

## 7 Roads and Traffic

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### 7.1 Introduction

This section of the EIAR identifies and evaluates the likely significant effects of the traffic generated by the proposed Ringaskiddy Resource Recovery Centre (RRRC), both during its construction and operational phases.

This section describes the existing traffic situation in the area surrounding the site and provides a description of the local road network. Existing traffic levels are quantified and existing facilities for public transport, cyclists and pedestrians are described.

Brief details of the proposed development are provided, and the trip generation and distribution methodologies are explained. The effect of the generated traffic on the local road network is assessed, and mitigation measures which Indaver intend to include in their development proposals are investigated where necessary.

It is clear from the extensive consultations which Indaver have carried out with both the local community and the statutory authorities that traffic congestion on the main N28 approaches to Ringaskiddy and to the site, and how this congestion should be managed during the peak hours is a priority.

Indaver welcomes the recent grant of planning permission for the N28 upgrade and the pending implementation of the proposed improvements to the Dunkettle Interchange, although these are not necessary for this project. Whilst these road upgrades will facilitate the free flow of all strategic traffic when complete, Indaver also recognise that peak hour capacity on the strategic road network will require ongoing management into the future to ensure that the corridor continues to have capacity during peak periods.

Accordingly, the minimisation of commuting traffic during the morning and evening peak periods will continue to be an overriding prerogative of the road authorities and strategic road users as indicated in consultations with the road authority in relation to the N40 demand management study and the pending Cork Metropolitan Area Transport Strategy.

Consequently, Indaver has approached the design, construction and operation of the RRRC on the principle of minimising traffic at peak periods through the implementation of a HGV booking system, and the arrangement of operational personnel shifts and visitor traffic so that the facility generates minimal traffic on the local road network during the peak traffic periods once operational. These initiatives are similar to those developed at the Port of Cork as part of their approach to management of traffic flow at peak times. Furthermore, a robust staff Mobility Management Plan will ensure that there are no staff movements to or from the facility for two-hour periods in the morning and evening by car, while HGV movements will also be reduced to a minimum level during these times.

In addition, Indaver will arrange construction contracts such that all construction travel to and from the site will be controlled and managed and will not be permitted to access the site during the peak traffic periods, except in situations of emergency.

Indaver is aware of the concerns, previously expressed by the community at the consultations, in relation to the provision of enhanced active mode travel facilities including improved footpaths, cycle facilities and controlled safe road crossing points. Indaver understands that the local authority is developing proposals for the provision of improved cycle facilities as part of the Cork Cycle Network, and improvements to the junctions at Shannon Park and Raffeen Bridge are currently under construction.

In this regard, and as referenced elsewhere in this EIAR the Indaver facility in Meath contributes to a Community Benefit Fund as part of the planning conditions of that facility. This fund, which is managed independently by a representative group including local authority and community representatives has contributed to footpath improvements, enhanced public lighting and other related safety features and community and sports projects in the Duleek area.

Condition 19 of the existing planning permission for the RRRC requires that such a fund be established and the local community in Ringaskiddy will benefit from the distribution of this fund annually for local projects including new facilities and upgrades to existing facilities.

## 7.2 Assessment Methodology

The methodology used to carry out the transport assessment can be summarised as follows:

- Step 1 – Assess the existing traffic situation;
- Step 2 – Define the traffic flows underpinning the assessment;
- Step 3 – Define the traffic generation effects of the proposed development;
- Step 4 – Assess the effect of the traffic generated on the local road network;
- Step 5 – Identify mitigation measures to form part of the development proposals; and
- Step 6 – Identify residual effects which remain present after mitigation is considered.

These steps are described in greater detail below.

Step 1 assesses the existing traffic situation:

- Existing traffic operations in the Ringaskiddy area have been observed, particularly at junctions; and
- 18-hour traffic counts (06:00-00:00) were undertaken on all relevant roads and junctions on Tuesday January 29<sup>th</sup> 2019 and form the basis of subsequent analysis.

Step 2 defines the assessment base case figures:

- An opening year for the proposed development of 2023 is assumed, and therefore the peak construction period is assumed to occur in 2022;

- Background traffic growth rates were obtained from the 'Transport Infrastructure Ireland Project Appraisal Guidelines (2016)' for the Cork City and County area; these growth rates were used to increase 2019 traffic levels to the future years for analysis – a construction year of 2022, an opening year of 2023 and future years of 2028 and 2038; and
- In addition to growth of background traffic, which will ensure that other potential developments in the Ringaskiddy area are accounted for, a specific additional allowance was included in the assessment for the Port of Cork expansion proposals at their Ringaskiddy site, based on traffic flow information contained in the relevant submitted planning documentation.

Step 3 defines the traffic generation characteristics of the proposed development:

- An appraisal of the traffic generation during the construction phase is undertaken, split into three categories: heavy goods vehicles (HGV) traffic, workforce traffic and general site traffic. This includes for construction of the facility itself and any ancillary construction processes which may occur in tandem, such as the proposed L2545 road upgrade on the local road network adjacent to the site, for example;
- An assessment of the traffic generation during the operational phase is also undertaken, split into two categories: HGV traffic generated by the proposed RRRC and car traffic generated by the workers commuting to the site and by visitors to the site; and
- Both the construction and operational phase traffic are distributed onto the road network in accordance with expected origins and destinations.

Step 4 assesses the effect of the traffic generated by the proposed development on the local road network:

- All traffic flows are converted from vehicles to passenger car units (PCUs). A PCU is a common unit used in traffic modelling to ensure that larger vehicles such as HGVs are proportionally represented when compared with general traffic. When converting vehicles to PCU, a factor of 1.0 is used for cars, while a factor of 2.3 is used for HGVs. This ensures that the effect of HGVs on sensitive junctions is correctly examined during the traffic modelling process;
- Whilst there are identified morning and evening peak hours on the local road network (08:00-09:00 and 16:45-17:45 respectively), these morning and evening peak hours are accompanied by warm-up and cool-down periods where traffic increases to the peak hour and decreases thereafter, in a form of 'peak-spreading'. Observations on-site and discussions with the local authority have indicated that therefore there are two-hour morning and evening periods (from 07:00-09:00 and from 16:00-18:00) where traffic conditions on the local road network are such that the network is sensitive to congestion and delay due to its volatility;

- There are three distinct times associated with this traffic assessment; firstly, there are the existing morning and evening peak hours on the network (08:00-09:00 and 16:45-17:45), secondly the morning and evening peak hours at the site during the construction phase (06:00-07:00 and 18:00-19:00), and finally the operational morning, afternoon and evening peak hours at the development itself once opened (06:00-07:00, 14:00-15:00 and 18:00-19:00);
- The actual numerical and relative percentage increases in traffic on all relevant roads during the morning (AM) and evening (PM) construction peak periods associated with the proposed development (in the 2022 construction year) are assessed and reported;
- The actual numerical and relative percentage increases in traffic on all relevant roads during the AM and PM network peaks and the development peak when the proposed development would become operational (opening year 2023) are assessed and reported;
- Subsequent future year scenarios, both 5 and 15 years post-opening (2028 and 2038) are also included for assessment and reporting;
- The effects on junction capacity at all relevant junctions of the traffic generated during both the construction phase and the operational phases are assessed and reported; and
- The junction capacity assessments were carried out using industry-standard assessment software ARCADY and PICADY, for roundabouts and priority junctions, respectively.

Step 5 identifies mitigation measures to be included within the development proposals that would serve to reduce the effect of traffic generated by the proposed development.

The sixth and final step is to identify any net residual effects associated with traffic generated by the proposed development, taking into account the mitigation measures considered in Step 5.

## 7.3 Receiving Environment

### 7.3.1 General

Ringaskiddy is situated on a peninsula to the south east of Cork City. The area is characterised by a number of major industrial facilities, some small residential areas, the Port of Cork, a deep-water berth, the headquarters of the Irish Naval Service and the National Maritime College of Ireland. The site of the proposed RRRC is shown in relation to the local road network in **Figure 7.1**.

In recent years the Ringaskiddy area has experienced moderate but steady levels of industrial growth, with some further growth likely in the future, including a significant expansion of operations at the Port of Cork. Historically, the increase in industrial growth has in the past led to a significant increase in traffic within the Ringaskiddy area.

### 7.3.2 Existing Road Network

The N28 national primary route links Ringaskiddy to Cork City and beyond. It is the major route into and out of Ringaskiddy and has been designed to accommodate high volumes of traffic, serving the ferry port and the various industrial developments in the area. The roadway, however, does experience congestion during peak periods.

The R613 links Ringaskiddy with Carrigaline and gives access to a number of industrial facilities along its route. However, certain sections of the R613, particularly between Coolmore and Carrigaline are narrow with substandard alignment in parts, reducing heavy goods vehicle (HGV) accessibility.

The R610 links the Ringaskiddy area with the residential areas of Passage West and Monkstown, and the cross-river ferry to Cobh and Great Island.

### 7.3.3 Existing Junctions

Road network congestion and capacity in urban and industrialised areas is generally associated with the junctions on the road network. The following junctions were examined during the morning, afternoon and evening peak periods to assess their present operational capacity. The locations of the junctions can be seen in **Figure 7.2**.

1. Shannon Park Roundabout;
2. Raffeen Bridge Junction;
3. Shanbally Roundabout, and the adjacent T-junction with Raffeen Road;
4. Barnahely Road Junction (N28/R613);
5. Ferry Port Access; and
6. Proposed Indaver Site Access.

The above junctions were analysed using 'Junctions 9', the suite of computer applications designed by the Transport Research Laboratory (TRL) in the UK. Within Junctions 9, the PICADY module is used to model priority-controlled junctions and the ARCADY module is used to model roundabouts. The assessments were carried out using Year 2019 traffic flow information as the base year for a number of time periods, as set out in Table 7.1 below.

**Table 7.1 Assessment Scenarios for Modelling**

Scenario	Construction Peaks /Operational Peaks			Existing Network Peaks	
	06:00 - 07:00	14:00– 15:00	18:00– 19:00	08:00– 09:00	16:45– 17:45
2019 Base Year	✓	✓	✓	✓	✓
2022 Construction Year	✓		✓		
2023 Opening Year	✓	✓	✓	✓	✓
2028 Opening Year + 5	✓	✓	✓	✓	✓
2038 Opening Year + 15	✓	✓	✓	✓	✓

The results of the above analysis of the existing traffic scenario are shown in **Appendix 7.1**.

