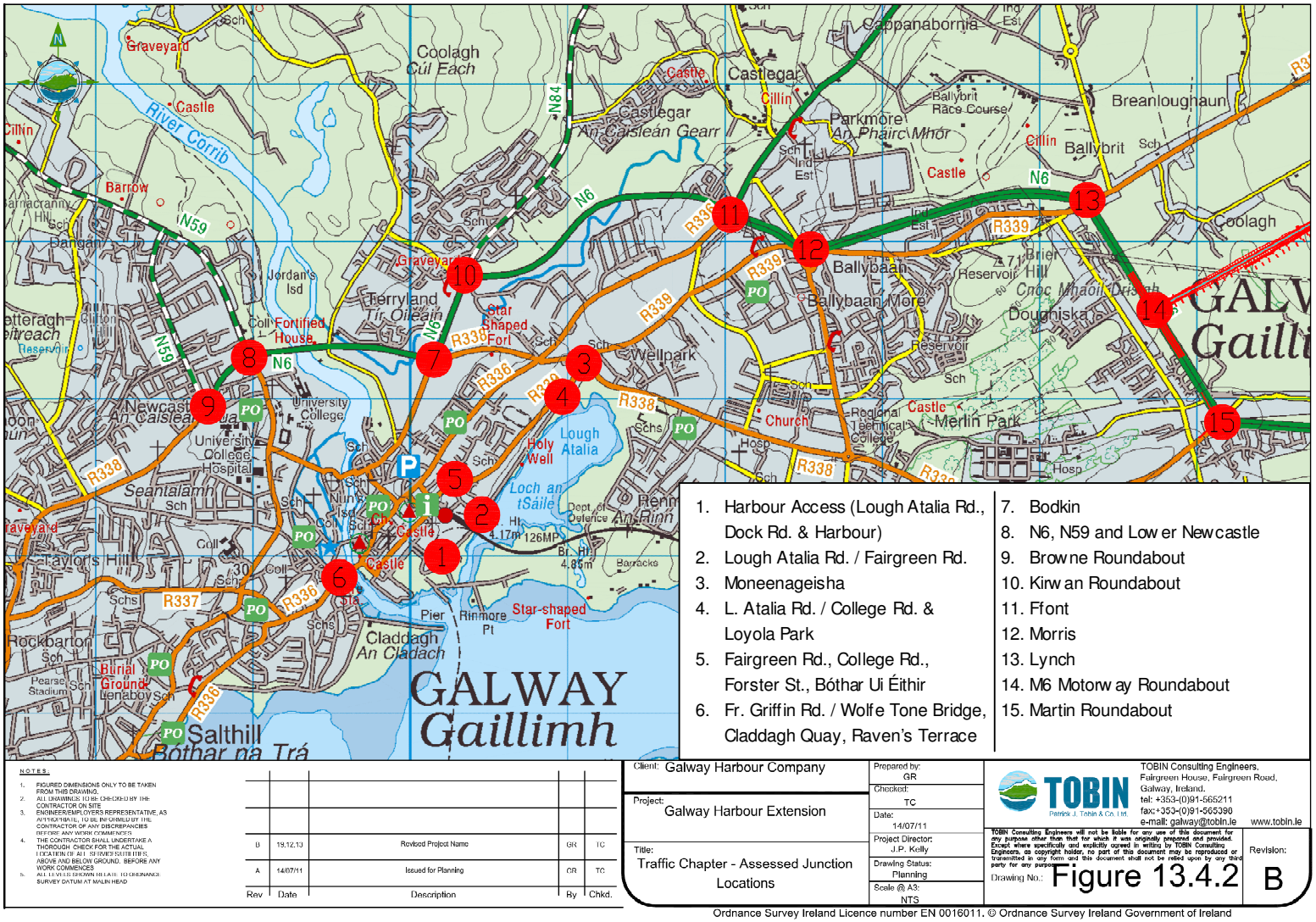

Figure 13.4.2 – Assessed Junction Locations

13.4.3.2.1 Description of Junction 1 (Lough Atalia Rd/Bóthar na Long/Galway Harbour)

Junction 1 is currently a three armed priority junction. The mainline of this junction is Lough Atalia Road and Bóthar na Long, with traffic departing from the harbour giving priority to traffic on the mainline. All arms of the junction are currently single carriageways. It should be noted that large buses and HCVs currently have difficulty in making certain manoeuvres through this junction, particularly when accessing and egressing the harbour. Footways are provided on all arms of the junction, with street lighting also present.

13.4.3.2.2 Description of Junction 2 (Lough Atalia Rd/Fairgreen Rd)

Junction 2 is a three armed traffic signal controlled junction between Lough Atalia Road and Fairgreen Road. Lough Atalia Road is a single carriageway road on the southern approach to the junction, while a right-turning lane and straight through lane are provided on the northern approach. Fairgreen Road has two approach lanes onto Lough Atalia Road, separate left and right turning lanes. These two lanes extend back approximately 45m, where they become one lane.

13.4.3.2.3 Description of Junction 3 (College Rd / Moneenageisha Rd / Wellpark Rd / Dublin Rd)

Junction 3 is a four arm traffic signals junction. The approach from college road is a two-lane approach, right-turning manoeuvres being allowed in both lanes due to Dublin Road having two receiving lanes. The approaches from both Moneenageisha Road and Wellpark Road are also two-lane approach, while the approach from Dublin Road has three lanes. Advance stop lines for cyclists are provided on all arms of the junction, while pedestrian refuge islands are also provided on all arms. Street lighting is provided at this junction.

13.4.3.2.4 Description of Junction 4 (Lough Atalia Rd/College Rd/Loyola Park)

Junction 4 is currently a four arm traffic signalled junction. The Lough Atalia Road approach to the junction has separate left and straight ahead/right lanes which are separated by a physical island. The College Road approach from the Sports ground is a single lane approach. The Loyola Park approach is a single lane approach. The College Road approach from Moneenageisha is a two-lane approach, but one lane is a filter lane to Lough Atalia Road. This lane is continuously unopposed, except for an on demand pedestrian phase to the traffic signals.

The junction operates in 3 stages, but the third stage (Loyola park green, all others red) is only called on demand and this does not happen every cycle. This junction has been modelled as a 3-arm junction in the SATURN model.

13.4.3.2.5 Description of Junction 5 (Bóthar Uí Eithir / Forster Street)

Junction 5 is a traffic signals junction crossroads. Bóthar Uí Eithir is one-way southbound, with 3 lanes approaching the junction, although one of these lanes is a 24 hour bus lane into Foster Street. Forster Street is one way westbound with a short length of PM peak bus lane, while both College Road and Fairgreen Road operates for two-way traffic. College Road has a single approach lane, while there are 2 approach lanes from Fairgreen Road. The junction currently operates with 3 stages.

13.4.3.2.6 Description of Junction 6 (Fr. Griffin Rd / Claddagh Quay)

Junction 6 has recently been upgraded to a three-arm priority junction. The Wolf Tone Bridge approach is a single lane approach, the Claddagh Quay approach is a single lane approach that flares on the approach to the stop line, while the Fr. Griffin Road approach is a 2-lane approach. For the purposes of the SATURN modelling, the junction was modelled in its previous layout as a priority crossroads junction. Ravens Terrace was a one-way northbound street (which has since been closed off), with all other arms of the junction as currently arranged.

13.4.3.2.7 Description of Junction 7 (Formerly Bodkin Roundabout) (near Galway Shopping Centre)

Junction 7 was a large five-arm traffic signal-controlled roundabout at the time of completion of the SATURN modelling. The approach from Sean Mulvoy Road was a two-lane approach, with traffic signals controlling entry to the roundabout, whilst also providing controlled pedestrian crossing facilities. The N6 Headford Road approach was also a two-lane approach up to the exit from Dunne's Stores Shopping Centre, upon which it opened up to 3 entry lanes. Entry to the roundabout from this arm was also controlled by traffic signals. No pedestrian crossing facilities were provided on this arm of the junction. The N6 Quincentennial Bridge arm of the junction had 2 approach lanes, which widened to 3 lanes entering the roundabout and a separate left turning slip lane for vehicles wishing to access the N6 Headford Road. Access to the roundabout from this approach arm was controlled by traffic signals. Uncontrolled pedestrian crossings were provided on this arm of the roundabout. Headford Road had a single lane approach to the roundabout, which widened to 3 approach lanes from the exit to Galway Retail Park. Access to the roundabout was controlled via YIELD traffic signs and road markings. Uncontrolled pedestrian crossings were provided on this arm of the junction. The Galway Shopping Centre arm had a single lane approach, which widened to two lanes on the immediate approach to the roundabout. Access to the roundabout was controlled via YIELD signs and markings, with uncontrolled pedestrian crossings also provided on this arm. The inscribed circle diameter of the roundabout was approximately 84m.

This junction has since been upgrade to a four-arm traffic signal controlled junction as part of the as part of the Bóthar na dTreabh (N6) Multi-Modal Corridor Improvement Scheme.

13.4.3.2.8 Description of Junction 8 (N6 / N59 / Lower Newcastle Road) (back of U.C.H.G.)

Junction 8 is a four traffic signals junction. Each arm of the junction has 2 entry lanes, with right-turning manoeuvres prohibited on each arm. Pedestrian crossing facilities are also provided on each arm of the junction.

13.4.3.2.9 Description of Junction 9 (Browne Roundabout) (Coolagh Road)

Junction 9 is a five arm roundabout. The approach from the N6 is a two-lane approach. The N59 Thomas Hynes Road approach is also a single-lane approach, which widens to 2 entry lanes to the roundabout. The R338 Seamus Quirke Road approach is currently a single-lane approach which widens to 2 approach lanes to the roundabout (The Seamus Quirke Road is currently under construction to widen the road to a dual carriageway incorporating bus lanes – due for completion towards the end of 2011). The UCHG approach is a single lane approach to the roundabout, while the Seamus Quirke Road approach is a single-lane approach, widening to 2 lanes on the approach to the roundabout. Uncontrolled pedestrian crossing facilities are provided on each arm of the roundabout. The inscribed circle diameter of the roundabout is approximately 70m.

13.4.3.2.10 Description of Junction 10 (Kirwan Roundabout)

Junction 10 is a five arm roundabout. The approach from the N6 Bóthar na dTreabh has 2 approach lanes, with a controlled pedestrian crossing provided approximately 40m from the roundabout. The N84 Headford Road is a single-carriageway road which tapers to 2 approach lanes on the approach to the roundabout. The arm providing access to Castlelawn Heights and Tirellan Park is a single carriageway road which flares to a 2 lane approach to the roundabout. The N6 Headford Road is a 2 lane approach to the roundabout. Sandy Road is a single-carriageway road which tapers to 2 lanes on the approach to the roundabout. A zebra crossing is located approximately 25m from the roundabout on the Sandy Road Arm. The inscribed circle diameter of the roundabout is approximately 67m.

13.4.3.2.11 Description of Junction 11 (formerly Ffont Roundabout) (Tuam Road)

Junction 11 was a four arm roundabout at the time of completion of the analysis.

The approach from N6 Bóthar na dTreabh (West) was a two-lane approach. The R336 Tuam Road approach was a single-lane approach which widened to a 2 lane approach approximately 130m from the roundabout. The N6 Bóthar na dTreabh (East) was a two-lane road in both directions. The N17 Tuam Road arm of the roundabout was a single-carriageway road, which widened to 3 entry lanes on the approach to the roundabout. The inscribed circle diameter of the roundabout was approximately 69m.

This junction has since been upgraded to a traffic signal-controlled junction as part of the Bóthar na dTreabh (N6) Multi-Modal Corridor Improvement Scheme.

13.4.3.2.12 Description of Junction 12 (formerly Morris Roundabout) (Ballybane)

Junction 12 was a four arm roundabout at the time of completion of the analysis.

The approach from N6 Bóthar na dTreabh (West) is a two-lane approach. The R865 Ballybane Road approach is a single-lane approach which tapers to 2 entry lanes in the vicinity of the roundabout. N6 Bóthar na dTreabh (East) is a dual-carriageway road with 2 entry lanes into the roundabout. The Ballybrit Industrial Estate arm of the roundabout is a single-carriageway road, which tapers to 3 entry lanes approximately 60m from the roundabout. The inscribed circle diameter of the roundabout is approximately 68m.

This junction has since been upgraded to a traffic signal-controlled junction as part of the Bóthar na dTreabh (N6) Multi-Modal Corridor Improvement Scheme.

13.4.3.2.13 Description of Junction 13 (formerly Lynch Roundabout) (Ballybrit)

Junction 13 was a four arm roundabout located within the 100km/h speed limit at the time of completion of the analysis.

The approach from N6 Bóthar na dTreabh (West) is a dual-carriageway road with 2 entry lanes into the roundabout. The R339 Monivea Road (West) approach is a single-lane approach to the roundabout. N6 Bóthar na dTreabh (South) is a dual-carriageway road with 2 entry lanes into the roundabout. The R339 Monivea Road (East) approach is a single-carriageway road, which widens to 2 entry lanes on the approach to the adjacent traffic signals junction. The inscribed circle diameter of the roundabout is approximately 78m.

This junction has since been upgraded to a traffic signal-controlled junction This junction has since been upgraded to a traffic signal-controlled junction as part of the Bóthar na dTreabh (N6) Multi-Modal Corridor Improvement Scheme and is located within a speed 60km/h speed limit.

13.4.3.2.14 Description of Junction 14 (M6 / N6 Roundabout)

Junction 14 is a three arm roundabout providing access from the M6 Galway to Dublin motorway. The junction is located within the 100km/h speed limit. The approach from N6 Bóthar na dTreabh (N) is a 2 lane approach, with a dedicated slip-road provided for vehicles accessing the M6. The M6 is a 2 lane approach, with a dedicated slip road provided for vehicles wishing to access Martin Roundabout. N6 Bóthar na dTreabh (N) is a two-lane approach. The inscribed circle diameter of the roundabout is approximately 80m.