### 7.3.4 Traffic Characteristics on N28 Road Network

Traffic flow on the N28 between the Shannon Park roundabout and the proposed Indaver site is quite tidal in nature. Heavy traffic flows arrive from Cork travelling to Ringaskiddy in the morning peak, with heavy returning flows from Ringaskiddy to Cork and Carrigaline in the evening peak. In addition, there is a large Carrigaline-Cork traffic movement in the AM peak and a converse Cork-Carrigaline movement in the PM peak.

During the morning and evening peaks, in some instances on the local road network, these heavy flows are not in conflict – for example the heavy Cork-Ringaskiddy and Carrigaline-Cork flows in the AM peak do not conflict at the Shannon Park roundabout. In other instances, however, there are large flows of traffic in direct conflict which can lead to queuing and delay – for example, in the PM peak the heavy Ringaskiddy-Cork and Cork-Carrigaline flows are in direct conflict at the Shannon Park roundabout, leading to queuing and delay developing frequently over the evening peak period, particularly on the approach from Ringaskiddy.

The two most critical junctions on the local road network are the roundabouts at Shannon Park and Shanbally. As outlined below, there have been numerous upgrades proposed at these junctions in recent years, intended to improve junction performance in the interim while the N28 upgrade was progressing through the design and planning processes.

Despite the recent grant of planning approval and the inclusion of the N28 upgrade in the recent Capital Investment Program, nevertheless some form of junction improvement is still necessary at specific locations on the local road network in the interim. There are ongoing improvement works at a number of locations on the N28 between Shannon Park roundabout and the proposed development site; these are detailed in the following sections.

### 7.3.5 Shannon Park Roundabout

This large roundabout junction links the N28, the major route serving Ringaskiddy, with the R611 Carrigaline Road. The roundabout provides localised widening to facilitate two-lane entries on all approaches. Typically, some queuing is experienced on the approaches, particularly from the Ringaskiddy direction during the evening peak period. Some slow-moving queuing is also common on the southbound approach from Cork in the morning peak period.

Cork County Council have prepared an upgrade proposal for the roundabout, which will comprise the following works:

- The provision of an additional lane on the N28 approach from the north to allow two straight ahead lanes for traffic moving from the to the R611. The additional lane will be approximately 120m in length;
- The widening of the R611 exit to accommodate two lanes, merging to a single lane after 130m;

- The provision of an additional lane on the N28 approach from the east to allow two lanes to turn from the N28 eastern approach to the northern exit whilst also providing a dedicated left turn lane for traffic travelling to Carrigaline (i.e. a total of three entry lanes at this arm). The additional lane will be approximately 60m in length;
- Widening the N28 northern approach exit to accommodate two lanes, merging to a single lane after 130m; and
- Upgrade and extension of shared pedestrian/cycle facilities at the roundabout.

These works, although localised will constitute a significant improvement to the junction operation by maximising the number of traffic lanes for the dominant movements, and by facilitating the heavy Cork-Carrigaline and Ringaskiddy-Cork movements with two dedicated entry lanes and two circulatory lanes. This scheme is currently substantially complete (as of end June 2019) and is expected to be fully complete in mid-July 2019.

### 7.3.6 Raffeen Bridge Junction

This is a priority junction connecting the R610 with the N28. On the R610, another priority junction is located roughly 50m to the north of the Raffeen Bridge N28/R610 junction. This junction links the R610 with the L2470 local road. The local road and the R610 provide an alternative route for traffic from the Douglas area to travel to Ringaskiddy, avoiding queues on the N28 and at the Shannon Park Roundabout. Due to heavy queuing and delay on the N28 in the vicinity of Shannon Park roundabout in the morning and evening peak periods, a notable proportion of traffic uses these alternative routes to and from the Ringaskiddy area.

At the Raffeen Bridge junction, the N28 has dedicated “left-turn in” and “right-turn in” lanes, allowing vehicles access to Raffeen Bridge without disrupting through-traffic. Additionally, a left-turn filter lane allows traffic exiting from Raffeen Bridge to merge with eastbound N28 traffic.

As with Shannon Park roundabout, Cork County Council have developed an upgrade proposal for this junction, comprising the following:

- Narrowing of the carriageway by removing the deceleration lane for traffic entering the R610 and removing the acceleration lane for traffic exiting the R610;
- The provision of a shared/footpath cycle lane on each side of the road;
- The provision of pedestrian/cycle crossing points across both the N28 and R610;
- Upgrade of public lighting lanterns to current standards; and
- Gateway treatment, consisting signage and central concrete island, at either side of the junction in line with relevant design guidance.

As above, this scheme is also currently substantially complete (as of end June) and is due to be fully completed in mid-July 2019.

It must be noted that unlike the improvement works at Shannon Park roundabout, the proposed upgrade works at Raffeen Bridge are primarily intended to act as traffic calming improvements, and therefore these works are expected to have the effect of reducing the vehicular capacity of the junction.

### 7.3.7 Shanbally Roundabout and adjacent T-Junction

These junctions operate as two separate junctions. The first junction is a priority-controlled T-junction linking the N28 to Raffeen via the L6473 local road (known as Curragh Hill) and the second junction is a roundabout junction providing a link via the L2492 between the N28 and the R613 at Coolmore Crossroads.

Curragh Hill is a rural road which facilitates localised routing for vehicles approaching the N28 from the north to access the route. Similar to the junction at Raffeen Bridge, this junction allows traffic to avoid congestion at Shannon Park roundabout and at Raffeen Bridge itself in the morning and evening peak periods. There is also a local shop and deli to the north of the N28 in the vicinity of the junction with Curragh Hill.

In the morning peak period, heavy traffic flow through the roundabout on the N28 mainline affords little or no opportunity for traffic to exit the T-junction to the N28, leading to some queuing and delay on this approach.

A ghost island arrangement on the N28 at the priority junction allows for the storage of two right-turning vehicles without disrupting westbound traffic following behind. Visibility from the minor arm of the priority junction is also below standard due to the presence of buildings either side of the route on its approach to the N28, although this improves in the immediate vicinity of the STOP line as the minor arm is then clear of adjacent buildings.

The roundabout at Shanbally, which is approximately 25m to the east of this priority junction experiences congestion in peak conditions, with slow-moving queues of eastbound traffic often extending back for a considerable distance in the morning peak period. In the evening peak period, heavy returning traffic flow from Ringaskiddy and from Curraghbinny to the south arrive at the roundabout, leading to some queuing and delay; again, these are typically slow-moving queues.

Due to the location of the central circular island, the roundabout junction also suffers from pronounced entry deflection on the N28 approach from Ringaskiddy which leads to reduced vehicle speeds entering the junction (particularly HGVs), while conversely, the lack of entry deflection on the N28 approach from the west leads to higher entry speeds.

### 7.3.8 Barnahely Road Junction (N28/R613)

This priority junction links two heavily-trafficked routes in the area and is located to the west of Ringaskiddy Village. Problems are caused by high volumes of traffic and the proximity of the nearby deep water berth access road which has a high proportion of HGV traffic and steep approach gradients.

The R613 flares on its approach to the junction to allow two vehicles to queue at the stop line.

The width of the N28 allows vehicles waiting to turn right onto the R613 to queue in a dedicated right-turning facility without disrupting eastbound traffic.

To the immediate east of the junction at Barnahely lies the existing access junction to the Port of Cork deep water berths. It is noted that this junction is currently being upgraded (as of February 2019) to realign the Port of Cork access junction and amalgamate it with the Barnahely Road junction to create a crossroads.

### 7.3.9 Ferry Port Access

This is a five-arm priority junction of the N28, the Ferry Port access road and local roads to the Loughbeg area. The N28 continues north from this junction into to the Port. Beyond the Ferry Port junction, the road continues eastwards as the L2545 local road to the Naval Base, via the eastern part of Ringaskiddy and Haulbowline Bridge. The Ferry Port access arm of the junction flares to allow two vehicles to wait at the stop line. The width of the N28 at this point allows right turning vehicles to queue without disrupting through traffic. The Ferry Port junction does not experience congestion during peak periods.

### 7.3.10 Existing Provision of Alternative Modes of Transport

The proposed Indaver site is currently served by the Bus Éireann Cork City 223 and 223X Services.

The 223 service departs the City Centre from the South Mall and makes numerous stops along its route, including in Douglas, Rochestown, Passage West, Monkstown and Shanbally Village, with the terminus at Haulbowline. There are currently two existing bus stops on the N28 at the National Maritime College of Ireland, in close proximity to the Indaver site.

Services commence at 06:50. There are 2 scheduled services in the AM Peak which arrive at the site before 09:00, and 5 scheduled services which pass the site towards Cork after 17:30. Scheduled travel time to the Indaver site from the South Mall is identified in the route timetable as 52-61 minutes in the AM peak (where multiple stops along the route are served), and the return journey in the PM Peak is stated to be 42-52 minutes.

The 223X service departs the City Centre from the South Mall and makes numerous stops en route to Haulbowline, including in Douglas, at Shanbally and Ringaskiddy Village. The 223X is an earlier-morning service than the 223 but is primarily a more direct service to and from Haulbowline, with morning and evening services only, and no weekend services. Morning services depart the City Centre at 06:15 and 06:45, and a single evening service departs Haulbowline at 19:10. Journey time from the City Centre to the Indaver site via this service in the morning peak is indicated in the timetable as 36-47 minutes, and journey time from the site to the City Centre in the evening peak is stated as 30 minutes.

In addition to the above existing bus services, a new bus service is due to commence in mid-2019 linking Ringaskiddy to Cork Airport, serving Carrigaline and Ballygarvan as intermediate stops.

### 7.3.11 Walking and Cycling

There is a footpath along the northern side of the L2545 adjacent to the proposed development which connects the National Maritime College of Ireland site back to Ringaskiddy village (note this footpath also continues east towards Haulbowline). There are footpaths located on both sides of the road through Ringaskiddy village. There are no dedicated cycle facilities in the local area.