13.4.3.2.15 Description of Junction 15 (Martin Roundabout) (Galway Clinic)

Junction 15 is a four arm roundabout, located close to the Galway City / County boundary. The approach from R446 Bóthar na dTreabh (North) is a dual-carriageway road with 2 entry lanes into the roundabout. The R338 Dublin Road (West) approach is a single-carriageway road, incorporating a segregated left turn slip road for access to the N6. This arm has a single lane entry into the roundabout. The R446 (East) is a dual-carriageway road with 2 entry lanes into the roundabout. The arm providing access into Galway Clinic is a single-carriageway road, which tapers to 2 entry lanes in the vicinity of the roundabout. The inscribed circle diameter of the roundabout is approximately 78m.

It is proposed that this junction will be subject to an 80km/h speed limit. The dual carriageway between Junction 14 and Martin Roundabout is also proposed to be subject to an 80km/h speed limit.

13.4.3.3 Recent and Proposed Network Improvements

Following the recent interpretation by the European Court of Justice that the N6 Galway City Outer Bypass (GCOB) project would have an adverse impact on the integrity of a European Site, Galway City and County Councils remain committed to the project, and propose to make a new application to An Bord Pleanála for a by-pass of Galway City. Accordingly, Galway County Council has recently appointed consultants to redesign the route of the N6 Galway City Outer Bypass and to progress the scheme through the planning process. It is anticipated that a revised application to An Bord Pleanála will be ready by 2015 with an envisaged opening year of mid 2019 at the earliest.

In order to ensure robustness of the report, the analysis contained within this chapter has not accounted for the construction of the GCOB.

The M6 Galway to Dublin Motorway was opened to traffic in December 2009, which provides a continuous motorway link between Galway and Dublin, significantly reducing delays along the route. The N17 / N18 Gort to Tuam PPP scheme is currently at Tender Stage, with contract signing anticipated in early 2014, and upon completion will provide a link between Galway, Dublin and Limerick. The provision of this motorway will further enhance the connectivity of Galway Harbour with its natural catchment area. This scheme is anticipated to have a construction period of 3 years.

Funding has been obtained for the Bóthar na dTreabh (N6) Multi-Modal Corridor Improvement Scheme. The aims of the scheme are as follows:

- Ensure the national road network within Galway protects and supports growth of the regional economy;
- Reduce the environmental impact of transport in Galway City;
- Facilitate and encourage the use of sustainable travel modes;
- Ensure future development of the N6 is integrated with a shared vision for future development of the public transport network;
- Promote integration of walking and cycling links;
- To ensure future development of the N6 is integrated with proposals for upgrading the local and regional road network;
- Improve road safety for all road users on the N6 links and junctions within Galway City;
- Improve access to Galway's vital social infrastructure such as schools, third level institutions, hospitals and large employment areas.

The scheme includes for the upgrading of all roundabouts along the N6 corridor to traffic signal controlled junctions. These junction upgrades have been included in the 2011 SATURN model, with the most recent design information for each junction at the time of the analysis being utilised

in the model. All but two of these roundabouts have been upgraded and it is anticipated that the remaining junction upgrades along the N6 corridor will be completed by 2016.

At the time of completing this chapter, Galway City Council has implemented an Urban Traffic Management & Control (UTMC) System, initially for use on three corridors in the city, namely:

- Seamus Quirke Road / Bishop O'Donnell Road (completed);
- N6 Corridor (partially complete);
- R338 Dublin Road Corridor, including Moneenageisha Junction (partially complete).

The provision of this UTMC system will aid in improving the efficiency of traffic signal controlled junctions along each of the corridors, for vehicles in general and public transport in particular, allowing Galway City Council a greater degree of control over traffic movements throughout the city. It is the Council's intention to extend the UTMC system city-wide, however no timeframe is currently available for this.

Galway City Council has policy aims to develop a number of proposals for Galway City and environs as part of their Smarter Travel policy, including:

- Extension of the pedestrian area in Galway City Centre into Cross Street & Middle Street and the provision of a shared surface for public transport and pedestrians & cyclists on Eglinton Street
- Development of a new walking and cycling route from Newtownsmith to the Docks via Abbeygate Street
- A 6 fold increase in the length of bus corridors from 3km to 18km, to serve Knocknacarra, Parkmore, Oranmore, Monivea Road and Tuam Road
- Development of a multi-modal transport hub in Garraun, Oranmore (railway station developed)
- Reduction in speed limits to 30 kph in the City Centre area
- Development of high quality cycle routes from the City Centre to Barna, Dangan and Oranmore.

The implementation of the above measures will help promote alternative modes of transport to the private car throughout Galway City and environs, which will in turn provide additional capacity to the road network and reduce congestion.

The recorded modal split in the Galway, Barna, Claregalway and Oranmore area for 2006 is as follows (source: Draft Galway City and Environs Walking and Cycling Strategy 2010 - 2017):

- Car - 56%
- Walking - 23%
- Cycling - 4%
- Public Transport - 9%
- Other - 8%

It is anticipated that the implementation of the above Smarter Travel proposals will induce the following modal splits:
2017 Targets:

- Car – 43%
- Walking – 25%
- Cycling – 15%
- Public Transport – 14%
- Other – 3%

Given that funding has not yet been committed to the above Smarter Travel schemes, these proposals have not been included in the SATURN model utilised in this report, however it is important to note Galway City Council's policy of promoting sustainable transport within the city.

In recent years a significant amount of investment in the rail network has been undertaken to improve services in the west of Ireland. The Western Rail Corridor (WRC) provides a rail link between Galway and Limerick, and commenced services in March 2010. The second phase of the WRC, proposed to extend north to Claremorris, is unlikely to proceed in the near future. The provision of the WRC will provide a sustainable alternative to road-based haulage activities over a significant portion of the anticipated catchment area south of Galway Harbour.

13.4.4 Trip Distribution and Generation

13.4.4.1 Trip Generation

13.4.4.1.1 Proposed New Port Facilities

The generation of traffic from the various elements of the development has been estimated using a variety of techniques deemed most suitable for each particular element of the proposed development.

- For the proposed haulage-related activities, a trip rate based on the anticipated increase in port tonnage throughput as a result of the proposed development was utilised.
- For the proposed extension to the Enterprise Park, a trip rate based on the proposed increase in site area was applied.

Roadside surveys were carried out at the harbour access, which recorded the number of hourly arrivals and departures to the harbour, as well as their origin / destination within the Harbour and Enterprise Park over a midweek period between 7th September and 9th September 2010. This survey distinguished between motorcycles, cars, light goods vehicles (LGV), buses and heavy commercial vehicles (HCV). As the maximum traffic levels were observed on Thursday 9th September, this day was used as a representative day for harbour related activities. From these surveys it was possible to identify the proportion of current traffic accessing the Harbour and Enterprise Park which was harbour related, Enterprise Park-related or neither harbour nor Enterprise Park related, thereby facilitating a more accurate estimation of future year traffic growth as a result of the proposed development.

For haulage related activities, the number of HCV arrivals and departures were recorded for each peak period, and a trip rate based on the baseline annualised tonnage figure of 759,564 tonnes was obtained. This baseline annualised tonnage figure was obtained from Galway Harbour Company's tonnage records for the week in which the traffic surveys were carried out (i.e. 6th – 10th September 2010). These trip rates were applied to the projected future increases in tonnage for 2016, 2021 and 2031. It should be noted that the existing harbour was anticipated to cater for 780,000 tonnes in 2015, prior to the commencement of operations of the new harbour facilities. This 2015 figure is considered committed development. The additional tonnage figures given below in Tables 13.4.1 and 13.4.2 show the difference in tonnage between the annualised tonnage figure of 759,564 and the project tonnage figures for 2015, 2016, 2021 and 2031 (as stated above and in Section 13.4.2.3). The calculations to determine the TRIP rates from the survey data are included in Appendix 13.4.2.

Tables 13.4.1 and 13.4.2 below outline the additional traffic generated by the haulage-related activities in the assessment years for the AM and PM peak hours, namely 08:00 – 09:00 and 17:00 – 18:00.

Haulage Related Additional Trip Generation for Proposed Development for AM Peak Hour						
			Arrivals		Departures	
Year	Total Projected Tonnage	Additional Tonnage	HCV Trip Rate Per 100,000 Tonnes	No. HCV Arrivals	HCV Trip Rate per 100,000 Tonnes	No. HCV Departures
2015	780,000	0	1.185	0	1.448	0
2016	1,417,500	637,500	1.185	8	1.448	9
2021	1,697,500	917,500	1.185	11	1.448	13
2031	2,102,000	1,322,000	1.185	16	1.448	19

Table 13.4.1 - Haulage Related Additional Trip Generation for Proposed Development for AM Peak Hour

Haulage Related Additional Trip Generation for Proposed Development for PM Peak Hour						
			Arrivals		Departures	
Year	Total Projected Tonnage	Additional Tonnage	HCV Trip Rate Per 100,000 Tonnes	No. HCV Arrivals	HCV Trip Rate per 100,000 Tonnes	No. HCV Departures
2015	780,000	0	0.922	0	0.790	0
2016	1,417,500	637,500	0.922	6	0.790	5
2021	1,697,500	917,500	0.922	8	0.790	7
2031	2,102,000	1,322,000	0.922	12	0.790	10

Table 13.4.2 - Haulage Related Additional Trip Generation for Proposed Development for PM Peak Hour

The results of the roadside survey were also utilised for estimating the increase in cars and LGV traffic for Port-related activities. The existing number of car and LGV arrivals and departures were recorded for port-related elements, and a trip rate based on the proposed increase in site area was obtained.

It should be noted that while the current nett site area (excluding roads and green areas) was used to generate traffic volumes at the time of inputting into the SATURN model, these areas have been subsequently amended. These alterations are considered negligible (18.47 Ha used in the Saturn Model, compared to a final nett site area of 16.18 Ha, refer to drawing 2139-2127), and as the final site area is smaller than those used in the developing the generated traffic, the figures derived from the Saturn Model and contained within this chapter are considered robust.

Tables 13.4.3 and 13.4.4 below outline the traffic generated by the harbour related activities in the assessment years for the AM and PM peak hours.

Port Related Trip Generation for Proposed Development for AM Peak Hour					
		Arrivals		Departures	
Year	Additional Site Area (Ha)	Trip Rate per Additional Ha	No. Cars / LGV Arrivals	Trip Rate per Additional Ha	No. Cars / LGV Departures
2016	0	1.114	0	0.203	0
2021	18.47	1.114	21	0.203	4
2031	18.47	1.114	21	0.203	4

Table 13.4.3 - Port Related Trip Generation for Proposed Development for AM Peak Hour

Port Related Trip Generation for Proposed Development for PM Peak Hour					
		Arrivals		Departures	
Year	Additional Site Area (Ha)	Trip Rate per Additional Ha	No. Cars / LGV Arrivals	Trip Rate per Additional Ha	No. Cars / LGV Departures
2016	0	0.203	0	1.266	0
2021	18.47	0.203	4	1.266	23
2031	18.47	0.203	4	1.266	23

Table 13.4.4 - Port Related Trip Generation for Proposed Development for PM Peak Hour

Similarly; for Enterprise Park-related activities, the number of cars and LGV arrivals and departures were recorded for Enterprise Park-related activities, and a trip rate based on the proposed increase in site area was obtained.

Tables 13.4.5 and 13.4.6 below outline the car / LGV traffic generated by the Enterprise Park-related activities in the assessment years for the AM and PM peak hours.

Enterprise Park Related Trip Generation for Proposed Development for AM Peak Hour					
		Arrivals		Departures	
Year	Additional Site Area (Ha)	Trip Rate per Additional Ha	No. Cars / LGV Arrivals	Trip Rate per Additional Ha	No. Cars / LGV Departures
2016	0	2.736	0	0.405	0
2021	18.47	2.736	51	0.405	7
2031	18.47	2.736	51	0.405	7

Table 13.4.5 - Enterprise Park Car / LGV Related Trip Generation for Proposed Development for AM Peak Hour

Enterprise Park Related Trip Generation for Proposed Development for PM Peak Hour					
		Arrivals		Departures	
Year	Additional Site Area (Ha)	Trip Rate per Additional Ha	No. Cars / LGV Arrivals	Trip Rate per Additional Ha	No. Cars / LGV Departures
2016	0	0.507	0	2.128	0
2021	18.47	0.507	9	2.128	39
2031	18.47	0.507	9	2.128	39

Table 13.4.6 - Enterprise Park Car / LGV Related Trip Generation for Proposed Development for PM Peak Hour

Tables 13.4.7 and 13.4.8 below outline the HCV traffic generated by the Enterprise Park-related activities in the assessment years for the AM and PM peak hours.

Enterprise Park Related HCV Trip Generation for Proposed Development for AM Peak Hour					
		Arrivals		Departures	
Year	Additional Site Area (Ha)	Trip Rate per Additional Ha	No. HCV Arrivals	Trip Rate per Additional Ha	No. HCV Departures
2016	0	0.101	0	0.152	0
2021	18.47	0.101	2	0.152	3
2031	18.47	0.101	2	0.152	3

Table 13.4.7 - Enterprise Park HCV Related Trip Generation for Proposed Development for AM Peak Hour

Enterprise Park Related HCV Trip Generation for Proposed Development for PM Peak Hour					
		Arrivals		Departures	
Year	Additional Site Area (Ha)	Trip Rate per Additional Ha	No. HCV Arrivals	Trip Rate per Additional Ha	No. HCV Departures
2016	0	0.000	0	0.000	0
2021	18.47	0.000	0	0.000	0
2031	18.47	0.000	0	0.000	0

Table 13.4.8 - Enterprise Park HCV Related Trip Generation for Proposed Development for PM Peak Hour

For the proposed marina, a trip rate was established from the Trip Rate Information Computer System (TRICS) database 2010 (a), a computerised database and analysis package for planning and development. TRICS generates rates to represent various land uses. These trip rates are generated from developments of a similar nature. Trip Rates for the marinas have been determined for weekdays, Monday to Friday, to coincide with the maximum levels of existing traffic on the adjacent road network.

Tables 13.4.9 and 13.4.10 below outline the car / LGV traffic generated by the marina-related activities in the assessment years for the AM and PM peak hours.

Trip Generation for Marina Related Development for AM Peak Hour					
		Arrivals		Departures	
Development Type	No. Berths	Arrivals per Berth	Total Arrivals	Departures Per Berth	Total Departures
2016	0 no.	0.046	0	0.027	0
2021	216 no.	0.046	10	0.027	6
2031	216 no.	0.046	10	0.027	6

Table 13.4.9 - Trip Generation for Marina Related Development for AM Peak Hour

Trip Generation for Marina Related Development for PM Peak Hour					
		Arrivals		Departures	
Development Type	No. Berths	Arrivals per Berth	Total Arrivals	Departures Per Berth	Total Departures
2016	0 no.	0.073	0	0.102	0
2021	216 no.	0.073	16	0.102	22
2031	216 no.	0.073	16	0.102	22

Table 13.4.10 - Trip Generation for Marina Related Development for PM Peak Hour

For the proposed cruise liner terminal, liaison with cruise operators and analysis of cruise operations at Dublin Port was undertaken to estimate traffic generated from this element of the development.

From research into cruise liners arriving at Dublin Port it was found that typically 845 passengers per cruise visited Dublin. For the purposes of this report, it was considered appropriate to assume that cruise liners of a similar size to Dublin Port would access the Galway Harbour Extension.

In order to estimate trip generation from cruise ships, it has been assumed that the typical cruise ship will dock with 845 no. passengers. Of these passengers:

- 70% will take a bus tour to Connemara, Cliffs of Moher etc.
- 15% will take walking tours of Galway City
- 15% will remain on the ship.

These proportions have been arrived at following discussions between Galway Harbour Company and its proposed shipping agents.

Assuming 52 seats per coach, 12 coaches will be required to cater for the projected demand for coach tours. It should be noted that current Galway-based coach tours depart at 09:30 at the earliest, thereby falling outside the network peak. Tours return to Galway City between 17:30 and 18:30. For the purposes of this analysis, it has been assumed that 6 bus arrivals and departures (to ensure robustness of the analysis) will be generated by the proposed cruise liner terminal in the AM and PM peaks.

For the purposes of this analysis, it has been assumed that 20% of those passengers taking walking tours of Galway City will arrive and depart from the terminal in taxis during the peak periods. An average taxi occupancy of 2 passengers has been assumed, resulting in 13 taxis arriving and departing in the AM and PM peak periods.

While it is the practice of cruise operators to stock their ships with the vast bulk of consumable provisions and food at their liner's home port, it is anticipated that some service vehicles supplying locally-sourced provisions will access the terminal. These service vehicles will be subject to the recommendations of the Mobility Management Framework, however it is assumed that 5 LGV arrivals and departures will be generated by the proposed cruise liner terminal in the AM & PM peak hours as a result of service vehicles.

It should also be noted that the cruise liner terminal will not be in continuous use, with a maximum of 36 cruises anticipated per annum. However, to ensure the robustness of the report, it has been assumed that a cruise liner was docked in port on the analysed day, with the above figures included in the junction capacity analysis.

Tables 13.4.11 and 13.4.12 below outline the traffic generated by the cruise liner terminal-related activities in the assessment years for the AM and PM peak hours.

Trip Generation for Cruise Liner Related Development for AM Peak Hour				
	Arrivals		Departures	
Development Type	Taxi & LGV	Bus	Taxi & LGV	LGV
2016	18	6	18	6
2021	18	6	18	6
2031	18	6	18	6

Table 13.4.11 - Trip Generation for Cruise Liner Terminal Related Development for AM Peak Hour

Trip Generation for Cruise Liner Related Development for PM Peak Hour				
	Arrivals		Departures	
Development Type	Taxi & LGV	Bus	Taxi & LGV	LGV
2016	18	6	18	6
2021	18	6	18	6
2031	18	6	18	6

Table 13.4.12 - Trip Generation for Cruise Liner Terminal Related Development for PM Peak Hour

Tables 13.4.13 and 13.4.14 below outline the total number of vehicles expected to be generated by the proposed harbour development and ancillary services for the AM and PM peak hours respectively.

Total Generated Traffic for Harbour Development for AM Peak Hour								
Year	Arrivals				Departures			
	No. Car / LGV	No. Buses	No. HCV	Total	No. Car / LGV	No. Buses	No. HCV	Total
2016	18	6	8	**32**	18	6	9	**33**
2021	100	6	13	**119**	35	6	16	**57**
2031	100	6	18	**124**	35	6	22	**63**
2031 Sensitivity	100	6	24	**130**	35	6	30	**71**

Table 13.4.13 - Total Generated Traffic for Harbour Development for AM Peak Hour

Total Generated Traffic for Harbour Development for PM Peak Hour								
	Arrivals				Departures			
Year	No. Car / LGV	No. Buses	No. HCV	Total	No. Car / LGV	No. Buses	No. HCV	Total
2016	18	6	6	**30**	18	6	5	**29**
2021	47	6	8	**61**	102	6	7	**115**
2031	47	6	12	**65**	102	6	10	**118**
2031 Sensitivity	47	6	17	**70**	102	6	15	**123**

Table 13.4.14 - Total Generated Traffic for Harbour Development for PM Peak Hour

The total traffic generated by the proposed development was input into the Galway City SATURN model to calculate the effect of the development on the surrounding road network.

13.4.4.1.2 Harbour Construction Traffic Impact

While it will not be continuous, the construction period for Galway Harbour is proposed to extend for 10 years, commencing in 2015. The design philosophy of Galway Port has been selected to achieve a balance between dredged material and material required for land reclamation. This process will help to minimise the impact of construction activities on the surrounding road network. Where possible, materials, including the required rock armour, will be transported to the site by sea.

A total of 150 people are anticipated to be employed during the construction process. It is anticipated that normal working hours for the construction period will be 07:00 – 20:00. Other activities, such as dredging or piling, are expected to be carried out by teams working on shift patterns, which may fall outside of these periods. The dredging and piling equipment includes worker accommodation, thus having negligible effect on the surrounding road network. Workforce arrivals and departures are therefore expected to primarily fall outside of network peak. For the purposes of this report, a trip rate per employee was used to estimate generated traffic for construction workers in the peak hours.

Estimated Trip Generation For Galway Harbour Extension Construction for AM Peak Hour					
		Arrivals		Departures	
Activity Type	No. Employees	per Employee	Total	Per Employee	Total
Construction	150 no.	0.500	75	0.100	15
Total			**75**		**15**

Table 13.4.15 - Estimated Trip Generation for Galway Harbour Extension Construction for AM Peak Hour

Estimated Trip Generation For Galway Harbour Extension Construction for PM Peak Hour					
		Arrivals		Departures	
Activity Type	No. Employees	per Employee	Total Arrivals	Per Employee	Total Departures
Construction	150 no.	0.100	15	0.500	75
Total			**15**		**75**

Table 13.4.16 - Estimated Trip Generation for Galway Harbour Extension Construction for PM Peak Hour

For stage 1 of the construction of the new harbour, a total of 305 HCV movements per day are anticipated to be generated, as stated in Chapter 3 of this report. It has been assumed that the average working hours for the construction of the harbour will be between 07:00 – 20:00, with haulage activities operating at half-capacity during peak periods in order to restrict the impact of such operations during sensitive periods. This equates to 14 HCV arrivals and 14 HCV departures per peak hour. For stage 2 of the construction of the new harbour, a total of 105 HCV movements per day are anticipated to be generated, equating to 5 HCV arrivals and 5 HCV departures per peak hour. For stage 3 of the construction of the new harbour, a maximum total of 105 HCV movements per day are anticipated to be generated, equating to 5 HCV arrivals and 5 HCV departures per peak hour. For stage 4 of the construction of the new harbour, a total of 45 HCV movements per day are anticipated to be generated, equating to 2 HCV arrivals and 2 HCV departures per peak hour.

Although the construction methods as above have been input into the 2011 SATURN model, it should be noted that these methods have been subsequently amended to account for a number of issues, including mitigations measures relating to ecology. These alterations are considered negligible (Stage 2 and 3 hourly HCV movements are now expected to be 5 HCV arrivals and departures, compared to 8 HCV arrivals and departures input into the SATURN mode, and 2 HCV movements now expected for Stage 4 compared to 4 HCV movements input into SATURN). The revised construction methods results in less traffic than those used in developing the generated traffic derived from the Saturn Model and contained within this chapter and are considered robust.

Tables 13.4.17 and 13.4.18 below outline the total number of vehicles expected to be generated by the proposed harbour development for the AM and PM peak hours respectively.

Total Generated Traffic for Harbour Construction for AM Peak Hour								
	Arrivals				Departures			
	No. Car / LGV	No. Buses	No. HCV	Total	No. Car / LGV	No. Buses	No. HCV	Total
2015	75	0	14	**89**	15	0	14	**29**
2016	75	0	8	**83**	15	0	8	**23**
2021	75	0	4	**79**	15	0	4	**19**

Table 13.4.17 - Total Generated Traffic for Harbour Construction for AM Peak Hour

Total Generated Traffic for Harbour Construction for PM Peak Hour								
	Arrivals				Departures			
	No. Car / LGV	No. Buses	No. HCV	Total	No. Car / LGV	No. Buses	No. HCV	Total
2015	15	0	14	**29**	75	0	14	**89**
2016	15	0	8	**23**	75	0	8	**83**
2021	0	4	19	**15**	0	4	79	**0**

Table 13.4.18 - Total Generated Traffic for Harbour Construction for PM Peak Hour

The total traffic generated by the construction of the new harbour was input into the Galway City SATURN model for the design years of 2011 and 2016 to calculate the effect of these activities on the surrounding road network. As the full operation of harbour activities generates more traffic than the construction activities prior to completion in 2021, the 2021 model has been based on the full operation of harbour activities.

It is considered that the above estimation of construction-generated traffic is conservative. It is anticipated that the hours of operation of construction will be on average between 07:00 and 20:00, and as such employee arrivals and departures will generally fall outside of network peak periods. It is also proposed to implement a traffic management plan for the construction phase, which will aim to limit the impact of construction activities (including worker access to the site) on the surrounding road network. See Section 13.4.5.4.1 for details of traffic-related mitigation measures for the construction phase of the development.

13.4.4.1.3 Galway Harbour Village

For the purposes of this report, it was also necessary to estimate the potential traffic generated by the construction of the Galway Harbour Village development. The volume of traffic expected to be generated during the AM and PM peak hours was established from the Trip Rate Information Computer System (TRICS) database 2010 (a), a computerised database and analysis package for planning and development. TRICS generates rates to represent various land uses. These trip rates are generated from developments of a similar nature.

As stated previously, Galway Harbour Village is expected to be constructed on a phased basis, with 10% completed in 2020, 30% in 2025 and 70% in 2035, however for the purposes of this report, it has been assumed that 50% will be constructed in 2016, with a further 50% being constructed in 2021. This has ensured a robust assessment of the surrounding road network.

Tables 13.4.19 and 13.4.20 below outline the traffic expected to be generated by the fully constructed Galway Harbour Village development.

Estimated Trip Generation for Galway Harbour Village Development for AM Peak Hour					
		Arrivals		Departures	
Development Type	No. Units / GFA	per Unit / 100m^2 GFA	Total	per Unit / 100m^2 GFA	Total
Residential	1040 No.	0.046	48	0.199	207
Energy Centre	61,000m^2	0.150	92	0.037	23
Hotel	20,000m^2	0.273	55	0.400	80
Offices	10,000m^2	0.724	72	0.169	17
Hospitality	5,500m^2	0.471	26	0.412	23
Arts / Culture	6,000m^2	0.060	4	0.000	0
Retail	4,000m^2	0.354	14	0.215	9
Total			**311**		**359**

Table 13.4.19 - Total Generated Traffic for Galway Harbour Village Development for AM Peak Hour

Estimated Trip Generation for Galway Harbour Village Development for PM Peak Hour					
		Arrivals		Departures	
Development Type	No. Units / GFA	per Unit / 100m^2 GFA	Total	per Unit / 100m^2 GFA	Total
Residential	1040 No.	0.177	184	0.078	81
Energy Centre	61,000m^2	0.035	21	0.105	64
Hotel	20,000m^2	0.365	73	0.251	50
Offices	10,000m^2	0.117	12	0.620	62
Hospitality	5,500m^2	2.110	116	1.563	86
Arts / Culture	6,000m^2	0.006	0	0.123	7
Retail	4,000m^2	1.235	49	1.243	50
Total			**455**		**400**

Table 13.4.20 - Total Generated Traffic for Galway Harbour Village Development for PM Peak Hour

Tables 13.4.21 and 13.4.22 below outline the traffic expected to be generated by the Galway Harbour Village development for the analysis years of 2021 and 2031.

Generated Traffic for Galway Harbour Village Development for AM Peak Hour			
Assessment Year	**No. Arrivals**	**No. Departures**	**Total**
2016 (50% developed)	156	180	**336**
2021 (100% developed)	311	359	**670**
2031 (100% developed)	311	359	**670**

Table 13.4.21 - Generated Traffic for Galway Harbour Village Development for AM Peak Hour

Generated Traffic for Galway Harbour Village Development for PM Peak Hour			
Assessment Year	**No. Arrivals**	**No. Departures**	**Total**
2016 (50% developed)	228	200	**428**
2021 (100% developed)	455	400	**855**
2031 (100% developed)	455	400	**855**

Table 13.4.22 - Generated Traffic for Galway Harbour Village Development for PM Peak Hour

It should be noted that the above traffic volumes are considered highly conservative, as no reduction factor has been applied to the figures to account for multi-purpose trips. Due to the mixed-nature of the development, it's city centre location and close proximity to the proposed CSQ transportation hub (with associated pedestrian and cyclist links), it is considered that traffic generated by the proposed development will generate significantly less than that outlined above. In addition, the timescale for the development is conservative, as the development will not start until after the new harbour has opened. However, in order to ensure the robustness of the analysis, the above figures were input into the SATURN model.

13.4.4.1.4 Ceannt Station Quarter

Traffic generated by the proposed Ceannt Station Quarter development has been obtained from CIE. It was agreed with Galway City Council that the use of these figures was the most appropriate method of obtaining traffic volumes for this development. A breakdown of total traffic volumes for the AM and PM peak hours is outlined in Table Numbers 13.4.23 and 13.4.24 below.