## 7.4 Proposed Road Infrastructure Upgrades

There are a number of major infrastructural projects planned for the Cork region, which are at varying levels of progress. The most significant of these are the M28 Motorway Upgrade Scheme and the Dunkettle Interchange Upgrade Scheme.

### 7.4.1 M28 Cork to Ringaskiddy Motorway Scheme

The N28 Cork-Ringaskiddy route lies on the strategic TEN-T European Network of corridors which provide connectivity to key strategic areas, such as the Port of Cork site at Ringaskiddy. As a result, it is proposed to upgrade the N28 from its junction with the N40 at the Bloomfield Interchange to its terminus in Ringaskiddy Village. The upgraded M28 scheme will significantly enhance the level of accessibility to the Ringaskiddy area and will remove a substantial amount of traffic from the existing road network in the area, bypassing numerous settlements such as Ringaskiddy Village itself, Shanbally Village and the Shannonpark Roundabout, for example.

The proposed upgrade will comprise a combination of on-line upgrade work on the existing N28 between the Bloomfield Interchange to the north and Carr's Hill, and new off-line infrastructure to the west and south of the existing N28 alignment between Carr's Hill and Ringaskiddy.

Along the N28 between Shannon Park and Ringaskiddy, the proposed motorway will have an interchange at Shannon Park (which will include the existing roundabout), at Shanbally (to the south-east of the existing roundabout, with a connecting road to the existing N28 to the east of Shanbally Roundabout), and new roundabout junctions are proposed at Barnahely (to the south of the existing N28/Barnahely Road junction), at Loughbeg (a new roundabout to the south of the Ferry Port Access junction) and Ringaskiddy (a new roundabout junction to facilitate access to the proposed service station at the Port of Cork lands).

The motorway scheme was submitted for planning in June 2017, was subject to an Oral Hearing and was granted planning permission in June 2018. Judicial review proceedings have been initiated following the grant of permission, and as such the scheme has not progressed beyond the planning approval stage. The upgrade scheme has been included in the recent Government Capital Investment Programme, which covers infrastructural projects in the period to 2021, and the recently-published National Planning Framework (2040) identifies enhanced connectivity to Ringaskiddy Port as a key future growth enabler for Cork.

It is envisaged that the scheme may be delivered by 2023 (the EIAR recently submitted by the Port of Cork assumed that the M28 motorway scheme would be in place by 2023), however at this time the scheme has not commenced construction and therefore there is no certainty to this delivery date.

As part of this assessment, in order to ensure a robust, 'worst-case' scenario, the M28 motorway scheme has not been included for in the future year analysis scenarios, as the junctions on the local road network are expected to see a significant reduction in traffic flow due to the anticipated diversion of strategic traffic to the new M28 alignment.

Post-construction, it is anticipated that the M28 scheme will provide significant relief to the local road network in the vicinity of the site and will allow staff and delivery vehicles to and from the Indaver site to avoid travelling through the numerous local settlements along the route.

### 7.4.2 Dunkettle Interchange Upgrade Scheme

It is proposed to upgrade the Dunkettle Interchange to achieve full free-flow for traffic through the interchange. This will significantly improve the performance of the interchange, and in the wider area it will also improve traffic flow through the Jack Lynch Tunnel from the south via the N40. The scheme was granted planning permission in 2013. As with the M28 upgrade, the scheme has been included in the recent Government Capital Investment Programme and the National Planning Framework.

Site clearance works are almost complete, site investigation works are expected to conclude in early 2019 and the construction stage is expected to commence in the second half of 2019. However, similar to the M28 upgrade scheme, the Dunkettle Interchange upgrade scheme has not been included in this assessment in order to ensure a robust, 'worst-case' scenario is considered.

### 7.4.3 Cork Metropolitan Area Transport Strategy (CMATS)

The National Transport Authority (NTA), in conjunction with Cork City Council, Cork County Council and Transport Infrastructure Ireland (TII) are currently developing a transport strategy for the Cork Metropolitan Area, to cover the period from 2018-2040.

The CMATS will address all transport modes and will provide a long-term strategic planning framework for the integrated development of transport infrastructure and public transport services in the Cork Metropolitan Area over the next two decades. The CMATS will also guide transport investment levels and prioritisation over the short term and long term and will inform sustainable land use and transport policy formulation at the strategic and local level, including the Ringaskiddy area, with an emphasis expected to be placed on increasing the number and frequency of services linking the Ringaskiddy and Carrigaline areas to Cork City.

The CMATS was published in draft form in May 2019 for consultation, ahead of finalisation and publication in later 2019. The consultation period concluded on June 28<sup>th</sup>, 2019.

## 7.5 Base Year Traffic Flows

### 7.5.1 Passenger Car Unit Conversion

For the purpose of this assessment, traffic flows obtained through junction vehicle counts have been converted to Passenger Car Units in accordance with the guidance set out in the Transport Infrastructure Ireland 'Project Appraisal Guidelines' (Unit 5.2), which in turn refers to the Transport for London 'Traffic Modelling Guidelines' for conversion factors.

In order to better reflect the composition of the traffic flow and the numerous vehicle types contained therein, traffic modelling software regularly utilises a common unit, known as a passenger car unit (PCU) in order to convert different types of traffic to a common, single type. Various vehicle classification types are assigned a conversion factor to enable them to be collectively assessed. For example, larger vehicles such as buses, coaches and HGVs have a disproportionately higher effect on a road network than a single passenger car, motorcycle or even bicycle.

Where traffic passes through sensitive locations, such as small villages or problematic junctions, converting larger vehicles to PCUs can ensure that the potential effects associated with traffic flows can be correctly appraised during the traffic modelling process.

**Table 7.2** below illustrates the PCU conversion factors adopted for this assessment.

**Table 7.2 PCU Conversion Factors (TFL Traffic Modelling Guidelines)**

Vehicle Type	PCU Value
Pedal Cycle	0.2
Motor Cycle	0.4
Passenger Car	1.0
Light Goods Vehicle (LGV)	1.0
Medium Goods Vehicle (MGV/OGV 1)	1.5
Heavy Goods Vehicle (HGV/OGV 2)	2.3
Bus/Coach	2.0

Traffic surveys undertaken in January 2019 at the various junctions and links in the site vicinity have included the above vehicle classifications, which enables the traffic data to be converted from vehicles to PCU based on the above conversion factors.

### 7.5.2 Existing Traffic Levels

An 18-hour (06:00-24:00) traffic count was undertaken at all of the junctions listed in **Section 7.3.3** above on Tuesday, 29<sup>th</sup> January 2019, on a typical working day, during school term time.

The traffic surveys on the local road network identified a morning peak hour of 08:00-09:00, and an evening peak hour of 16:45-17:45.

However, these peak periods typically extend beyond a single hour, and it is more appropriate to acknowledge a two-hour morning peak period from 07:00-09:00 and a two-hour evening peak period from 16:00-18:00.

The peak hour link counts on the surrounding road network can be seen in **Table 7.3** below. The locations of the junction counts can be seen in **Figure 7.2**. Note that traffic flows are presented in PCUs.

**Table 7.3 Existing Two-Way Link Flows – Base Year 2019**

Roadway	Construction Peaks/ Operational Peaks			Existing Network Peaks	
	06:00– 07:00	14:00– 15:00	18:00– 19:00	08:00– 09:00	16:45– 17:45
N28–North of Shannon Park	1828	1860	2426	2396	2553
R611 – South of Shannon Park	868	1442	1847	1876	2141
N28 – East of Shannon Park	1241	924	1170	1521	1186
R610 – North of N28	134	319	567	740	969
N28 – East of Raffeen Bridge	1160	789	1319	1364	1541
L6473 Raffeen Road – North of N28	206	77	142	352	172
N28 – East of Shanbally	1263	651	1198	1372	1254
L2492 Shanbally Link Rd – South of N28	111	160	209	364	344
R613 Barnahely Rd – South of N28	213	249	342	463	458
N28 – West of Ferry Port Access	423	316	522	745	608
L2545 – East of Ferry Port Access	42	189	115	406	212
L6517 Loughbeg Road – South of N28	368	117	395	331	366

\*All traffic flows in Passenger Car Units (PCUs) per hour

Five time periods have been determined as having the most significant effect by traffic generated by the proposed development. These five time periods are as follows (note that the Construction AM and PM peak periods and the Operational AM and PM peak periods are coincidental):

- Construction AM Peak (06:00 – 07:00);
- Construction PM Peak (18:00 – 19:00);
- Operational AM Peak (06:00 – 07:00);
- Operational Afternoon Peak (14:00 – 15:00);
- Operational PM Peak (18:00 – 19:00);
- N28 Network AM Peak (08:00 – 09:00); and
- N28 Network PM Peak (16:45 – 17:45).

It can be seen that the network AM and PM peaks (08:00-09:00 and 16:45-17:45) are the busiest time periods for traffic accessing the Ringaskiddy area.

**Table 7.3** also shows that the 14:00-15:00 period, which will be the inter-peak period for construction traffic, experiences reduced levels of traffic flow on the N28 and the local road network, with traffic as much as 70% lower than during the Network AM and PM peak periods.

It is therefore proposed to reduce construction-related traffic to zero, and to restrict operational waste acceptance and staff arrivals/departures at the facility in the AM and PM periods (from 07:00-09:00 and 16:00-18:00 respectively) in order to minimise the effect on the N28 road network in the Ringaskiddy area during these times and instead to avail of the prevailing carrying capacity on the road network during the inter-peak periods.

**Figure 7.3** shows a profile of traffic flows over the 18-hour period of the 2019 traffic surveys at all sites – this figure shows the total flows at each junction (on all arms). It can be seen that across the local road network, there are distinct peaks in traffic flows in the morning and evening periods, at around 07:30/08:00 and 16:30/16:45.

**Figure 7.3** also highlights the five assessment time periods outlined above. It can be seen that the proposed operational peak periods (06:00-07:00, 14:00-15:00 and 18:00-19:00) are coincidental with reduced traffic flows across the study area compared to the existing network AM and PM peak periods (08:00-09:00 and 16:45-17:45).