Total Generated Traffic for CSQ Development for AM Peak Hour			
Development Type	**No. Arrivals**	**No. Departures**	**Total**
Residential	10	60	**70**
Commercial	30	5	**35**
Retail	28	6	**34**
Hotel	10	10	**20**
CIE	110	5	**115**
Total	**188**	**86**	**274**

Table 13.4.23 - Total Generated Traffic for CSQ Development for AM Peak Hour

Total Generated Traffic for CSQ Development for PM Peak Hour			
Development Type	**No. Arrivals**	**No. Departures**	**Total**
Residential	40	10	**50**
Commercial	20	30	**50**
Retail	112	140	**252**
Hotel	15	15	**30**
CIE	10	145	**155**
Total	**197**	**340**	**537**

Table 13.4.24 - Total Generated Traffic for CSQ Development for PM Peak Hour

13.4.4.1.5 Committed Development

Traffic volumes generated by the proposed Galway Shopping Centre redevelopment and Crown Development have been obtained from a review of planning documentation on the Galway City Council website. For robustness of the analysis it has been assumed that both developments will be fully operational by 2016, and are included in the baseline scenario for each year onwards. A breakdown of total traffic volumes for the AM and PM peak hours is outlined in Table Numbers 13.4.25 and 13.4.26 below.

Total Generated Traffic for Committed Developments for AM Peak Hour			
Development	**No. Arrivals**	**No. Departures**	**Total**
Galway Shopping Centre	265	229	**494**
Crown Development	443	222	**665**
Total	**708**	**451**	**1159**

Table 13.4.25 - Total Generated Traffic for Committed Developments for AM Peak Hour

Total Generated Traffic for Committed Developments for PM Peak Hour			
Development	**No. Arrivals**	**No. Departures**	**Total**
Galway Shopping Centre	1499	1321	**2820**
Crown Development	371	503	**874**
Total	**1870**	**1824**	**3694**

Table 13.4.26 - Total Generated Traffic for CSQ Development for PM Peak Hour

A breakdown of total traffic volumes, including harbour construction related traffic in 2016, for the AM and PM peak hours for each development is outlined in Tables 13.4.27 below.

Total Generated Traffic From All Sources				
	AM		PM	
Development & Year	Arrivals	Departures	Arrivals	Departures
2016				
Galway Harbour Extension	115	56	53	112
Galway Harbour Village	156	180	228	200
Ceannt Station Quarter	118	86	197	340
Galway Shopping Centre	265	229	1499	1321
Crown Development	443	222	371	503
Total	**1097**	**773**	**2348**	**2476**
2021				
Galway Harbour Extension	119	57	61	115
Galway Harbour Village	311	359	455	400
Ceannt Station Quarter	118	86	197	340
Galway Shopping Centre	265	229	1499	1321
Crown Development	443	222	371	503
Total	**1256**	**952**	**2583**	**2679**
2031				
Galway Harbour Extension	124	63	65	118
Galway Harbour Village	311	359	455	400
Ceannt Station Quarter	118	86	197	340
Galway Shopping Centre	265	229	1499	1321
Crown Development	443	222	371	503
Total	**1261**	**958**	**2587**	**2682**

Table 13.4.27 - Total Generated Traffic From All Sources

13.4.4.2 Trip Distribution

For haulage activities, a region-wide population-based distribution pattern was utilised, based on the 2006 Census. Five main routes were identified, which are listed below:
Route 1 - N6 and N18
Route 2 - N17
Route 3 - N84
Route 4 - N59
Route 5 - R336

The main urban hubs accessed by each route are listed below.

Route 1
Oranmore
Athenry
Clarinbridge
Kilcolgan
Craughwell
Kinvarra
Loughrea
Gort
Lisdoonvarna
Miltown Malbay
Ennis
Scarriff
Portumna
Ballinasloe
Athlone

Route 2
Claregalway
Tuam
Moylough & Ballygar
Mountbellew
Roscommon
Claremorris
Ballyhaunis
Castlerea
Strokestown
Foxford
Ballina
Swinford
Charlestown / Bellaghy
Ballaghaderreen
Tubercurry
Ballymote
Boyle
Carrick-On-Shannon
Sligo
Kiltimagh
Strandhill

Route 3
Headford
Ballinrobe
Castlebar
Westport
Newport
Belmullet

Route 4
Moycullen
Oughterard
Clifden

Route 5
Barna
Spiddal
Inverin
Rossaveal
Carraroe
Furbo

The total population for the urban hubs accessed by each route is as follows:
Route 1 - 66,428
Route 2 - 66,140
Route 3 - 21,888
Route 4 - 4,039
Route 5 - 1,049
Galway City - 72,414

These populations equate to the following proportions:
Route 1 - 29%
Route 2 - 28%
Route 3 - 9%
Route 4 - 2%
Route 5 - 1%
Galway City - 31%

The above distribution scenarios were input directly into SATURN for the haulage-related traffic.

The trip distribution pattern for the new port development for non-haulage related activities was informed from a vehicle registration plate survey carried out on Tuesday 9th February 2010. This survey set up cordon points at the port entrance, Dock Road, Fairgreen Road, Moneenageisha Road, Wellpark Road and Dublin Road, from which distribution patterns to and from the port to the other destinations were obtained.

13.4.4.3 Seasonal Adjustment

In order to undertake an analysis of key junctions, it is sometimes necessary to apply a correction factor to convert the surveyed traffic into seasonally adjusted traffic flows to take account of the seasonal variation that is experienced with traffic volumes. However in this instance, the analysis utilises the Galway SATURN model, which has already been calibrated for Galway traffic to represent an average annual weekday.

13.4.4.4 Traffic Growth

The background traffic growth figures used in the analysis in this report have been derived following discussions with Galway City Council and MVA, and mirror the City Council's expected growth patterns for the city and surrounding areas as set out in the Galway City Development Plan 2011 - 2017.

The Galway City Development Plan anticipates that the population of Galway City and Environs will grow by 10,100 between 2010 and 2018. The population is expected to grow by a further 10,200 by 2022. It is anticipated that the majority of this additional population will be in the Ardaun area, with the remainder in both the city centre and Rahoon areas. This equates to an additional 2880 and 2909 households in the Ardaun area in 2018 and 2022 respectively. A further 498 and 507 households are anticipated in the Rahoon area in 2018 and 2022 respectively. These additional households have been included in the SATURN model in the Do Nothing scenario for the assessment years of 2016 and 2021.

The above growth rates for Galway City are based on the assumption of Galway's Gateway Hub status, and as such, projected growth has been "front-loaded" to achieve this status within this timeframe. As a result, it is anticipated that more modest growth patterns will be experienced between 2022 and 2031. For the purposes of this report, it is considered that an additional 2,000 residential units will be provided in the Ardaun area. These additional units have also been included in the SATURN model scenarios for the design year of 2031.

The Census of Population 2011 results indicate that the population of Galway City grew by 3,000 people between 2006 and 2011. Due to the current economic conditions, it is extremely unlikely that the population growths outlined in the Galway City Development Plan will be achieved, and as such the baseline traffic volumes for future years should be considered robust.

Further background growth has been applied to trips originating from outside Galway City, which has been based on the 2003 to 2040 NRA forecast indices for 2016, 2021 and 2031.

13.4.4.5 Modelling Scenarios Tested

In order to provide a robust assessment of the future road network, a number of scenarios have been tested within the SATURN model. Analysis was initially carried out for 2016, 2021 and 2031 based on the existing road network (i.e. the Do Nothing scenario), with isolated junction upgrades being included in the analysis. These upgrades have either been granted planning permission or are on Galway City Council and the NRA's programme for completion prior to 2016. The junction upgrades included in the SATURN model are as follows:

- Junction upgrades related to the main committed developments (i.e. Galway Shopping Centre and Crown Site Development);
- Bothar na dTreabh (N6) Multi-Modal Corridor Improvement Scheme;
- Bishop O'Donnell Road / Seamus Quirke Road Improvement Scheme (under construction at the time of running the SATURN model scenarios).

SATURN analysed the road network for the following scenarios:

- Do Nothing – Background traffic growth only (including committed development)
- Do Harbour (i.e. background traffic growth with the inclusion of the proposed new harbour)
- Do Harbour, Harbour Village and CSQ (i.e. sensitivity testing for inclusion of all possible future development in Galway City Centre)
- Do Harbour Sensitivity Test (i.e. background traffic growth with inclusion of the proposed new harbour based on the high tonnage growth scenario).

The analysis was carried out for the analysis years of 2011, 2016, 2021 and 2031.

13.4.5 Road Impact

13.4.5.1 Overall Network Assessment

The SATURN analysis carried out for 2016, 2021, 2031 has indicated that the proposed New Port development does not significantly impact on the surrounding road network. A more detailed analysis of the SATURN results is presented below in Section 13.4.5.2.3.

13.4.5.2 Junction Analysis

13.4.5.2.1 Introduction and Methodology

The junctions analysed in this report have been analysed using SATURN.

The performance of the junctions have been analysed for the critical AM and PM peak hours, for 2011, the expected year of opening 2016, 2021 and the design year 2031, 15 years beyond the year of opening.

The key parameters examined in the results of the analysis are as follows:

- Volume over capacity V/C value in SATURN (desirable value should be no greater than 0.85 for SATURN – values over 1.00 indicate the approach arm is over capacity),
- The maximum queue length on any approach to the junctions; and
- The average delay for each vehicle passing through the junction during the modelled period.

In scoping this report and impacts of the proposed development the threshold approach as specified in the NRA TTA Guidelines[1] has been used to establish the area of influence of the development. The guidelines specify that a study area should include all road links and associated junctions where traffic to and from the development will exceed 10% of existing traffic at uncongested junctions, and 5% in congested or other sensitive locations.

SATURN requires the following input data:

- Basic modelling parameters (usually peak hour traffic counts synthesised over a 90 minute model period)
- Geometric parameters (including lane numbers & widths, visibility, storage provision etc)
- Traffic demand data

The results of the SATURN analysis are presented in Section 13.4.5.2.3. The origin/destination traffic demand tables for all the different scenarios tested for the analysed junctions are provided in the appendices of this report.

13.4.5.2.2 Assessment Years

The performance of the junctions has been analysed for the critical AM peak hour (08:00 – 09:00) and PM peak hour (17:00 – 18:00). This analysis was carried out for the anticipated year of opening of the development at the time of completion of the SATURN modelling, 2016, five years beyond this year of opening, 2021, and the design year of the development 2031, 15 years beyond the year of opening of the development in accordance with the NRA “Traffic and Transport Assessment Guidelines” and as agreed with Galway City Council.

As noted previously, while the projections for the harbour have been amended since the completion of the SATURN modelling, the maximum annual tonnage for the design year has reduced. It is therefore considered that the analysis contained within this report is robust and represents a worst-case scenario.

[1] Traffic and Transport Assessment Guidelines, Section 3.1

13.4.5.2.3 Analysis

The analysis results for the modelling scenarios are shown below. Note that the list below outlines the modelling scenarios tested, and that the year will be 2011, 2016, 2021 or 2031, depending on the scenario being run:

- Year = Baseline Traffic
- Year + Dev = With Port Development
- Year + Dev + Other = With Port, Harbour Village and CSQ Developments
- Year + Dev Sens. = With Port Development (Sensitivity Test).

13.4.5.2.3.1 SATURN Network Statistics

An overview of the network statistics obtained from SATURN for the various scenarios tested is provided in Table 13.4.28 below.

SATURN Results: Network Statistics AM & PM Peak Hours			
Date and Time	**Average Speed (km/h)**	**Over-Capacity Queues (PCUs)**	**Total Trips Loaded (PCUs)**
2011 AM	30.2	300	27300
2011 PM	27.5	720	30800
2011 AM + Dev	29.9	340	27400
2011 PM + Dev	27.2	760	31000
2016 AM	23.9	1040	29900
2016 PM	20.8	1440	35100
2016 AM + Dev	23.4	1150	30100
2016 PM + Dev	20.3	1580	35400
2016 AM + Dev + Other	22.2	1360	30800
2016 PM + Dev + Other	19.1	1940	36400
2021 AM	22.6	1460	31600
2021 PM	19.4	1980	37000
2021 AM + Dev	22.2	1560	31800
2021 PM + Dev	19.1	2080	37200
2021 AM + Dev + Other	20.9	1890	32900
2021 PM + Dev + Other	17.6	2650	38600
2031 AM	21.5	1910	33100
2031 PM	18.2	2530	38400
2031 AM + Dev	21.0	2060	33400
2031 PM + Dev	18.1	2610	38700
2031 AM + Dev + Other	19.9	2390	34400
2031 PM + Dev + Other	16.8	3140	40100
2031 AM + Dev Sens.	21.0	2070	33400
2031 PM + Dev Sens.	18.1	2610	38700

Table 13.4.28 - SATURN Results: Network Statistics AM & PM Peak Hours

The statistics provided in Table 13.4.28 above indicate that the proposed development will result in a reduction in average speed throughout the network of approximately 2.3% in the AM peak hour, and 0.5% in the PM peak hour.

13.4.5.2.3.2 Junction Analysis Results

The analysis results for the site access junction for the AM and PM peak hours are provided below in Table 13.4.29.

SATURN Results: Junction 1 AM & PM Peak Hours						
	Arm A – Lough Atalia Road		Arm B – Harbour Access		Arm C – Bóthar na Long	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.69	7	0.29	16	0.30	13
2011 PM	0.67	6	0.25	13	0.11	12
2011 AM + Dev	0.71	7	0.48	20	0.29	15
2011 PM + Dev	0.69	7	0.54	17	0.14	13
2016 AM	0.59	5	0.29	15	0.31	11
2016 PM	0.88	17	0.47	26	0.17	20
2016 AM + Dev	0.45	12	0.35	25	0.37	16
2016 PM + Dev	0.67	16	0.43	27	0.23	22
2021 AM	0.58	5	0.28	14	0.29	11
2021 PM	0.88	17	0.53	28	0.18	21
2021 AM + Dev	0.45	12	0.27	24	0.37	16
2021 PM + Dev	0.68	17	0.43	27	0.24	22
2031 AM	0.58	5	0.28	14	0.28	11
2031 PM	0.89	18	0.42	32	0.19	22
2031 AM + Dev	0.45	12	0.36	25	0.36	16
2031 PM + Dev	0.67	16	0.45	28	0.26	22
2031 AM + Dev Sens.	0.44	12	0.40	26	0.35	17
2031 PM + Dev Sens.	0.67	16	0.47	28	0.26	22

Table 13.4.29 - SATURN Results: Junction 1 AM & PM Peak Hours (Harbour Entrance)

The above results indicate that the existing site access junction will operate above the desired 0.85 V/C value in 2016, based on its current arrangement. With the upgrading of the junction to a

signalised junction, it will operate below capacity and will continue to do so up to and including the design year of 2031.