**Figure 7.4** shows the same traffic flow profiles, but also highlights the proposed hours in the morning and evening when restrictions are proposed for traffic accessing and exiting the proposed facility. It can be seen in **Figure 7.4** that the proposed restriction periods (07:00-09:00 and 16:00-18:00) are coincidental with the morning and evening peaks on the network (08:00-09:00 and 16:45-17:45), but also allow for an additional time period either side of these peaks to account for the increase and decrease in traffic flows either side of the peak hours.

### 7.5.3 Assessment Years

It is anticipated that the proposed RRRC will be fully operational by 2023 with the peak construction period therefore occurring in 2022. Background traffic levels for 2019 have been forecasted to 2022, 2023, 2028 and 2038 by applying the following growth rates:

- For 2019-2022 – light vehicles increased by 3.1%, heavy vehicles increased by 7.3%;
- For 2019-2023 – light vehicles increased by 4.1%, heavy vehicles increased by 9.8%;
- For 2019-2028 – light vehicles increased by 9.6%, heavy vehicles increased by 23.5%; and
- For 2030-2038 – light vehicles increased by 12.9%, heavy vehicles increased by 48.8%.

These growth rates have been established using the guidelines in the '*TII Project Appraisal Guidelines (2011), Unit 5.5 – Link-Based Traffic Growth Forecasting*', and by utilising the specific growth rates therein for the Cork City and County area. The guidelines present 'Low Sensitivity', 'Central Growth' and 'High Sensitivity' growth rates for the Cork City and County area.

In light of the economic decline in recent years, and the subsequent return to growth in the period between 2008 and 2019, it is not considered likely that the 'High Sensitivity' growth scenario will be realised in the Ringaskiddy area in the coming years, in particular given the approach to demand management being adopted on the N28 and the N40 by Cork County Council and Transport Infrastructure Ireland (formerly the National Roads Authority).

A 'Central Growth' scenario was therefore assumed for the Ringaskiddy area in the coming years, and this is considered to allow for all committed and likely future development in the area, with the exception of the Port of Cork re-development works at Ringaskiddy, which is a development of strategic significance and warranting of special consideration.

The estimated 2022 and 2023 traffic flows on the local road network without the proposed development can be seen in **Table 7.4** and **Table 7.5**.

**Table 7.4 Base Traffic Flows, 2022 Construction Year**

Roadway	Construction Peaks/Operational Peaks			Existing Network Peaks	
	06:00 - 07:00	14:00– 15:00	18:00– 19:00	08:00– 09:00	16:45– 17:45
N28 – North of Shannon Park	1889	1927	2502	2478	2635
R611 Carrigaline Road – South of Shannon Park	897	1492	1904	1938	2209
N28 – East of Shannon Park	1282	960	1207	1574	1225
R610 Raffeen Bridge – North of N28	138	330	584	763	1000
N28 – East of Raffeen Bridge	1199	821	1360	1412	1591
L6473 Raffeen Road – North of N28	213	79	147	363	177
N28 – East of Shanbally	1305	678	1236	1421	1295
L2492 Shanbally Link Rd – South of N28	114	165	215	375	355
R613 Barnahely Rd – South of N28	220	258	353	479	473
N28 – West of Ferry Port Access	437	327	538	769	627
L2545 Haulbowline Road – East of Ferry Port Access	43	194	119	417	218
L6517 Loughbeg Road – South of N28	379	121	408	342	377

\*All traffic flows in Passenger Car Units (PCUs) per hour

**Table 7.5 Base Traffic Flows, 2023 Opening Year**

Roadway	Construction Peaks/Operational Peaks			Existing Network Peaks	
	06:00 - 07:00	14:00– 15:00	18:00– 19:00	08:00– 09:00	16:45– 17:45
N28 – North of Shannon Park	1910	1950	2528	2506	2663
R611 Carrigaline Road – South of Shannon Park	906	1509	1923	1960	2233
N28 – East of Shannon Park	1296	973	1219	1593	1238
R610 Raffeen Bridge – North of N28	139	334	590	771	1010
N28 – East of Raffeen Bridge	1212	831	1374	1429	1608
L6473 Raffeen Road – North of N28	215	80	148	366	179
N28 – East of Shanbally	1319	687	1249	1438	1309
L2492 Shanbally Link Rd – South of N28	116	167	217	379	358
R613 Barnahely Rd – South of N28	222	261	356	484	478
N28 – West of Ferry Port Access	441	330	544	778	634
L2545 Haulbowline Road – East of Ferry Port Access	44	197	120	422	221
L6517 Loughbeg Road – South of N28	383	122	412	346	381

\*All traffic flows in Passenger Car Units (PCU's) per hour

## 7.6 Other Developments in the Vicinity

Existing traffic levels were forecast from 2019 to 2022, 2023, 2028 and 2038 using a central growth rate profile from the TII Project Appraisal Guidelines. Applying this growth to traffic flows on the local road network will account for additional development which may occur in the Ringaskiddy area over this time period. However, a specific allowance has been made within this assessment for the Port of Cork re-development works at Ringaskiddy, which is considered to be a strategic development and therefore warrants specific inclusion.

There are a number of schemes and infrastructural works in various states of progress in the Ringaskiddy area at present, as detailed below.

### 7.6.1 Proposed Junction Upgrades at Shannon Park and Roundabout and R610 Raffeen Bridge/N28 Junction

As outlined above, proposals have been developed by the Cork Roads Design Office to upgrade the roundabout junction at Shannon Park to significantly improve capacity in the short term through the provision of localised widening on the approaches and exits and the achievement of two circulatory lanes.

Additionally, local improvements are proposed at the R610 Raffeen Bridge junction to provide traffic calming. Both of these projects have progressed through the planning and detailed design/tender stage, and are now under construction, with both due for completion in mid-2019. These improvements have therefore been assumed to be in place for the purpose of junction assessment.

## 7.6.2 Other proposed developments

There are a number of developments in the Ringaskiddy area that are either under construction at present or expected to commence construction in the near future. The construction and operation of these proposed developments are considered to fall within the increase in traffic flows associated with the Medium-Growth scenario applied to existing traffic flows in the area. These developments are discussed in greater detail in **Chapter 17** include:

### Proposed Projects:

- M28 Cork to Ringaskiddy Motorway Scheme – Under judicial review. Timeline unknown, construction estimated 30-36 months;
- Other planned/permitted projects include the following (note that the construction/operation timelines of these projects are currently unknown):
  - BioMarin - (PA No. 186603) extension to manufacturing building;
  - GE Healthcare Life Science BioPark – (PL04 .248154) – planning granted. To be located in Barnahely;
  - Pfizer Ireland - PA Ref 16/6937: Granted in Jan 2017; and
  - Novartis – Number of permitted projects including the permitted wind turbine (planning for turbine expires November 2022).

### Existing Projects

- Hammond Lane Metal Company Ltd. – Now operating under a IE licence P0997-01. No further planned expansion;
- Four operational 3MW Wind turbines –Including the De Puy 3MW turbine which is operational since 2018. No information available on construction timeline of the permitted Novartis turbine;
- The National Maritime College of Ireland (NMCI);
- UCC ERI Beaufort Building;
- The Island Crematorium;
- Haulbowline Island Recreational Park – the park is due to be open to the public in May 2019;
- Ispat Steelworks Site, Haulbowline Island – Remediation works likely in the future, but timeline known.
- Irish Naval Service base, Haulbowline Island;
- Spike Island – New masterplan is currently being prepared;
- Port of Cork – redevelopment due to be complete in 2020;

- Cork Lower Harbour Drainage Scheme – WwTP complete, other associated upgrade works (pump stations, pipelines) ongoing in the area and due to be complete in 2019;
- Residential Developments - No known planned/permitted projects;
- Aghada Power Station;
- BGE Power Station at Whitegate;
- Amenity developments in Ringaskiddy;
- Ferry and Cruise Ship Business;
- Future local projects associated with the proposed Indaver Community Gain Fund; and
- Pharmaceutical and Medical Device Manufacturers.

A number of the above developments are already in operation and therefore the traffic surveys undertaken as part of this assessment have captured a significant amount of the traffic associated with these schemes. As outlined in **Section 7.6.4** below, a specific allowance has been made for traffic associated with the Port of Cork redevelopment traffic, which is added to future traffic flows once the redevelopment is complete. As construction at the Port is ongoing, the construction traffic associated with this has also been captured as part of the traffic surveys for this assessment.

A growth factor has been applied to baseline traffic data, using a 'Medium Growth' profile as outlined in the Transport Infrastructure Ireland Project Appraisal Guidelines. This growth profile will account for the developments referenced above and is therefore considered sufficiently-robust for this assessment.

### 7.6.3 Brittany Ferries Cruise Ships

Brittany Ferries operate two cruise ship services from Cork, to Roscoff and Santander.

The Cork-Roscoff service departs on Saturday afternoons and Monday evenings, with returning services departing Roscoff on Friday and Tuesday evenings (arriving to Cork the following mornings).

The Cork-Santander service departs Cork on Wednesday mid-morning and Friday night, with returning services departing Santander on Sunday afternoon and Thursday evening.

The majority of these services arrive and depart outside of the assessment periods included within this assessment, and associated traffic would not be considered representative of a typical daily traffic profile. Therefore, ferry port services have not been included within this assessment.

In addition, from April to October, cruise ships occasionally dock at Ringaskiddy when the Cobh cruise ship berth is occupied. These cruise ships can in theory arrive any day of the week. Usually these ships arrive circa 09.00 and depart circa 17.00 or arrive around midday and depart in the late evening.

However, due to the irregular nature of this type of occurrence, it is not included within this assessment.

#### 7.6.4 Port of Cork Ringaskiddy Port Redevelopment

The Port of Cork was granted permission in May 2015 for redevelopment of the existing port facilities in Ringaskiddy. The redevelopment works will comprise three distinct phases, as follows:

- Phase 1 – an increase in LoLo (Lift-on, Lift-off), general cargo and trade cars;
- Phase 2 – an increase in bulk operations; and
- Phase 3 – an increase in RoRo (Roll-on, Roll-off) operations.

The EIAR documentation submitted as part of the planning application indicated an estimated Opening Year of 2018 for the re-development works. Construction is well-advanced on site (but still ongoing), and works are now expected to be complete by 2020 (as per the Port of Cork website, which provides regular update bulletins regarding the redevelopment process). The documentation also indicated that the Port of Cork proposed that Phase 3 of the redevelopment would not become operational until the M28 upgrade scheme has been completed.

In the grant of planning permission, An Bord Pleanála imposed a specific condition that Phase 3 of the redevelopment would not be permitted to proceed until after the M28 and Dunkettle Interchange upgrade schemes are both completed.

For the purpose of this assessment, it has been assumed that Phases 1 and 2 of the Port redevelopment works are completed and operational in 2020, and therefore are in place in the 2022 construction year and 2023 opening year (and subsequent future years). Construction of the Port of Cork expansion (due to be complete by 2020) does not overlap with construction at the RRRC, which will be at its most intensive in 2022.

The M28 and Dunkettle Interchange upgrade schemes have not been included in this assessment in order to ensure a robust, worst-case scenario. Therefore Phase 3 of the Port of Cork Ringaskiddy Redevelopment has not been included in the 2028 and 2038 future years. In the event of these major road infrastructure schemes progressing, the existing traffic flows on the local road network in the Ringaskiddy area would significantly reduce, and as such the potential effects of the proposed RRRC in the area would not be as pronounced.

**Table 8.8** (Ringaskiddy Daily Traffic Generation Figures for 2018 and 2033) of the Port of Cork EIAR documentation indicates the following traffic flow increases associated with Phases 1 and 2 of the proposed expansion, which have therefore been included as part of this assessment:

- A daily increase of 591 heavy vehicles; and
- A daily increase of 184 light vehicles.

These flows have been added to the background traffic captured in the January 2019 traffic surveys for the purpose of analysis.

It is also noteworthy that traffic surveys undertaken in January 2019 also include for construction traffic currently present on the road network that is associated with the Port redevelopment works.

## 7.7 Characteristics of Proposed Development

As indicated in **Section 7.1**, the proposed RRRC is located on a site to the east of Ringaskiddy Village. In terms of traffic generation, aside from the traffic generation during the construction stage, the key operational element of the development is the RRRC itself.

The traffic effect appraisal has been undertaken by examining both the construction traffic (traffic generated by the workforce and processes involved in the construction period) and the operational traffic (traffic generated by the processes involved in the operation of the facility once complete). The expected level of traffic generated by both the construction and the operational aspects of the development are detailed below.

### 7.7.1 Construction Traffic

Traffic will firstly be generated during the construction phase of the development. Throughout the construction phase, three types of construction traffic will access the site.

- HGV traffic;
- Workforce traffic; and
- General site traffic.

Typical working hours during the construction phase will be:

<b>Start</b>	<b>Finish</b>	<b>Days</b>
06:00	20:00	Monday – Friday; and
07:00	13:00	Saturday.

In order to minimise the potential effect of traffic flows during the construction stage, it is proposed to schedule HGV, workforce and general site traffic in such a manner to ensure no vehicles arrive or depart the proposed development site during the 07:00-09:00 and 16:00-18:00 periods, as these represent peak periods on the existing road network during these times.

### 7.7.2 HGV Traffic

The construction stage of the development will involve a significant number of HGV movements. Estimates of the anticipated HGV construction traffic volumes indicate that a maximum of 11 heavy goods vehicles per hour will access the site during the day time shift with smaller volumes expected during the night shift.

### 7.7.3 Workforce Traffic

The construction period will also generate demand in terms of construction workforce access. Throughout the construction period there will be some variation in the number of workers or size of the workforce on site. However, a maximum of approximately 320 construction workers will be employed on site, with around 250 workers working a daytime shift and 70 working a night shift.

To determine the trips generated during construction it is assumed, that 95% of the workforce will travel by car and there will be car occupancy of 1.15. These assumptions are applied to the 250 workers arriving for the day shift and also to the 70 workers leaving after the night shift.

Due to the nature of the construction stage of the development, not all workers will arrive or depart simultaneously in the morning/evening as there will be some natural variation in activity throughout a typical day. For the purpose of this assessment, the following arrival and departure profile for the construction workers has been assumed:

- 100% of the daytime construction workers arrive before 07:00;
- 100% of the night-time construction workers leave before 07:00;
- 25% of the daytime construction workers leave between 12:00-14:00, with 75% of these leaving before 13:00 and 25% arriving back before 13:00;
- 40% of the daytime construction workers leave between 18:00-19:00;
- 60% of the daytime construction workers leave after 19:00; and
- 100% of the night shift construction workers arrive after 18:00.

### 7.7.4 General Site Traffic

The construction stage will also generate general site traffic in addition to HGV movements and workforce traffic. This general site traffic accounts for visitors and general service vehicles to the site. The general site traffic is estimated at up to 32 vehicles (in and out) per hour between 06:00 - 19:00 with a fall-off to 6 vehicles (in and out) per hour during the night shift. As with the workforce traffic, no general site traffic will be permitted to or from the site during the 2-hour restriction periods in the morning and evening.

### 7.7.5 L2545 Road Upgrade

It is expected that the L2545 road upgrade works will take place in advance of the main construction works on site. However, for the purpose of this assessment, it is assumed that the road and road drainage upgrade will occur concurrently with the main facility construction. While the L2545 road upgrade works will fluctuate throughout a typical day, it is estimated that a maximum of 24 HGVs (two-way) per hour may occur during normal working hours.

## 7.7.6 Total Construction Traffic

The projected volume of traffic generated during the construction phase of the development can be seen in **Table 7.6** and **Table 7.7** below. For clarity, **Table 7.6** presents the daily profile of arrivals in vehicles, while **Table 7.7** converts these flows to PCUs.

It can be seen from **Table 7.6** and **Table 7.7** below that no vehicles will arrive or depart the proposed development site during the morning and evening peak periods (07:00-09:00 and 16:00-18:00) during the construction process. It can be seen in the subsequent tables that the morning and evening two-hour peak periods (shown in grey) contain no additional traffic flows associated with construction works at the RRRC. The traffic flows to and from the facility during these hours where restrictions apply have been redistributed across the remainder of the working day. Therefore, the values indicated in **Table 7.6** below have been rounded up or down for clarity.

**Table 7.6 Projected Volumes of Construction Traffic (Vehicles Per Hour)**

	Construction		Road Raising Works		Workforce Traffic		General Site Traffic		Traffic Generation		
	HGV Movements		HGV Movements		Car Movements		Car & LV Movements		ALL		
	In	Out	In	Out	In	Out	In	Out	In	Out	Total
<b>0600-0700</b>	10	10	1	1	207	57	14	14	231	82	<b>314</b>
<b>0700-0800</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>0800-0900</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>0900-1000</b>	11	11	12	12	0	0	16	16	39	39	<b>78</b>
<b>1000-1100</b>	10	10	10	10	0	0	14	14	34	34	<b>68</b>
<b>1100-1200</b>	10	10	8	8	0	0	14	14	32	32	<b>64</b>
<b>1200-1300</b>	10	10	2	2	39	13	14	14	65	39	<b>103</b>
<b>1300-1400</b>	10	10	3	3	13	39	14	14	40	66	<b>105</b>
<b>1400-1500</b>	10	10	8	8	0	0	14	14	32	32	<b>64</b>
<b>1500-1600</b>	11	11	6	6	0	0	16	16	33	33	<b>66</b>
<b>1600-1700</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>1700-1800</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>1800-1900</b>	10	10	0	0	57	83	14	14	81	106	<b>188</b>
<b>1900-2000</b>	2	2	0	0	0	124	3	3	5	129	<b>134</b>
<b>2000-2100</b>	1	1	0	0	0	0	3	3	4	4	<b>10</b>
<b>TOTAL/DAY</b>	<b>95</b>	<b>95</b>	<b>50</b>	<b>50</b>	<b>316</b>	<b>316</b>	<b>136</b>	<b>136</b>	<b>597**</b>	<b>597**</b>	<b>1,194</b>

\*All traffic flows in Vehicles per hour

\*\*Note: Traffic flows to and from the facility during the restriction periods have been re-allocated across the remaining construction hours; therefore, the above values have been rounded up or down for clarity

**Table 7.7 Projected Volumes of Construction Traffic (PCUs Per Hour)**

	Construction		Road Raising Works		Workforce Traffic		General Site Traffic		Traffic Generation		
	HGV Movements		HGV Movements		Car Movements		Car & LV Movements		ALL		
	In	Out	In	Out	In	Out	In	Out	In	Out	Total
<b>0600-0700</b>	22	22	2	2	207	57	14	14	245	95	<b>342</b>
<b>0700-0800</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>0800-0900</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>0900-1000</b>	25	25	28	28	0	0	16	16	69	69	<b>139</b>
<b>1000-1100</b>	23	23	23	23	0	0	14	14	60	60	<b>119</b>
<b>1100-1200</b>	23	23	18	18	0	0	14	14	55	55	<b>110</b>
<b>1200-1300</b>	23	23	5	5	39	13	14	14	81	55	<b>134</b>
<b>1300-1400</b>	23	23	7	7	13	39	14	14	57	83	<b>139</b>
<b>1400-1500</b>	23	23	18	18	0	0	14	14	55	55	<b>110</b>
<b>1500-1600</b>	25	25	14	14	0	0	16	16	55	55	<b>111</b>
<b>1600-1700</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>1700-1800</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>1800-1900</b>	22	22	0	0	57	83	14	14	93	119	<b>214</b>
<b>1900-2000</b>	5	5	0	0	0	124	3	3	8	132	<b>139</b>
<b>2000-2100</b>	5	5	0	0	0	0	3	3	8	8	<b>15**</b>
<b>TOTAL/DAY</b>	<b>219</b>	<b>219</b>	<b>115</b>	<b>115</b>	<b>316</b>	<b>316</b>	<b>136</b>	<b>136</b>	<b>786</b>	<b>786</b>	<b>1,571</b>

\*All traffic flows in Passenger Car Units (PCUs) per hour

\*\*Note: Traffic flows to and from the facility during the restriction periods have been re-allocated across the remaining construction hours, and traffic flows have been converted to PCU; therefore, the above values have been rounded up or down for clarity

### 7.7.7 Earthworks

The above tables were used to analyse the effect of the construction traffic on the local road network during peak periods. However, it is recognised that the earthworks element of the construction will introduce some additional heavy goods vehicles to the area, and a separate analysis of this is presented.