Should Galway Harbour Village be granted planning permission, the proposed 3-arm traffic signals junction will require upgrading to a 4-arm traffic signals junction to allow for access into a portion of this development. The analysis results for this site access junction arrangement for the AM and PM peak hours are provided below in Table 13.4.30.

SATURN Results: 4-Arm Junction 1 AM & PM Peak Hours								
	Arm A – Lough Atalia Road		Arm B – Harbour Access		Arm C – Harbour Village Access		Arm D – Bóthar na Long	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2016 AM + Dev + Other	0.67	25	0.73	54	0.08	71	0.51	43
2016 PM + Dev + Other	0.87	41	0.74	64	0.23	72	0.42	42
2021 AM + Dev + Other	0.67	28	0.73	53	0.12	71	0.50	44
2021 PM + Dev + Other	0.88	41	0.91	99	0.35	73	0.42	42
2031 AM + Dev + Other	0.67	29	0.74	55	0.15	71	0.49	44
2031 PM + Dev + Other	0.86	39	0.94	112	0.36	73	0.40	42

Table 13.4.30 - SATURN Results: 4-Arm Junction 1 AM & PM Peak Hours (Harbour Entrance)

The above results indicate that the proposed 4-arm site access junction will operate above the desired V/C value of 0.85 but within capacity in the design year of 2031 with the inclusion of Harbour Village and CSQ development-generated traffic. It should be noted that the Harbour Village and CSQ developments will be subject to separate planning applications, which may require alterations to junction layouts and overall development content and timescale schedules.

The analysis results for the existing Lough Atalia Road / Fairgreen Road traffic signals junction for the AM and PM peak hours are provided below in Table 13.4.31.

SATURN Results: Junction 2 AM & PM Peak Hours						
	Arm A – Lough Atalia Road (W)		Arm B – Fairgreen Road		Arm C – Lough Atalia Road (E)	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.70	38	0.07	15	0.90	49
2011 PM	0.31	29	0.07	15	0.72	32
2011 AM + Dev	0.77	43	0.15	16	0.92	53
2011 PM + Dev	0.40	34	0.10	15	0.75	34
2016 AM	0.76	41	0.08	15	0.77	39
2016 PM	0.49	32	0.05	15	0.93	57
2016 AM + Dev	0.81	45	0.13	16	0.78	43
2016 PM + Dev	0.69	41	0.08	15	0.95	63
2016 AM + Dev + Other	0.89	58	0.18	16	0.82	45
2016 PM + Dev + Other	0.85	54	0.09	15	0.92	54
2021 AM	0.73	39	0.08	15	0.76	38
2021 PM	0.52	33	0.05	15	0.94	57
2021 AM + Dev	0.75	41	0.12	16	0.78	39
2021 PM + Dev	0.71	42	0.08	15	0.95	63
2021 AM + Dev + Other	0.91	64	0.18	16	0.82	45
2021 PM + Dev + Other	0.96	85	0.13	16	0.94	57
2031 AM	0.73	39	0.08	15	0.75	38
2031 PM	0.58	35	0.05	15	0.94	60
2031 AM + Dev	0.83	49	0.12	16	0.76	44
2031 PM + Dev	0.79	48	0.08	15	0.96	68
2031 AM + Dev + Other	0.91	66	0.19	16	0.81	46
2031 PM + Dev + Other	0.98	95	0.13	16	0.95	63
2031 AM + Dev Sens.	0.85	52	0.12	16	0.77	44
2031 PM + Dev Sens.	0.80	49	0.08	15	0.96	69

Table 13.4.31 - SATURN Results Junction 2 AM & PM Peak Hours (Fairgreen Road)

The above results indicate that the proposed development will have minimal impact on the existing Lough Atalia Road / Fairgreen Road junction, which will operate above the desired V/C value of 0.85 but within capacity up to and including the design year of 2031, with or without the

inclusion of development-generated traffic. With the inclusion of Harbour Village and CSQ development-generated traffic, the junction will operate above the desired 0.85 V/C value but below capacity in the design year of 2031.

It should be noted that it is Galway City Council's intention to extend the UTMC system throughout the city, including the Lough Atalia Road / Fairgreen Road Junction. The inclusion of this junction within the UTMC system will facilitate an improvement in junction efficiency, resulting in increased vehicular throughput at the junction. Since the implementation of the UTMC at the College Road / Lough Atalia Road and Moneenageisha Junctions, there has been an increase in traffic throughput at the Lough Atalia Road / Fairgreen Road Junction of 13.4% in the AM and 7.2% in the PM, as observed when examining the 2011 and 2012 traffic counts. Further benefits will be expected when the Lough Atalia Road / Fairgreen Road Junction is added to the UTMC system; expected to be connected in 2014.

The analysis results for Moneenageisha Junction for the AM and PM peak hours are provided below in Table 13.4.32.

SATURN Results: Junction 3 AM & PM Peak Hours								
	Arm A – College Road		Arm B – Moneenageisha Road		Arm C – Wellpark Road		Arm D – Dublin Road	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.98	123	1.03	195	0.95	146	1.02	178
2011 PM	1.04	233	0.96	112	0.52	74	0.69	64
2011 AM + Dev	0.98	122	1.04	201	0.97	157	1.02	172
2011 PM + Dev	1.08	294	0.96	110	0.58	76	0.66	62
2016 AM	1.16	419	1.03	162	1.20	624	1.17	488
2016 PM	1.21	529	1.06	239	1.12	398	1.10	269
2016 AM + Dev	1.18	454	1.04	188	1.24	692	1.17	491
2016 PM + Dev	1.21	531	1.06	244	1.14	431	1.11	295
2016 AM + Dev + Other	1.19	472	1.07	225	1.31	812	1.17	493
2016 PM + Dev + Other	1.21	526	1.09	291	1.23	594	1.16	380
2021 AM	1.19	481	1.04	185	1.23	669	1.17	492
2021 PM	1.22	522	1.07	253	1.15	459	1.13	329
2021 AM + Dev	1.20	487	1.05	202	1.27	736	1.17	494
2021 PM + Dev	1.21	541	1.09	293	1.18	507	1.15	375
2021 AM + Dev + Other	1.23	548	1.07	240	1.32	838	1.16	483
2021 PM + Dev + Other	1.21	546	1.11	326	1.31	735	1.16	380
2031 AM	1.22	526	1.06	220	1.27	740	1.18	502
2031 PM	1.22	526	1.10	312	1.16	475	1.14	346
2031 AM + Dev	1.22	528	1.08	251	1.31	814	1.17	499
2031 PM + Dev	1.21	526	1.09	295	1.15	452	1.12	320
2031 AM + Dev + Other	1.23	553	1.09	273	1.36	899	1.17	492
2031 PM + Dev + Other	1.21	548	1.10	321	1.25	639	1.16	380
2031 AM + Dev Sens.	1.22	532	1.08	253	1.31	820	1.17	496
2031 PM + Dev + Sens.	1.21	548	1.10	312	1.16	460	1.13	329

Table 13.4.32 - SATURN Results: Junction 3 AM & PM Peak Hours (Moneenageisha)

The above results indicate that the proposed development will have minimal impact on the existing Moneenageisha junction, which is now, and will continue to operate above capacity up to and including the design year of 2031, with or without the inclusion of development generated traffic. With the inclusion of Harbour Village and CSQ development-generated traffic, the junction will continue to operate above capacity in the design year of 2031.

Although the junction will operate above capacity, the impact the proposed port development will have on the junction is low. As the SATURN model indicates that the proposed development will generate 1.9% additional traffic movements through Moneenageisha Junction (Junction 3) in the AM peak hour, and 3.9% additional traffic movements in the PM peak hour compared to existing traffic volumes, it is therefore demonstrated that traffic generated by this development does not exceed the thresholds outlined by the NRA at this junction.

It should be noted that since the completion of the analysis presented in this report, the UTMC system has been implement along the Dublin Road corridor, which includes Moneenageisha junction. An assessment of the 2011 and 2012 traffic count data, undertaken by Galway City Council, showed that since the implementation of this UTMC system there has been a significant increase in traffic throughput at the Moneenageisha Junction of 5.2% in the AM and 22.3% in the PM.

A backwards calculation of the scenario 2016 PM + Development results in an adjusted V/C of less than 1.0 for each of the arms at the junction. Therefore harbour generated traffic is anticipated to operate below capacity at the opening year.

The analysis results for the College Road / Lough Atalia Road traffic signals junction for the AM and PM peak hours are provided in Table 13.4.33.

SATURN Results: Junction 4 AM & PM Peak Hours						
	Arm A – College Road (N)		Arm B – Lough Atalia Road		Arm C – College Road (S)	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.55	30	0.74	32	0.46	29
2011 PM	0.43	27	0.59	26	0.85	53
2011 AM + Dev	0.57	30	0.75	33	0.45	28
2011 PM + Dev	0.45	27	0.63	27	0.85	53
2016 AM	0.54	29	0.84	41	0.64	34
2016 PM	0.55	30	1.17	421	1.18	452
2016 AM + Dev	0.53	29	0.86	44	0.66	35
2016 PM + Dev	0.56	30	1.22	513	1.23	536
2016 AM + Dev + Other	0.53	29	0.89	51	0.65	35
2016 PM + Dev + Other	0.55	29	1.28	612	1.28	635
2021 AM	0.53	29	0.80	37	0.73	39
2021 PM	0.55	29	1.24	543	1.25	570
2021 AM + Dev	0.53	29	0.80	37	0.75	40
2021 PM + Dev	0.57	30	1.25	559	1.25	580
2021 AM + Dev + Other	0.54	29	1.00	112	0.71	40
2021 PM + Dev + Other	0.55	29	1.36	759	1.36	782
2031 AM	0.54	29	0.80	37	0.76	41
2031 PM	0.55	30	1.29	641	1.30	669
2031 AM + Dev	0.54	29	0.82	39	0.75	41
2031 PM + Dev	0.57	30	1.31	670	1.31	693
2031 AM + Dev + Other	0.54	29	1.04	190	0.91	74
2031 PM + Dev + Other	0.55	30	1.42	667	1.43	892
2031 AM + Dev Sens.	0.54	29	0.83	40	0.75	41
2031 PM + Dev Sens.	0.57	30	1.31	667	1.31	686

Table 13.4.33 - SATURN Results: Junction 4 AM & PM Peak Hours (Lough Atalia Road)

The above results indicate that the proposed development will have minimal impact on the existing Lough Atalia Road / College Road junction, which is expected to operate above the desired 0.85 V/C value but below capacity in the design year of 2031, with or without the

inclusion of development-generated traffic. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development. With the inclusion of Harbour Village and CSQ development-generated traffic, the junction will continue to operate above capacity in the design year of 2031 in the PM peak hour.

It should be noted that since the completion of the analysis presented in this report, the UTMC system has been implement along the Dublin Road corridor, which includes the College Road / Lough Atalia Road junction. An assessment of the 2011 and 2012 traffic count data, undertaken by Galway City Council, showed that since the implementation of this UTMC system there has been a significant increase in traffic throughput at the Lough Atalia Road / College Road junction of 6.3% in the AM and 10.5% in the PM. A backward calculation of the scenario 2016 PM + Development results in a lower adjusted V/C but still above 1.0 for the Lough Atalia Road and College Road (south) arms of the junction.

The analysis results for the existing Bóthar Ui Eithir / Forster Street traffic signals junction for the AM and PM peak hours are provided below in Table 13.4.34.

SATURN Results: Junction 5 AM & PM Peak Hours								
	Arm A – Bóthar Uí Eithir		Arm B – College Road		Arm C – Fairgreen Road		Arm D – Forster Street (1-way)	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.54	33	0.36	28	0.00	32	-	-
2011 PM	0.32	31	0.34	28	0.02	32	-	-
2011 AM + Dev	0.54	36	0.41	29	0.00	32	-	-
2011 PM + Dev	0.33	32	0.34	28	0.02	32	-	-
2016 AM	0.48	33	0.38	29	0.00	32	-	-
2016 PM	0.36	31	0.54	32	0.02	32	-	-
2016 AM + Dev	0.48	35	0.38	29	0.00	32	-	-
2016 PM + Dev	0.33	31	0.68	36	0.02	32	-	-
2016 AM + Dev + Other	0.72	45	0.40	29	0.00	32	-	-
2016 PM + Dev + Other	0.33	32	0.72	38	0.17	32	-	-
2021 AM	0.48	33	0.39	29	0.00	32	-	-
2021 PM	0.31	31	0.58	33	0.02	32	-	-
2021 AM + Dev	0.48	34	0.38	29	0.00	32	-	-
2021 PM + Dev	0.31	31	0.70	37	0.02	32	-	-
2021 AM + Dev + Other	0.42	46	0.42	29	0.00	32	-	-
2021 PM + Dev + Other	0.35	33	0.78	42	0.16	32	-	-
2031 AM	0.47	33	0.40	29	0.00	32	-	-
2031 PM	0.31	31	0.67	36	0.02	32	-	-
2031 AM + Dev	0.47	34	0.41	29	0.00	32	-	-
2031 PM + Dev	0.32	31	0.75	40	0.02	32	-	-
2031 AM + Dev + Other	0.41	46	0.44	30	0.03	32	-	-
2031 PM + Dev + Other	0.34	33	0.85	49	0.15	32	-	-
2031 AM + Dev Sens.	0.47	34	0.42	29	0.00	32	-	-
2031 PM + Dev Sens.	0.33	32	0.77	41	0.02	32	-	-

Table 13.4.34 - SATURN Results: Junction 5 AM & PM Peak Hours (Forster Street)

The above results indicate that the proposed development will have minimal impact on the existing Bóthar Ui Eithir / Forster Street junction, which will operate below capacity up to and including the design year of 2031, with the inclusion of both development-generated, Galway Harbour Village and CSQ traffic. No significant increase in delay through the junction is expected to be caused as a result of the proposed development.