Before work can commence on the main construction phase of the development, a projected net quantity of ~114,000 tonnes of soil will be excavated and removed from the site. This excludes the quantity which will be re-used to raise the levels in the western field. This figure also excludes the quantity of material which will be removed to facilitate the L2545 upgrade as this will occur before the earthworks phase commences (see **Section 7.7.5** above).

In addition, approximately 42,000 tonnes of fill material are expected to be imported to construct the main retaining structures at the same time. This figure excludes the quantity of import material required for the L2545 upgrade (see **Section 7.7.5** above). This figure also excludes the quantity of shingle required for the coastal protection works as this will occur at the end of the construction period (see **Section 7.7.8** below).

It is anticipated that the excavation of materials and the import of fill materials will occur simultaneously for a period of 6 weeks. After this, the import of materials will cease, and the excavation works are expected to continue for a further 7 weeks.

It is therefore estimated that the entire excavation and import processes will be carried out over a 16-week period. This equates to 17 truckloads per hour for the first 6 weeks when both processes are occurring at the same time, and then will equate to 9 trucks per hour for the remaining 7 weeks. These figures are based on the following assumptions:

- 20 tonnes per truck; and
- 48 hours per week – based on 6 days, 8-hours per day (note this allows for no trucks during the 07:00-09:00 and 16:00-18:00 periods).

The bulk excavation works and construction of the retaining structures will be undertaken in advance of the main construction phase and will not be as labour-intensive. Therefore, the bulk excavation and construction of the retaining structures will have less of an effect on the local traffic network than the main construction phase, the effect of which is assessed and is included in this chapter.

### 7.7.8 Placing of Sacrificial Material on the Beach

The placing of sacrificial material on the beach will be undertaken towards the end of the main construction phase over a 6-day period. The quantity of sacrificial material is expected to be 1,100m<sup>3</sup>. It will require 83 truckloads in total, equivalent to an average of 3 trucks per hour. However, the phasing of this will be programmed so as to not occur in tandem with either earthworks or construction phases, and is therefore not included in the main assessment.

### 7.7.9 Electricity substation building, compound and grid connection

As discussed in **Section 4.5.10**, the electricity import/export substation and compound within the Indaver site will be located east of the main entrance to the RRRC.

The RRRC will be connected to the national electrical grid via the 38kV electrical substation (Lough Beg substation) adjacent to the eastern boundary of the Hammond Lane facility. The grid connection will be made by running underground cables from the ESB side of the Indaver electricity compound to the Lough Beg substation. The works required within Lough Beg substation lands will be carried out by ESB Networks.

The grid connection within Lough Beg substation lands will require the excavation of one or two short trenches (approximately 5m in length) – the exact connection method will be decided by ESB Networks.

It is likely that this process may occur in parallel with the construction phase of the RRRC itself. The traffic effect of these works will be very low and will not be recurring due to the short-term nature of the works in question. As a result, these works have not been included as part of this Traffic Impact Assessment.

Due to the layout of the facility, there will be no requirement to divert the existing 38 kV lines which traverse the south-western portion of the site.

### 7.7.10 Operational Traffic Generation

The proposed development will generate two types of operational traffic. Heavy goods vehicle (HGV) traffic will be generated by the operation of the facility. Car traffic will be generated by workers commuting to the site and by visitors to the site.

As outlined above, the construction-related traffic (the arrivals and departures of staff and construction vehicles) has been arranged in order to ensure no arrivals or departures will occur during the morning and evening local network peak periods. However, from an operational and logistic perspective, it is not financially feasible to reduce deliveries of waste materials to the site entirely to zero during these hours.

Instead, in order to minimise the effect of operational traffic on the local road network during the morning and evening network peaks, it is proposed to control the arrivals and departures of waste delivery vehicles to and from the site during the two-hour network peak period in the morning (07:00-09:00) and the evening (16:00-18:00). Further detail of the proposed restriction to waste delivery vehicles is outlined in **Section 7.11 (Mitigation Measures)** below.

### 7.7.11 HGV Generation

The estimated volume of HGV traffic generated by the proposed development was based on anticipated volumes of waste coming into the facility. The facility will accept waste for 50 weeks per year, for 5.5 days per week and 14 hours per day (from 06:00-20:00).

Information obtained from the Indaver Meath facility, which also treats similar waste streams to those proposed for Ringaskiddy established that peak hour traffic at the site was around 16% of total daily traffic. This occurs at 07:00, when the facility opens.

Discussions with waste collection operators in the Cork area indicate that there is a preference to avoid the AM and PM peak periods due to prevailing traffic congestion on the network and the resultant delay to vehicles travelling to and from the facility. These waste collection operators have indicated that an opening time of 06:00 would be preferable in terms of delivering waste in the morning period ahead of the local peak period, whilst extending the opening hours to 20:00 also allows operators to avoid the evening peak period.

The facility is expected to generate a total of 71 HGVs to the site over the course of the 14-hour day, i.e. a total of 142 two-way HGV movements over the entire day.

It is noted from past experience at other facilities that waste deliveries are not uniform and the waste processing procedure does not operate at a continuous rate; peaks and troughs tend to occur throughout the year. Based on monthly variations at the Dublin Port Waste Transfer Station, for example, it was established that the peak usage of the facility was 13% greater than the average usage.

The traffic generated through HGV movements (71) has therefore been increased by 13% to account for the peaks in the arrival of vehicles, resulting in an increase to 80 vehicles (i.e. 160 two-way HGV movements) per day.

As outlined above, it is planned to manage HGV movements so that the vast majority of vehicles will arrive to and/or depart from the facility outside of the Ringaskiddy morning and evening peak periods (07:00-09:00 and 16:00-18:00) by extending the hours that waste will be accepted at the facility. The number of HGV vehicles that arrive and depart during the peak periods will be capped at 3 arrivals and 3 departures per hour.

### 7.7.12 Commuters/Site Visitors

A total of 63 staff will be employed on site once the facility is in operation. **Table 7.8** below classifies the staff and indicates their expected working hours:

**Table 7.8 Staff Numbers and Working Hours**

Staff Type	Number of Staff	Hours of Operation
<b>Administration Staff</b>		
Customer Logistics/Tech Support	8	06:45-14:45
Sales	8	09:30-18:00
Other	5	09:30-18:00
<b>Resource Recovery Centre Staff</b>		
Shift Pattern 1	5	06:00-14:00
Shift Pattern 2	5	07:00-15:30
Shift Pattern 3	5	14:00-22:00
Shift Pattern 4	5	22:00-06:00
Tipping Hall & Crane Staff – A	2	06:00-13:00
Tipping Hall & Crane Staff – B	2	13:00-20:00
Maintenance, Warehouse & Plant Logistics - A	5	06:45-14:45
Maintenance, Warehouse & Plant Logistics - B	5	09:30-18:00
Security – A	1	06:00-13:00
Security - B	1	13:00-20:00
Management	6	09:30-18:00
<b>TOTAL</b>	<b>63</b>	

Note that administration staff in **Table 7.8** above will be transferred from the existing Indaver Administration facility at the Kinsale Road Industrial Park to the proposed RRRC.

In addition to the above traffic flows, it has also been assumed that 1 delivery/visitor vehicle will arrive and depart the site per hour between 08:00-18:00.

In the event that staff require a temporary amendment to their working hours, they will be permitted to travel to and from the facility in the restriction periods, providing they do so only by public transport, walking or cycling.

### 7.7.13 Disposal of bottom ash

The vehicle movements presented in **Section 7.7.11** above include an allowance for daily traffic associated with the disposal of bottom ash from the facility, via HGVs. It is anticipated that this will be transported to a national treatment facility. This traffic would therefore form part of the typical daily traffic profile associated with the scheme.

However, in the event that disposal of bottom ash at a national treatment facility cannot be undertaken, an alternative method for disposal of bottom ash may comprise the export of bottom ash from Ringaskiddy Port.

Disposal of bottom ash from Ringaskiddy Port would involve an alternative method, as follows:

- Bottom ash would be stored on site (the site will have capacity for on-site storage of up to 3,000 tonnes of ash);
- Every three weeks, for a two-day period, bottom ash would be transported from the site to Ringaskiddy Port in covered HGVs;
- It is anticipated that this would require a maximum of 7 HGVs per hour (i.e. a total of 14 HGV movements) between the site and Ringaskiddy Port;
- These HGV's would arrive on-site the night before transport of bottom ash would commence, and would remain in the local area over the two-day period transferring ash between the site and the Port (these vehicles would be parked on-site overnight);
- These HGV movements would be confined to the local road network between the Indaver site and Ringaskiddy Port; and
- These HGV movements would be subject to restrictions during the two-hour morning and evening peak periods, as proposed by Indaver so as to minimise potential impacts on the wider road network during these peak periods.

In the event of this alternative scenario taking place, the Operational Traffic flows presented in **Section 7.7.11** above would be reduced (as this traffic flow includes a daily allowance for disposal of bottom ash via a national treatment facility). Therefore, due to the bottom ash HGV traffic being localised between the site and Ringaskiddy Port, the impact of HGV traffic on the critical junctions to the west of the site (at Shannon Park Roundabout, Raffeen T-junction and Shanbally Roundabout) would be reduced. The localised impact between the Indaver site and Ringaskiddy Port would be confined to a number of junctions to the immediate west of the site only. These junctions are lightly-trafficked by comparison to the more critical junctions further east.

Thus, to ensure a robust assessment the potential alternative scenario where bottom ash is disposed of via Ringaskiddy Port does not represent the worst-case scenario in terms of impact on the critical junctions on the surrounding road network, and is not included as part of this assessment.

## 7.7.14 Total Operational Traffic

The projected volume of traffic generated during the operational phase of the development can be seen in **Table 7.9** below, in vehicles per hour.