The analysis results for the existing Fr. Griffin Road / Claddagh Quay priority junction for the AM and PM peak hours are provided below in Table 13.4.35.

SATURN Results: Junction 6 AM & PM Peak Hours								
	Arm A – Raven Terrace (1-Way)		Arm B – Wolfe Tone Bridge		Arm C – Claddagh Quay		Arm D – Fr. Griffin Road	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	-	-	0.44	7	0.51	31	0.86	18
2011 PM	-	-	0.40	5	0.00	12	0.27	13
2011 AM + Dev	-	-	0.44	7	0.54	33	0.88	18
2011 PM + Dev	-	-	0.42	5	0.00	12	0.27	13
2016 AM	-	-	0.44	7	0.98	97	1.01	72
2016 PM	-	-	0.41	5	0.00	12	0.28	13
2016 AM + Dev	-	-	0.43	7	1.00	98	1.01	73
2016 PM + Dev	-	-	0.42	5	0.00	12	0.29	13
2016 AM + Dev + Other	-	-	0.45	7	0.95	82	1.01	68
2016 PM + Dev + Other	-	-	0.37	5	0.00	14	0.35	13
2021 AM	-	-	0.44	7	1.02	135	1.02	86
2021 PM	-	-	0.40	5	0.00	12	0.28	13
2021 AM + Dev	-	-	0.43	7	0.98	96	1.01	74
2021 PM + Dev	-	-	0.39	5	0.00	13	0.28	13
2021 AM + Dev + Other	-	-	0.44	7	0.97	94	1.02	81
2021 PM + Dev + Other	-	-	0.37	5	0.00	15	0.39	13
2031 AM	-	-	0.44	7	1.01	118	1.03	99
2031 PM	-	-	0.40	5	0.00	12	0.30	13
2031 AM + Dev	-	-	0.44	7	1.00	102	1.02	89
2031 PM + Dev	-	-	0.41	5	0.00	12	0.29	13
2031 AM + Dev + Other	-	-	0.44	7	0.97	93	1.01	70
2031 PM + Dev + Other	-	-	0.37	5	0.00	15	0.38	13
2031 AM + Dev Sens.	-	-	0.44	7	1.00	107	1.02	90
2031 PM + Dev Sens.	-	-	0.40	5	0.00	13	0.29	13

Table 13.4.35 - SATURN Results: Junction 6 AM & PM Peak Hours (Claddagh)

The above results indicate that the proposed development will have minimal impact on the existing Fr. Griffin Road / Claddagh Quay junction, which will operate above capacity in the design year of 2031, with or without the inclusion of development-generated traffic. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development. With the inclusion of Harbour Village and CSQ development-generated traffic, the junction will operate above capacity in the design year of 2031.

It should be noted that Galway City Council have recently implemented improvements to both the Fr. Griffin Road / Claddagh Quay junction and the adjacent Fr. Griffin Road / Fairhill Road traffic signal-controlled junction. Fr. Griffin Road / Claddagh Quay junction is outside the area of influence (as defined by the 5% threshold rule in the NRA TTA Guidelines) of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the existing Bodkin Roundabout for the AM and PM peak hours are provided below in Table 13.4.36.

SATURN Results: Junction 7 AM & PM Peak Hours										
	Arm A – N6 Headford Road		Arm B – Sean Mulvoy Road		Arm C – Galway S.C.		Arm D – R866 Headford Road		Arm E – N6 West	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.66	146	0.51	34	0.06	27	0.54	34	1.13	112
2011 PM	0.64	68	0.57	41	0.27	28	0.72	73	1.13	72
2011 AM + Dev	0.67	149	0.48	34	0.06	26	0.55	33	1.16	110
2011 PM + Dev	0.65	76	0.56	51	0.26	36	0.73	117	1.15	75

Table 13.4.36 - SATURN Results: Junction 7 AM & PM Peak Hours (Galway Shopping Centre)

The above results indicate that the proposed development will have minimal impact on the existing Bodkin Roundabout (now junction) (near Galway Shopping Centre). No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development.

As Bodkin Roundabout is outside the area of influence (as defined by the 5% threshold rule in the NRA TTA Guidelines) of the development, it is considered that the proposed development has negligible impact on this junction.

At the time of completing this chapter, construction work to upgrade the junction to a four arm traffic signal controlled junction was completed. The analysis results for the proposed upgrade to Bodkin Junction for the AM and PM peak hours are provided below in Table 13.4.37.

SATURN Results: Junction 7 Upgrade AM & PM Peak Hours								
	Arm A – N6 Headford Road		Arm B – Sean Mulvoy Road		Arm C – R866 Headford Road		Arm D – N6 West	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2016 AM	0.91	51	0.41	61	0.48	67	0.96	104
2016 PM	0.94	63	1.01	120	0.94	213	1.07	290
2016 AM + Dev	0.90	48	0.40	60	0.54	83	0.98	112
2016 PM + Dev	0.97	74	1.01	123	1.00	264	1.07	295
2016 AM + Dev + Other	0.89	47	0.41	61	0.59	84	1.04	112
2016 PM + Dev + Other	0.95	66	1.01	121	1.01	272	1.07	287
2021 AM	0.91	47	0.42	61	0.50	84	0.96	199
2021 PM	0.94	61	1.01	122	0.94	214	1.07	296
2021 AM + Dev	0.90	51	0.42	61	0.54	83	0.98	103
2021 PM + Dev	0.93	61	1.01	121	0.92	201	1.07	298
2021 AM + Dev + Other	0.90	48	0.43	61	0.60	70	1.06	116
2021 PM + Dev + Other	0.89	52	1.01	121	1.05	345	1.08	270
2031 AM	0.91	50	0.44	61	0.53	83	0.98	114
2031 PM	0.90	54	1.01	122	0.96	231	1.07	293
2031 AM + Dev	0.89	47	0.44	61	0.54	84	1.00	129
2031 PM + Dev	0.95	66	1.01	122	0.99	249	1.08	275
2031 AM + Dev + Other	0.88	47	0.46	62	0.60	84	1.08	272
2031 PM + Dev + Other	0.94	62	1.01	122	1.09	428	1.08	278
2031 AM + Dev Sens.	0.89	47	0.44	61	0.54	84	1.00	131
2031 PM + Dev Sens.	0.95	64	1.01	122	1.01	276	1.08	274

Table 13.4.37 - SATURN Results: Junction 7 Upgrade AM & PM Peak Hours (Galway Shopping Centre)

The above results indicate that the proposed development will have minimal impact on the proposed Bodkin junction upgrade. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development.

As Bodkin junction is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the N6 / N59 / Lower Newcastle Road junction for the AM and PM peak hours are provided below in Table 13.4.38.

SATURN Results: Junction 8 AM & PM Peak Hours								
	Arm A – N59		Arm B – N6 East		Arm C – Newcastle Road Lower		Arm D – N6 West	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	1.07	252	0.77	28	0.60	32	0.98	78
2011 PM	1.02	162	0.89	35	0.92	89	0.61	25
2011 AM + Dev	1.07	254	0.76	28	0.60	46	0.98	77
2011 PM + Dev	1.02	165	0.89	35	0.92	91	0.62	26
2016 AM	0.98	96	0.96	39	0.34	28	0.77	29
2016 PM	1.04	187	1.03	125	0.73	44	0.87	31
2016 AM + Dev	0.97	91	0.95	38	0.34	28	0.75	28
2016 PM + Dev	1.03	183	1.05	158	0.71	43	0.86	31
2016 AM + Dev + Other	0.97	90	0.98	40	0.29	27	0.79	30
2016 PM + Dev + Other	1.04	186	1.08	211	0.74	44	0.89	33
2021 AM	0.98	95	0.97	40	0.34	28	0.78	30
2021 PM	1.04	198	1.05	151	0.82	51	0.89	33
2021 AM + Dev	0.97	91	0.95	39	0.34	28	0.77	30
2021 PM + Dev	1.04	199	1.04	140	0.83	51	0.89	33
2021 AM + Dev + Other	0.98	98	1.00	41	0.28	27	0.84	32
2021 PM + Dev + Other	1.04	202	1.07	203	0.81	50	0.91	35
2031 AM	0.98	92	0.98	41	0.34	28	0.78	30
2031 PM	1.06	224	1.05	153	0.83	52	0.92	37
2031 AM + Dev	0.97	90	0.96	39	0.33	28	0.77	29
2031 PM + Dev	1.06	226	1.06	176	0.81	50	0.93	39
2031 AM + Dev + Other	0.98	97	0.99	41	0.28	27	0.85	33
2031 PM + Dev + Other	1.06	231	1.09	233	0.82	51	0.94	40
2031 AM + Dev Sens.	0.97	87	0.96	39	0.33	28	0.77	29
2031 PM + Dev Sens.	1.06	229	1.06	168	0.82	50	0.93	38

Table 13.4.38 - SATURN Results: Junction 8 AM & PM Peak Hours (Newcastle Road)

The above results indicate that the proposed development will have minimal impact on the existing and proposed N6 / N59 / Lower Newcastle Road Junction. No significant increase in congestion through the junction is expected to be caused as a result of the proposed development. Although the junction will operate above capacity, the impact the proposed port development will have on the junction is low. As the SATURN model indicates that port related traffic in 2031 will account for 0.1% of existing vehicular movements in the AM and PM peak hours compared to existing traffic volumes, it is therefore demonstrated that traffic generated by this development does not exceed the thresholds outlined by the NRA at this junction.

As the N6 / N59 / Lower Newcastle Road junction is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the existing Browne Roundabout for the AM and PM peak hours are provided below in Table 13.4.39.

SATURN Results: Junction 9 AM & PM Peak Hours										
	Arm A – N6		Arm B – Old Seamus Quirke Road		Arm C – UCHG		Arm D – Seamus Quirke Road		Arm E – N59 Thomas Hynes Road	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.46	19	0.39	32	0.17	20	0.68	19	1.05	161
2011 PM	0.40	17	0.24	26	1.10	294	0.59	20	0.16	18
2011 AM + Dev	0.45	19	0.36	31	0.17	20	0.67	19	1.06	168
2011 PM + Dev	0.41	17	0.28	27	1.11	308	0.59	20	0.16	18

Table 13.4.39 - SATURN Results: Junction 9 AM & PM Peak Hours (Back of U.C.H.G.)

The above results indicate that the proposed development will have minimal impact on the existing Browne Roundabout. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development.

As Browne Roundabout is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the proposed upgrade of the Browne Roundabout to a 4-arm traffic signal controlled junction for the AM and PM peak hours are provided below in Table 13.4.40.

SATURN Results: Junction 9 AM & PM Peak Hours								
	Arm A – N6		Arm B – Old Seamus Quirke Road		Arm C – Seamus Quirke Road		Arm D – N59 Thomas Hynes Road	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2016 AM	0.97	115	0.23	86	0.90	60	1.01	151
2016 PM	1.00	117	0.93	211	1.02	111	0.53	85
2016 AM + Dev	0.97	118	0.25	86	0.87	56	1.02	154
2016 PM + Dev	1.00	118	0.86	175	1.01	101	0.51	85
2016 AM + Dev + Other	1.02	181	0.53	108	0.94	68	1.03	172
2016 PM + Dev + Other	0.99	113	0.97	236	1.02	115	0.55	84
2021 AM	1.00	148	0.26	86	0.91	63	1.03	170
2021 PM	1.01	139	0.96	227	1.02	115	0.58	96
2021 AM + Dev	1.01	155	0.25	86	0.90	60	1.02	161
2021 PM + Dev	1.01	137	0.98	244	1.02	115	0.59	96
2021 AM + Dev + Other	1.02	194	0.69	128	0.99	93	1.04	188
2021 PM + Dev + Other	1.01	129	1.00	264	1.02	114	0.61	92
2031 AM	1.00	142	0.26	88	0.90	61	1.03	178
2031 PM	1.01	135	1.00	256	1.02	115	0.62	94
2031 AM + Dev	1.01	163	0.27	90	0.88	58	1.03	175
2031 PM + Dev	1.01	128	1.00	261	1.02	114	0.62	94
2031 AM + Dev + Other	1.02	199	0.69	126	0.99	90	1.05	207
2031 PM + Dev + Other	1.00	126	1.01	276	1.02	114	0.63	98
2031 AM + Dev Sens.	1.01	155	0.33	93	0.88	58	1.03	170
2031 PM + Dev Sens.	1.00	125	1.00	258	1.02	114	0.62	95

Table 13.4.40 - SATURN Results: Junction 9 Upgrade AM & PM Peak Hours (Back of U.C.H.G.)

The above results indicate that the proposed development will have minimal impact on the proposed Browne junction improvements. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development.

As Browne junction improvements are outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the Kirwan Roundabout for the AM and PM peak hours are provided below in Table 13.4.41.

SATURN Results: Junction 10 AM & PM Peak Hours										
	Arm A – N84		Arm B – N6 East		Arm C – Sandy Road		Arm D – N6 South		Arm E – Castlelawn Heights	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	1.05	138	0.71	11	0.16	11	0.43	8	0.28	13
2011 PM	0.33	11	0.32	8	0.06	10	0.89	11	0.08	18
2011 AM + Dev	1.08	191	0.74	12	0.18	11	0.45	8	0.29	14
2011 PM + Dev	0.34	11	0.33	8	0.06	10	0.91	12	0.08	19
2016 AM	0.92	421	0.99	271	0.21	297	0.76	385	0.61	363
2016 PM	0.96	437	0.68	406	0.49	288	0.62	252	0.32	222
2016 AM + Dev	0.93	413	1.00	274	0.29	300	0.78	390	0.61	362
2016 PM + Dev	1.01	556	0.68	425	0.52	284	0.61	267	0.36	237
2016 AM + Dev + Other	0.95	410	1.01	275	0.32	301	0.77	391	0.63	362
2016 PM + Dev + Other	1.01	763	0.64	480	0.58	369	0.66	289	0.43	269
2021 AM	0.93	417	1.00	272	0.24	298	0.77	387	0.62	363
2021 PM	1.00	605	0.67	432	0.55	337	0.67	271	0.38	243
2021 AM + Dev	0.93	414	1.00	274	0.31	300	0.77	391	0.61	363
2021 PM + Dev	0.96	713	0.67	460	0.58	366	0.69	280	0.39	255
2021 AM + Dev + Other	0.95	409	1.01	276	0.37	302	0.78	393	0.65	362
2021 PM + Dev + Other	0.92	832	0.59	503	0.57	443	0.70	304	0.43	290
2031 AM	0.92	416	1.00	274	0.30	300	0.77	391	0.62	363
2031 PM	1.01	648	0.62	447	0.60	360	0.72	274	0.40	247
2031 AM + Dev	0.93	414	0.99	277	0.45	302	0.78	394	0.63	364
2031 PM + Dev	1.02	399	0.55	424	0.48	274	0.71	227	0.40	192
2031 AM + Dev + Other	0.93	413	1.00	277	0.41	302	0.78	395	0.64	363
2031 PM + Dev + Other	1.26	670	0.70	451	0.55	366	1.16	343	0.96	356
2031 AM + Dev Sens.	0.93	413	1.00	277	0.41	302	0.78	395	0.64	364
2031 PM + Dev Sens.	0.99	425	0.71	419	0.47	282	0.72	253	0.40	218

Table 13.4.41 - SATURN Results: Junction 10 AM & PM Peak Hours (Coolagh Road)

The above results indicate that the proposed development will have minimal impact on the existing and proposed Kirwan Roundabout. No significant increase in delay or congestion

through the junction is expected to be caused as a result of the proposed development. As Kirwan Roundabout is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the N6 / N17 / R336 traffic signals junction (formerly Ffont Roundabout) for the AM and PM peak hours are provided below in Table 13.4.42.

SATURN Results: Junction 11 AM & PM Peak Hours								
	Arm A – N17		Arm B – N6 East		Arm C – R336 Tuam Road		Arm D – N6 West	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.27	19	0.47	18	0.24	20	0.49	18
2011 PM	0.39	20	0.46	19	0.26	19	0.59	19
2011 AM + Dev	0.30	19	0.50	19	0.24	20	0.49	18
2011 PM + Dev	0.43	21	0.49	19	0.28	20	0.61	19
2016 AM	1.03	191	1.04	185	0.92	80	0.92	88
2016 PM	0.80	72	0.96	159	0.99	111	0.97	96
2016 AM + Dev	1.05	224	1.05	202	0.94	87	0.97	91
2016 PM + Dev	0.80	72	0.96	154	1.01	126	0.96	93
2016 AM + Dev + Other	1.06	250	1.06	222	0.95	95	0.94	99
2016 PM + Dev + Other	0.76	67	0.99	174	1.00	118	0.97	99
2021 AM	1.04	218	1.05	193	0.93	85	0.97	86
2021 PM	0.78	70	1.04	254	1.02	154	1.02	154
2021 AM + Dev	1.05	231	1.06	208	0.92	83	0.93	90
2021 PM + Dev	0.77	68	1.05	285	1.03	159	1.02	154
2021 AM + Dev + Other	1.06	247	1.06	221	0.93	87	0.87	99
2021 PM + Dev + Other	0.74	65	1.07	296	1.03	175	0.98	108
2031 AM	1.06	239	1.05	204	0.87	70	0.85	91
2031 PM	0.79	71	1.13	432	1.06	224	1.06	237
2031 AM + Dev	1.07	253	1.06	213	0.89	78	0.83	101
2031 PM + Dev	0.82	76	1.13	435	1.07	232	1.08	270
2031 AM + Dev + Other	1.07	263	1.07	109	0.91	84	0.81	114
2031 PM + Dev + Other	0.79	71	1.15	471	1.08	267	1.04	191
2031 AM + Dev Sens.	1.06	249	1.06	216	0.89	78	0.83	102
2031 PM + Dev Sens.	0.81	74	1.12	424	1.07	232	1.08	272

Table 13.4.42 - SATURN Results: Junction 11 AM & PM Peak Hours (Tuam Road)

The above results indicate that the proposed development will have minimal impact on this newly-upgraded junction. No significant increase in congestion through the junction is expected to be caused as a result of the proposed development. Although the junction will operate above capacity, the impact the proposed harbour development will have on the junction is low. As the

SATURN model indicates that port-related traffic in 2031 will account for 1.9% of existing vehicular movements in the AM peak hour, and 1.1% of existing vehicular movements in the PM peak hour compared to existing traffic volumes, it is therefore demonstrated that traffic generated by this development does not exceed the thresholds outlined by the NRA at this junction. As Ffont junction is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the N6 / Bóthar na Mine / Ballybane Road traffic signals junction (formerly Morris Roundabout) for the AM and PM peak hours are provided below in Table 13.4.43.

SATURN Results: Junction 12 AM & PM Peak Hours								
	Arm A – Bothar na Mine		Arm B – N6 East		Arm C – Ballybane Road		Arm D – N6 West	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.09	20	1.03	100	1.00	72	1.02	83
2011 PM	0.40	23	0.53	20	0.25	18	0.36	18
2011 AM + Dev	0.10	20	1.03	89	1.01	99	1.02	89
2011 PM + Dev	0.42	24	0.53	20	0.26	18	0.37	18
2016 AM	0.85	162	0.98	82	0.90	143	0.89	124
2016 PM	0.90	72	0.73	97	0.74	66	0.74	125
2016 AM + Dev	0.89	176	0.98	82	0.92	151	0.93	140
2016 PM + Dev	0.90	70	0.74	97	0.78	68	0.75	125
2016 AM + Dev + Other	0.92	186	0.97	76	0.95	169	0.95	64
2016 PM + Dev + Other	0.90	72	0.78	92	0.82	72	0.76	128
2021 AM	0.88	176	1.00	92	0.93	156	0.94	136
2021 PM	0.94	80	0.81	98	0.72	65	0.84	111
2021 AM + Dev	0.91	183	1.00	92	0.94	160	0.95	146
2021 PM + Dev	0.93	79	0.81	94	0.77	68	0.82	111
2021 AM + Dev + Other	0.93	194	0.98	81	0.92	150	0.95	159
2021 PM + Dev + Other	0.96	87	0.88	92	0.85	77	0.84	142
2031 AM	0.98	212	1.00	92	0.92	152	1.00	170
2031 PM	1.00	108	0.83	93	0.81	71	0.86	90
2031 AM + Dev	0.99	218	0.98	82	0.92	153	1.01	182
2031 PM + Dev	0.99	102	0.86	94	0.84	75	0.85	81
2031 AM + Dev + Other	0.99	218	0.97	75	0.88	135	1.01	191
2031 PM + Dev + Other	1.00	113	0.91	59	0.82	73	0.86	105
2031 AM + Dev Sens.	0.99	219	0.98	81	0.93	155	1.01	182
2031 PM + Dev Sens.	0.99	101	0.86	94	0.84	76	0.84	80

Table 13.4.43 - SATURN Results: Junction 12 AM & PM Peak Hours (Ballybane)

The above results indicate that the proposed development will have minimal impact on the Morris Junction. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development. As Morris Junction is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the Lynch Junction for the AM and PM peak hours are provided below in Table 13.4.44.

SATURN Results: Junction 13 AM & PM Peak Hours								
	Arm A – R339 (NE)		Arm B – N6 South East		Arm C – R339 (SW)		Arm D – N6 West	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.17	20	0.87	22	1.10	291	0.34	19
2011 PM	0.40	22	0.29	19	0.21	20	0.45	20
2011 AM + Dev	0.17	20	0.87	22	1.11	308	0.34	19
2011 PM + Dev	0.42	23	0.29	19	0.21	20	0.46	20
2016 AM	0.99	132	0.99	60	1.10	344	1.01	113
2016 PM	1.08	272	0.99	118	0.95	123	1.05	174
2016 AM + Dev	0.99	132	0.99	59	1.10	350	1.02	133
2016 PM + Dev	1.08	278	1.00	116	0.95	122	1.05	170
2016 AM + Dev + Other	1.00	146	1.00	63	1.11	364	1.02	134
2016 PM + Dev + Other	1.09	293	1.01	138	0.96	129	1.06	194
2021 AM	1.17	445	0.95	57	1.13	404	1.03	160
2021 PM	1.11	330	1.00	117	1.05	254	1.14	334
2021 AM + Dev	1.17	451	0.95	55	1.16	453	1.05	184
2021 PM + Dev	1.11	329	1.01	126	1.06	260	1.14	334
2021 AM + Dev + Other	1.18	465	0.95	53	1.15	215	1.04	183
2021 PM + Dev + Other	1.12	339	1.03	162	1.06	273	1.14	340
2031 AM	1.25	597	0.93	68	1.17	482	1.07	225
2031 PM	1.12	342	0.99	115	1.12	374	1.20	449
2031 AM + Dev	1.26	610	0.93	66	1.17	479	1.07	233
2031 PM + Dev	1.12	345	1.00	115	1.13	397	1.20	451
2031 AM + Dev + Other	1.27	621	0.94	63	1.16	457	1.07	231
2031 PM + Dev + Other	1.13	354	1.02	157	1.13	397	1.21	462
2031 AM + Dev Sens.	1.26	611	0.93	65	1.17	479	1.07	233
2031 PM + Dev Sens.	1.12	344	1.00	115	1.13	399	1.20	448

Table 13.4.44 - SATURN Results: Junction 13 AM & PM Peak Hours (Ballybrit)

The above results indicate that the proposed development will have minimal impact on Lynch Junction. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development.

As Lynch Junction is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the N6 / M6 Roundabout for the AM and PM peak hours are provided below in Table 13.4.45.

SATURN Results: Junction 14 AM & PM Peak Hours						
	Arm A – N6 North		Arm B – To M6		Arm C – N6 South	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.20	17	1.02	67	1.09	293
2011 PM	0.28	17	0.15	19	0.20	17
2011 AM + Dev	0.21	17	1.02	68	1.11	338
2011 PM + Dev	0.28	17	0.15	19	0.20	17
2016 AM	0.23	17	1.02	66	1.16	433
2016 PM	0.30	17	0.27	19	0.18	17
2016 AM + Dev	0.24	17	1.02	64	1.12	378
2016 PM + Dev	0.30	17	0.28	19	0.19	17
2016 AM + Dev + Other	0.24	17	1.02	64	1.12	367
2016 PM + Dev + Other	0.29	17	0.28	19	0.19	17
2021 AM	0.22	17	1.02	65	1.24	596
2021 PM	0.36	17	0.25	19	0.18	17
2021 AM + Dev	0.23	17	1.02	63	1.23	585
2021 PM + Dev	0.38	17	0.26	19	0.18	17
2021 AM + Dev + Other	0.22	17	1.02	63	1.23	587
2021 PM + Dev + Other	0.38	17	0.26	19	0.19	17
2031 AM	0.22	17	1.02	60	1.29	736
2031 PM	0.38	17	0.16	18	0.20	17
2031 AM + Dev	0.23	17	1.01	59	1.24	690
2031 PM + Dev	0.40	17	0.18	18	0.20	17
2031 AM + Dev + Other	0.22	17	1.01	59	1.27	745
2031 PM + Dev + Other	0.40	17	0.17	18	0.20	17
2031 AM + Dev Sens.	0.23	17	1.01	59	1.21	646
2031 PM + Dev Sens.	0.40	17	0.18	18	0.20	17

Table 13.4.45 - SATURN Results: Junction 14 AM & PM Peak Hours (N6 Motorway)

The above results indicate that the proposed development will have minimal impact on the existing N6 / M6 Roundabout. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development. As N6 / M6 Roundabout is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

The analysis results for the Martin Roundabout for the AM and PM peak hours are provided below in Table 13.4.46.

SATURN Results: Junction 15 AM & PM Peak Hours								
	Arm A – To Galway Clinic		Arm B – Old N6 E		Arm C – R921		Arm D – N6 North East	
Year & Time	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)	V/C Value	Delay (s)
2011 AM	0.01	7	0.27	6	0.11	6	0.19	6
2011 PM	0.06	10	0.30	7	0.26	7	0.43	7
2011 AM + Dev	0.01	7	0.27	6	0.12	6	0.19	6
2011 PM + Dev	0.06	10	0.30	7	0.26	7	0.43	7
2016 AM	0.01	7	0.26	6	0.14	6	0.20	7
2016 PM	0.09	11	0.33	7	0.27	7	0.53	7
2016 AM + Dev	0.01	7	0.26	6	0.14	6	0.19	7
2016 PM + Dev	0.09	11	0.33	7	0.27	7	0.53	7
2016 AM + Dev + Other	0.01	7	0.25	6	0.14	6	0.19	7
2016 PM + Dev + Other	0.14	12	0.35	7	0.28	7	0.53	7
2021 AM	0.01	7	0.24	6	0.16	6	0.20	7
2021 PM	0.12	10	0.32	7	0.29	7	0.47	7
2021 AM + Dev	0.01	7	0.24	6	0.17	6	0.19	7
2021 PM + Dev	0.12	10	0.32	7	0.29	7	0.46	7
2021 AM + Dev + Other	0.01	7	0.24	6	0.16	6	0.20	7
2021 PM + Dev + Other	0.16	10	0.34	7	0.31	7	0.47	8
2031 AM	0.01	7	0.26	6	0.20	6	0.17	7
2031 PM	0.26	10	0.39	7	0.32	7	0.40	7
2031 AM + Dev	0.01	7	0.26	6	0.20	6	0.17	7
2031 PM + Dev	0.25	10	0.39	7	0.33	7	0.40	7
2031 AM + Dev + Other	0.01	7	0.27	6	0.19	6	0.17	7
2031 PM + Dev + Other	0.28	10	0.40	7	0.32	7	0.40	7
2031 AM + Dev Sens.	0.01	7	0.26	6	0.20	6	0.17	7
2031 PM + Dev Sens.	0.25	10	0.39	7	0.33	7	0.40	7

Table 13.4.46 - SATURN Results: Junction 15 AM & PM Peak Hours (Galway Clinic)

The above results indicate that the proposed development will have minimal impact on the existing Martin Roundabout. No significant increase in delay or congestion through the junction is expected to be caused as a result of the proposed development. As Martin Roundabout is outside the area of influence of the development, it is considered that the proposed development has negligible impact on this junction.