**Table 7.10** shows the estimated flows in PCUs per hour. Note that in the subsequent tables, the morning and evening two-hour peak periods (highlighted in grey) show minimal additional traffic associated with the RRRC, and that there will be no traffic movements associated with the operational workforce during these times.

**Table 7.9 Projected Volumes of Operational Traffic (Vehicles per Hour)**

	HGV Movements		Workforce Traffic		Visitor/Delivery Traffic		Total Traffic Generation		
	In	Out	In	Out	In	Out	In	Out	Total
<b>0600-0700</b>	12	12	18	5	0	0	30	17	<b>47</b>
<b>0700-0800</b>	3	3	0	0	0	0	3	3	<b>6</b>
<b>0800-0900</b>	3	3	0	0	1	1	4	4	<b>8</b>
<b>0900-1000</b>	9	9	24	0	1	1	33	9	<b>42</b>
<b>1000-1100</b>	6	6	0	0	1	1	7	7	<b>15</b>
<b>1100-1200</b>	7	7	0	0	1	1	8	8	<b>16</b>
<b>1200-1300</b>	9	9	3	0	1	1	13	10	<b>23</b>
<b>1300-1400</b>	8	8	5	3	1	1	14	12	<b>26</b>
<b>1400-1500</b>	7	7	0	18	1	1	8	26	<b>34</b>
<b>1500-1600</b>	6	6	0	5	1	1	7	12	<b>18</b>
<b>1600-1700</b>	3	3	0	0	1	1	4	4	<b>8</b>
<b>1700-1800</b>	3	3	0	0	1	1	4	4	<b>8</b>
<b>1800-1900</b>	2	2	0	24	0	0	2	26	<b>29</b>
<b>1900-2000</b>	2	2	0	0	0	0	2	2	<b>5</b>
<b>2000-2100</b>	0	0	0	3	0	0	0	3	<b>3</b>
<b>2100-2200</b>	0	0	5	0	0	0	5	0	<b>5</b>
<b>2200-2300</b>	0	0	0	5	0	0	0	5	<b>5</b>
<b>2300-0000</b>	0	0	0	0	0	0	0	0	<b>0</b>
<b>TOTAL</b>	<b>80</b>	<b>80</b>	<b>63**</b>	<b>63</b>	<b>10</b>	<b>10</b>	<b>153**</b>	<b>153</b>	<b>306</b>

\*All traffic flows in Vehicles per hour

\*Note: there will be no workforce traffic during the morning and evening peak periods

\*\*The Figures of 63 and 153 workforce arrivals includes 55 and 145 staff as indicated in the table plus an additional 8 staff who arrive before 06:00

\*Note: Traffic flows to and from the facility during the restriction periods have been re-allocated across the remaining construction hours; therefore, the above values have been rounded up or down for clarity

**Table 7.10 Projected Volumes of Operational Traffic (PCUs per Hour)**

	HGV Movements		Workforce Traffic		Visitor/Delivery Traffic		Total Traffic Generation		
	In	Out	In	Out	In	Out	In	Out	Total
<b>0600-0700</b>	27	27	18	5	0	0	44	31	<b>75</b>
<b>0700-0800</b>	7	7	0	0	0	0	7	7	<b>15</b>
<b>0800-0900</b>	7	7	0	0	1	1	8	8	<b>17</b>
<b>0900-1000</b>	18	18	24	0	1	1	43	19	<b>63</b>
<b>1000-1100</b>	15	15	0	0	1	1	16	16	<b>32</b>
<b>1100-1200</b>	17	17	0	0	1	1	18	18	<b>35</b>
<b>1200-1300</b>	20	20	3	0	1	1	24	21	<b>46</b>
<b>1300-1400</b>	18	18	5	3	1	1	24	22	<b>47</b>
<b>1400-1500</b>	17	17	0	18	1	1	18	36	<b>53</b>
<b>1500-1600</b>	13	13	0	5	1	1	14	19	<b>33</b>
<b>1600-1700</b>	7	7	0	0	1	1	8	8	<b>17</b>
<b>1700-1800</b>	7	7	0	0	1	1	8	8	<b>17</b>
<b>1800-1900</b>	6	6	0	24	0	0	6	30	<b>35</b>
<b>1900-2000</b>	6	6	0	0	0	0	6	6	<b>11</b>
<b>2000-2100</b>	0	0	0	3	0	0	0	3	<b>3</b>
<b>2100-2200</b>	0	0	5	0	0	0	5	0	<b>5</b>
<b>2200-2300</b>	0	0	0	5	0	0	0	5	<b>5</b>
<b>2300-0000</b>	0	0	0	0	0	0	0	0	<b>0</b>
<b>TOTAL</b>	<b>185</b>	<b>185</b>	<b>63**</b>	<b>63</b>	<b>10</b>	<b>10</b>	<b>258**</b>	<b>258</b>	<b>516</b>

\*All traffic flows in Passenger Car Units (PCUs) per hour

\*Note: there will be no workforce traffic during the morning and evening peak periods

\*\*The Figures of 63 and 258 workforce arrivals includes 55 and 250 staff as indicated in the table plus an additional 8 staff who arrive before 06:00

\*Note: Traffic flows to and from the facility during the restriction periods have been re-allocated across the remaining construction hours, and traffic flows have been converted to PCU; therefore the above values have been rounded up or down for clarity

From the table above, it can be seen that the morning, afternoon and evening peak levels of development traffic are at 06:00-07:00, 14:00-15:00 and 18:00-19:00, respectively. These peak periods are outside of the general Ringaskiddy area road network peak periods, which are from 08:00-09:00 and 16:45-17:45, respectively.

## 7.8 Traffic Distribution

### 7.8.1 General

The generated traffic from the proposed development has been distributed through the road network based on expected origins of both construction/waste delivery vehicles and workforce staff origins. **Table 7.11** shows the estimated trip distribution profile for the proposed development. It has been assumed that the same arrival/distribution profile presented in **Table 7.11** below will apply to vehicles travelling to and from the site during the construction phase and the operational phase.

**Table 7.11 Traffic Distribution – Indaver**

Roadway	Percentage HGVs To/From	Percentage Staff To/From
N28 – North of Shannon Park Roundabout	80%	65%
R611 – South of Shannon Park Roundabout	15%	20%
R610 Raffeen Bridge – North of N28	2%	5%
L6473 Raffeen Road – North of N28	0%	5%
R613 Barnahely Rd – South of N28	3%	10%
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>

## 7.9 Traffic Assignment

### 7.9.1 General

The projected levels of construction and operational traffic generated by the proposed development were assigned to the local road network in accordance with the trip distribution detailed above. **Table 7.12** below shows the projected construction traffic (two-way) assigned to the local road network in 2022. **Table 7.13** shows the projected operational traffic (two-way) assigned to the local road network in 2023, 2028 and 2038.

**Table 7.12 Projected Distribution of Traffic – Construction Phase, 2022 (PCUs per Hour)**

Roadway	Construction Peaks	
	06:00-07:00	18:00-19:00
N28 – North of Shannon Park	215	137
R611 Carrigaline Road – South of Shannon Park	66	41
N28 – East of Shannon Park	281	178
R610 Raffeen Bridge – North of N28	16	9
N28 – East of Raffeen Bridge	297	187
L6473 Raffeen Road – North of N28	15	9
N28 – East of Shanbally	311	195
L2492 Shanbally Link Rd – South of N28	0	0
R613 Barnahely Rd – South of N28	31	18

Roadway	Construction Peaks	
	06:00-07:00	18:00-19:00
N28 – West of Ferry Port Access	342	214
L2545 Haulbowline Road – East of Ferry Port Access	342	214
L6517 Loughbeg Road – South of N28	0	0

\*All traffic flows in Passenger Car Units (PCUs) per hour

**Table 7.13 Projected Distribution of Traffic – Operational Phase, 2023, 2028 and 2038 (PCUs per Hour)**

Roadway	Operational Peaks			Existing Network Peaks	
	06:00-07:00	14:00-15:00	18:00-19:00	08:00-09:00	16:45-17:45
N28 – North of Shannon Park	55	39	23	12	14
R611 Carrigaline Road – South of Shannon Park	12	9	7	2	2
N28 – East of Shannon Park	67	48	30	15	16
R610 Raffeen Bridge – North of N28	2	2	2	0	0
N28 – East of Raffeen Bridge	70	49	31	16	16
L6473 Raffeen Road – North of N28	1	1	1	0	0
N28 – East of Shanbally	71	50	32	16	16
L2492 Shanbally Link Rd – South of N28	0	0	0	0	0
R613 Barnahely Rd – South of N28	4	3	3	0	0
N28 – West of Ferry Port Access	75	53	36	16	16
L2545 Haulbowline Road – East of Ferry Port Access	75	53	36	16	16
L6517 Loughbeg Road – South of N28	0	0	0	0	0

\*All traffic flows in Passenger Car Units (PCUs) per hour

The total projected levels of traffic on the local road network, following the addition of the proposed development traffic, can be seen in **Table 7.14** and **Table 7.15** below, for the 2022 Construction Year and 2023 Opening Year, respectively.