13.4.5.3 Haulage Routes

During the operation of the development, it is proposed that designated haul routes will be utilised by HCV traffic accessing the harbour. This is proposed to reduce the impact of HCV movements on roads considered unsuitable for larger vehicles. HCV traffic wishing to access the M6, M17 or M18 will do so using either Wellpark Road) or Dublin Road via Moneenageisha Junction. HCV traffic wishing to access the west of the city can do so either using the R336 for local trips or Bishop O'Donnell Road via Moneenageisha Junction and the Quincentennial Bridge. Drawing Number 2139-2180 outlines the proposed haul routes for operational HCV traffic.

13.4.5.4 Mitigation Measures

As can be seen from the analysis, mitigation measures will be required to reduce the impact of the proposed development on the surrounding road network, as well as improving traffic conditions generally in Galway City. While certain junction improvements may help to improve traffic flow throughout the city, it should be noted that these measures in isolation are unsustainable, and may not encourage the modal shift required by Galway City Council. Therefore, a combined approach of "hard" (i.e. network improvements) and "soft" (i.e. mobility management) measures is considered important to further ensure the effects of the development on the road network are minimised, as well as improving overall traffic conditions, and therefore quality of life, in Galway City as a whole. To this end, it is considered vital for the continued growth of Galway City that the Smarter Travel proposals outlined by Galway City Council will continue to be implemented, for example on the following schemes:

- Bishop O'Donnell Road / Seams Quirke Road – completed September 2012;
- N6 Bóthar Na dTreabh junction improvement schemes (partially completed at the time of completing this chapter; Browne and Kirwan Roundabouts remain to be upgraded to traffic signal junction).

These schemes have improved the reliability of the public transport network, as well as improving road safety to encourage a greater uptake of walking and cycling as a primary travel mode where appropriate.

13.4.5.4.1 General Traffic Management Measures

Galway Harbour Company (GHC) is committed to minimising the potential impact of the proposed development on the surrounding road network. GHC will be proactive in encouraging sustainable modes of transport other than the private car for harbour development access. A Mobility Management Framework which accompanies this application has been developed for the proposed harbour. This framework outlines the principal means of reducing the impact of the development on the surrounding road network. Potential proposals outlined in the framework include the promotion of car-pooling, incentivising the use of public transport, walking and cycling and the staggering of shift patterns to fall outside of network peaks.

It is proposed to restrict haulage operations during the AM and PM peak periods. As the new harbour has the potential to operate 24 hours a day, this restriction is not considered to significantly affect the ability of the harbour to trade successfully.

Where possible, the proposed rail link will also transfer haulage from the road network to the rail network. The completion of the Western Rail Corridor will expand the potential catchment area for rail-based haulage, further ensuring the sustainability of the proposed development.

It is further proposed to implement a Construction Traffic Management Plan, which will aim to reduce the impact of construction traffic on the surrounding road network. This Construction Traffic Management Plan will be developed by the contractor appointed by Galway Harbour Company; however it is recommended that measures such as car pooling / mini bus and incentivising public transport use be promoted for construction workers accessing the site. It is further recommended that construction related deliveries to the site be managed outside of network peak periods where possible.

13.4.5.4.2 Proposed Network Upgrades

As stated previously, the SATURN model results indicate that the proposed development will not significantly impact upon the surrounding city road network. It is therefore considered that the proposed local network upgrade works at the Harbour Road/Lough Atalia Road site access junction and at Lough Atalia Bridge, as outlined in Section 13.4.2.2, will be sufficient to mitigate any significant potential impact of the development on the surrounding road network.

It should also be noted that the proposed mitigation measures outlined in this report have been developed to compliment the Traffic Management measures proposed by Galway City Council for improving traffic flow throughout the city. The proposed upgrade of the site access junction will be future-proofed to ensure compatibility with the city's UTMC system, which will give Galway City Council greater control of traffic movements throughout the city. The design of junctions and access routes, incorporating pedestrian and cyclist facilities and the measures outlined in the Mobility Management Framework also broadly follow Galway City Council's policy of encouraging sustainable modes of transport. This will ensure an integrated approach to city-wide transport planning.

13.4.6 Other Road Issues

13.4.6.1 Road Safety

A review of the Road Collision Data available on the Road Safety Authority Database, within the period 2005 to 2011, recorded two collisions in the vicinity of the proposed harbour junction:

- Minor Collision 2005 was a rear-end collision with a car as a result of a right-turn manoeuvre.
- Minor Collision 2010 was a rear-end collision with a car straight into the back of another car.

Existing HCV manoeuvres are currently constrained along Lough Atalia Road by a height restriction at Lough Atalia Bridge. HCV manoeuvres are restricted to one-way movement through the centre of the bridge, thus resulting in a significant safety risk to approaching motorists. This has the effect of restricting traffic flow during times of moderate two way flow. More importantly it poses a serious risk due to the possibility of collision of high vehicles with the bridge cast iron arch. Records maintained by CIE indicate that such collisions have occurred on a number of occasions down through the years. It is proposed as part of this application to lower the road level of Lough Atalia Road to provide headroom under the structure in excess of the minimum 5.03 metres plus sag compensation as specified in NRA TD27.

The existing harbour access junction is unable to safely accommodate all HCV manoeuvres. Due to its poor geometric arrangement, heavy vehicles are unable to execute certain turning movements without crossing into the lanes of oncoming traffic. In addition vehicles exiting from, or turning right into, the Harbour Road can suffer considerable delays pending the availability of gaps in the traffic stream. The proposed traffic signal-controlled junction, designed in accordance with NRA addendum DMRB TD 50, will significantly improve vehicular manoeuvrability through this junction, reducing the risk of conflict between turning vehicles. The upgrade of the junction to a traffic signal-controlled junction with associated dedicated pedestrian and cyclist facilities will also facilitate safer access to the development for pedestrians and cyclists. Details of this junction layout can be found in Drawing Number 2139-2165.

13.4.6.2 Parking Provision

Galway Harbour Company is committed to ensuring that the Galway Harbour Extension will be as sustainable as possible. To this end, it will be the general policy of GHC to promote alternative modes of transport to the private car within the development. GHC will aim to minimise the amount of car parking provided for the various tenants within the harbour. It is acknowledged that the end users of the harbour and enterprise park may have particular requirements for car parking relating to their uses, and so GHC is committed to consulting with the end users (once identified) and Galway City Council to establishing appropriate car parking levels on a building-by-building basis. In no case will the parking provided for a development exceed the standards set out in the Galway City Development Plan. Any extensions to the enterprise park will be subject to further planning applications and approval from Galway City Council.

112 car parking spaces are proposed for the leisure marinas. This level of car parking is considered appropriate, as it is acknowledged that the potential for modal shift for this element of the development may be limited due to the nature of the activities involved.

It is proposed that adequate facilities for loading and unloading of service vehicles for the cruise liners be provided as part of this development. It is further proposed that suitable facilities for taxis be provided in close proximity to the cruise liner terminal building. These facilities will be limited to encourage non-car-based travel to the city, which is within walking and cycling distance of the cruise liner terminal.

13.4.6.3 Pedestrians and Cyclists

It is acknowledged that a balance between car-based and non-car-based travel is required to successfully achieve a sustainable development. As stated previously, as part of this strategy, car parking will be limited to encourage non-motorised user (NMU) access to the development. However in order to successfully deliver this modal shift, it is essential that adequate facilities be provided for those wishing to access the development by walking and cycling.

The Draft Galway City and Environs Walking and Cycling Strategy 2010 - 2017 suggests that for trips within 2km of a person's destination, walking and cycling is seen as a viable mode of transport. A number of large residential areas, including large sections of the city centre, Renmore and Claddagh fall within this catchment area. Key transportation hubs, such as Eyre Square and Ceannt Station, are also located within 2km of the proposed port. As such, with the provision of appropriate facilities, walking and cycling have the potential to be a major mode of transport to and from the proposed port, be it for those who live within close proximity of the port, or those who commute into the centre city via public transport. The cruise liner terminal, which is located approximately 1.7km from Eyre Square, is also well within walking and cycling distance for those wishing to access the city centre.

The proposed development has been designed to maximise the permeability of the site for pedestrians and cyclists accessing the development. A number of pedestrian and cyclist links are proposed throughout the development in order to provide links along the various desire lines to different areas of the development. On-site pedestrian and cyclists facilities are proposed to provide a NMU-friendly environment, and to facilitate safe NMU movement between the development and Galway City Centre. Pedestrian and cyclist links are also proposed between the new harbour, Galway Harbour Village and CSQ, which will allow for ease of movement between the development and the proposed transport hub.

It is further proposed to facilitate a future pedestrian and cyclist link between the Harbour and Renmore, thus providing an additional mode of transport between the harbour and a heavily-populated residential area.

Details of the proposed cycle lanes can be found in Drawing Number 2139-2132.

All junction upgrades have been designed, where possible, to safely accommodate both cyclist and pedestrian movement. Pedestrian and cyclist routes will be well-lit and secure to ensure the perception of these routes as being safe for those wishing to use them.

It is recommended that secure bicycle parking facilities be provided for each element of the proposed harbour to cater for the anticipated demand. The location of these parking spaces should be close to the various access points within the development, with sufficient scope to extend this parking as demand increases. Ancillary facilities, including lockers, changing and shower facilities should also be provided to encourage this mode of transport.

It is proposed to include a 'wayfinding' information sign within the cruise terminal area and within the Marina area. The detail of this sign will be consistent with 'wayfinding' signs proposed by Galway City Council. This sign will show all the local destinations within walking distance of the harbour.

13.4.6.4 Public Transport

The proposed site is well-positioned to capitalise on existing and proposed public transport services in Galway city and its environs. It is located within close proximity to Ceannt Station, the main bus and train station in Galway City. It is also within walking distance of the private coach station on Fairgreen Road. Eyre Square currently acts as the main interchange for local bus services in Galway City, and is within easy access of the proposed harbour by foot. As such, and

when taking into consideration the proposed rail link into the development, the proposed harbour is positioned to be as sustainable a development as possible from a transportation perspective.

Due to the proximity of the new bus depot in the existing Galway Harbour Enterprise Park, it is recommended that consideration be given to the provision of a shuttle service between the transport hubs and the proposed Enterprise Park in order to further maximise the take-up of public transport, particularly during periods of bad weather.

13.4.6.5 Access for People with Disabilities

It is proposed that dished kerbing and tactile paving slabs are installed at all crossing points, in accordance with "Guidance on the Use of Tactile Paving Surfaces".

It is also recommended that disabled parking spaces in accordance with the Galway City Development Plan and the NDA's "Building for Everyone" be provided within the development. This standard requires 5% of the total car parking capacity to be designated as disabled parking spaces. It is recommended that these parking spaces be located adjacent to the various points of entry to the buildings within the development.

13.4.6.6 AutoTrack Analysis

AutoTrack analysis, a computer program used to predict the swept path of steered vehicles, was carried out at the site access junction in order to ensure that the proposed design can accommodate the expected vehicles types that are to be generated. For the purposes of this design, a maximum legal articulated vehicle was used in the AutoTrack analysis. Drawing Number 2139-2173 highlight this analysis carried out at the junction. AutoTrack analysis was also carried out on the internal site junctions, which is highlighted in Drawing Numbers 2139 - 2174 to 2139-2177.

13.4.7 Conclusions and Recommendations

13.4.7.1 Conclusions

The conclusions of this report are as follows:

- The existing site access junction is expected to operate above the desired 0.85 V/C value.
- The proposed upgraded traffic signal-controlled site access junction will operate within capacity up to and including the design year of 2031;
- The proposed development will have minimal impact on the surrounding road network, including the N6 corridor.
- The area of influence of the new port was determined based on the 5% threshold guide set by the NRA Traffic and Transport Assessment Guidelines. As the development generates a maximum of 3.9% more traffic through Junction 3, then this junction is considered to fall outside the area of influence of the development.
- With the combination of minor network upgrade works and the implementation of an effective mobility management strategy, the proposed harbour will not significantly impact on the surrounding road network, particularly during network peak periods.
- Proposed junction upgrades have been designed in accordance with the NRA DMRB and the Design Manual for Urban Roads and Streets, and an AutoTrack analysis has been carried out to ensure that the junction will cater for large harbour related vehicles.
- The lowering of the vertical profile of Lough Atalia Road under the railway bridge to provide headroom in excess of the minimum 5.03 metres plus sag compensation will facilitate 2-way HCV movement under the bridge, thus improving road safety in general at this location;
- The provision of a rail link with the main Galway to Dublin rail line will facilitate sustainable haulage methods to and from the site. The extension of the Western Rail Corridor will increase the potential catchment area for such services;
- The design of the proposed development has been developed to facilitate a greater degree of accessibility to the development for pedestrians and cyclists, complimenting proposals outlined for adjacent developments as well as Galway City Council's roads and transportation policy aims.

13.4.7.2 Recommendations

This report recommends that:

- The lowering for the vertical profile of Lough Atalia Road, in conjunction with GCC and CIE approvals, is carried out at the commencement of construction activities.
- A Mobility Management Plan, based on the prepared Mobility Management Framework, be developed following identification of all tenants within the development;
- Mobility Management measures be implemented as part of the Construction Traffic Management Plan, to be developed by the appointed contractor;
- Consideration be given to the provision of a shuttle service between main transport hubs and the proposed Enterprise Park;
- Appropriate levels of secure bicycle parking facilities be provided within the development;
- Disabled parking spaces in accordance with the Galway City Development Plan and NDA's "Building for Everyone" to be provided on site.