**Table 7.14 Projected Total Traffic – Construction Phase, 2022 (PCUs per Hour)**

Roadway	Construction Peaks	
	06:00-7:00	18:00-19:00
N28 – North of Shannon Park	2177	2716
R611 Carrigaline Road – South of Shannon Park	963	1944
N28 – East of Shannon Park	1636	1461
R610 Raffeen Bridge – North of N28	153	594
N28 – East of Raffeen Bridge	1568	1624
L6473 Raffeen Road – North of N28	227	155

Roadway	Construction Peaks	
	06:00-7:00	18:00-19:00
N28 – East of Shanbally	1690	1508
L2492 Shanbally Link Rd – South of N28	114	215
R613 Barnahely Rd – South of N28	251	371
N28 – West of Ferry Port Access	852	828
L2545 Haulbowline Road – East of Ferry Port Access	387	334
L6517 Loughbeg Road – South of N28	379	408

\*All traffic flows in Passenger Car Units (PCUs) per hour

**Table 7.15 Projected Total Traffic – Operational Phase, 2023 Opening Year (PCUs per Hour)**

Roadway	Operational Peaks			Existing Network Peaks	
	06:00-07:00	14:00-15:00	18:00-19:00	08:00-09:00	16:45-17:45
N28 – North of Shannon Park	2036	2255	2640	2837	3037
R611 Carrigaline Road – South of Shannon Park	919	1517	1934	1962	2235
N28 – East of Shannon Park	1434	1287	1342	1926	1615
R610 Raffeen Bridge – North of N28	141	336	593	771	1011
N28 – East of Raffeen Bridge	1352	1148	1499	1946	1801
L6473 Raffeen Road – North of N28	216	81	151	366	179
N28 – East of Shanbally	1461	1004	1376	1956	1502
L2492 Shanbally Link Rd – South of N28	116	167	217	379	358
R613 Barnahely Rd – South of N28	226	264	361	485	478
N28 – West of Ferry Port Access	587	651	676	1113	1011
L2545 Haulbowline Road – East of Ferry Port Access	117	249	177	438	236
L6517 Loughbeg Road – South of N28	383	122	412	346	381

\*All traffic flows in Passenger Car Units (PCUs) per hour

## 7.10 Likely Significant Effects

### 7.10.1 General

The effect of traffic generated on the local road network has been assessed by comparing the projected future traffic volumes with and without the construction of the proposed development. In addition, the effect of the generated traffic on the junctions in the immediate vicinity of the proposed development was examined.

## 7.10.2 Construction Phase Traffic

The projected increase in traffic during the construction stage of the RRRC can be seen in **Table 7.16**. The table includes Year 2022 projected flows both with and without the proposed construction traffic.

**Table 7.16 Projected Traffic Increases – Construction Stage, 2022**

Roadway	Year 2022 - 06:00-07:00			Year 2022 - 18:00-19:00		
	Without	With	% Change	Without	With	% Change
N28 – North of Shannon Park	1961	2177	11%	2577	2716	5%
R611 Carrigaline Road – South of Shannon Park	897	963	7%	1904	1944	2%
N28 – East of Shannon Park	1354	1636	21%	1282	1461	14%
R610 Raffeen Bridge – North of N28	138	153	11%	584	594	2%
N28 – East of Raffeen Bridge	1270	1568	23%	1435	1624	13%
L6473 Raffeen Road – North of N28	213	227	7%	147	155	6%
N28 – East of Shanbally	1377	1690	23%	1311	1508	15%
L2492 Shanbally Link Rd – South of N28	114	114	0%	215	215	0%
R613 Barnahely Rd – South of N28	220	251	14%	353	371	5%
N28 – West of Ferry Port Access	508	852	68%	613	828	35%
L2545 Haulbowline Road – East of Ferry Port Access	43	387	800%	119	334	181%
L6517 Loughbeg Road – South of N28	379	379	0%	408	408	0%

\*All traffic flows in Passenger Car Units (PCUs) per hour

From the above appraisal, it can be seen that by scheduling the morning construction peak hour to coincide with the lower traffic flows between 06:00 - 07:00, the higher traffic flows which occur later are avoided, and therefore the resultant effects on the local road network during the morning and evening peak periods are minimised.

The results above also show that there are large proportional increases in traffic flow for the morning construction peak at certain locations. However, this is due to the background traffic being so low at this time at these locations. It should also be noted that the base traffic numbers adjacent to the proposed site entrance are extremely low, which explains the high percentage increase in traffic on the N28 to the east of the Ferry Terminal access junction, for example. These locations that show the effects of high relative increases are therefore only for a short period of time due to the temporary nature of the construction works.

### 7.10.3 Operational Phase Traffic

The peak period of generated traffic from the proposed development does not correspond with the Ringaskiddy road network peaks. The proposed development traffic peak occurs in the 14:00-15:00 hour, while the Ringaskiddy road network peaks occur in the 08:00-09:00 hour and 16:45-17:45 hour, respectively. To ensure a robust analysis is undertaken, the traffic assessment has been based on the following scenarios:

- AM Operational Peak (06:00 – 07:00);
- AM Network Peak (08:00 – 09:00);
- Afternoon Operational Peak (14:00 – 15:00);
- PM Network Peak (16:45 – 17:45);
- PM Operational Peak (18:00 – 19:00).

The projected increase in traffic during the operational stage can be seen in **Table 7.17**, **Table 7.18** and **Table 7.19** for the 2023 Operational Peak hours at the facility, and **Table 7.20** and **Table 7.21** for the 2023 Network Peak hours. The tables include Opening Year 2023 flows both with and without the operation of the RRRC.

**Table 7.17 Project Traffic Flows – 06:00-07:00 Operational AM Peak – Opening Year 2023**

Road	Operational - 06:00-07:00		
	Without	With	% Change
N28 – North of Shannon Park	1982	2036	3%
R611 Carrigaline Road – South of Shannon Park	906	919	1%
N28 – East of Shannon Park	1368	1434	5%
R610 Raffeen Bridge – North of N28	139	141	2%
N28 – East of Raffeen Bridge	1283	1352	5%
L6473 Raffeen Road – North of N28	215	216	1%
N28 – East of Shanbally	1391	1461	5%
L2492 Shanbally Link Rd – South of N28	116	116	0%
R613 Barnahely Rd – South of N28	222	226	2%
N28 – West of Ferry Port Access	513	587	14%
L2545 Haulbowline Road – East of Ferry Port Access	44	117	166%
L6517 Loughbeg Road – South of N28	383	383	0%

\*All traffic flows in Passenger Car Units (PCUs) per hour

From the above table, it can be seen that the proposed development when operational will have minimal effect on the local road network, with the largest increase being east of the Ferry Port Access Junction during the Operational AM Peak period. This is primarily due to the staff arrivals, which are to be scheduled to occur before 07:00. The very low traffic flows on the L2545 to the east of the Ferry Port access junction result in a proportionally-high increase. The road network at this location has ample capacity to accommodate the additional traffic.

**Table 7.18 Project Traffic Flows - Operational Afternoon Development Peak – Opening Year 2023**

Road	Operational – 14:00-15:00		
	Without	With	% Change
N28 – North of Shannon Park	2218	2255	2%
R611 Carrigaline Road – South of Shannon Park	1509	1517	1%
N28 – East of Shannon Park	1241	1287	4%
R610 Raffeen Bridge – North of N28	334	336	1%
N28 – East of Raffeen Bridge	1099	1148	4%
L6473 Raffeen Road – North of N28	80	81	1%
N28 – East of Shanbally	955	1004	5%
L2492 Shanbally Link Rd – South of N28	167	167	0%
R613 Barnahely Rd – South of N28	261	264	1%
N28 – West of Ferry Port Access	598	651	9%
L2545 Haulbowline Road – East of Ferry Port Access	197	249	27%
L6517 Loughbeg Road – South of N28	122	122	0%

\*All traffic flows in Passenger Car Units (PCUs) per hour

From the above analysis, it can be seen that during the Operational Afternoon Peak period, the relative effect on the local road network is minimal. However, it should be noted that the traffic surveys indicate that during this time period the local road network is not congested.

**Table 7.19 Project Traffic Flows - Operational PM Peak – Opening Year 2023**

Road	Operational – 18:00-19:00		
	Without	With	% Change
N28 – North of Shannon Park	2603	2640	1%
R611 Carrigaline Road – South of Shannon Park	1923	1934	1%
N28 – East of Shannon Park	1295	1342	4%
R610 Raffeen Bridge – North of N28	590	593	0%
N28 – East of Raffeen Bridge	1449	1499	3%
L6473 Raffeen Road – North of N28	148	151	2%
N28 – East of Shanbally	1324	1376	4%
L2492 Shanbally Link Rd – South of N28	217	217	0%
R613 Barnahely Rd – South of N28	356	361	1%
N28 – West of Ferry Port Access	619	676	9%
L2545 Haulbowline Road – East of Ferry Port Access	120	177	48%
L6517 Loughbeg Road – South of N28	412	412	0%

\*All traffic flows in Passenger Car Units (PCUs) per hour

The above analysis shows that the proposed development will have minimal effect on the local road network during the Operational PM Peak period other than east of the Ferry port junction, which is lightly trafficked, resulting in a proportionally high increase. The Operational PM Peak will see the majority of operational staff depart the site.

**Table 7.20 Project Traffic Flows – Network AM Peak – Opening Year 2023**

Road	Network – 08:00-09:00		
	Without	With	% Change
N28 – North of Shannon Park	2824	2837	0.4%
R611 Carrigaline Road – South of Shannon Park	1960	1962	0.1%
N28 – East of Shannon Park	1912	1926	0.8%
R610 Raffeen Bridge – North of N28	771	771	0.0%
N28 – East of Raffeen Bridge	1931	1946	0.8%
L6473 Raffeen Road – North of N28	366	366	0.0%
N28 – East of Shanbally	1941	1956	0.8%
L2492 Shanbally Link Rd – South of N28	379	379	0.0%
R613 Barnahely Rd – South of N28	484	485	0.1%
N28 – West of Ferry Port Access	1097	1113	1.4%
L2545 Haulbowline Road – East of Ferry Port Access	422	438	3.7%
L6517 Loughbeg Road – South of N28	346	346	0.0%

\*All traffic flows in Passenger Car Units (PCUs) per hour

The above analysis shows that the proposed development will have little or no effect on the local road network during the Network AM Peak period. This is due to the restrictions on waste acceptance and the scheduling of staff working hours outside of the Network AM Peak. The greatest increase is on the link east of the Ferry Port Junction – an increase of 16 PCUs in the hour. This link is lightly trafficked in the AM peak, resulting in an overall increase of 3.7%.

**Table 7.21 Project Traffic Flows – Network PM Peak – Opening Year 2023**

Road	Network – 16:45-17:45		
	Without	With	% Change
N28 – North of Shannon Park	3025	3037	0.4%
R611 Carrigaline Road – South of Shannon Park	2233	2235	0.1%
N28 – East of Shannon Park	1600	1615	0.9%
R610 Raffeen Bridge – North of N28	1010	1011	0.0%
N28 – East of Raffeen Bridge	1786	1801	0.8%
L6473 Raffeen Road – North of N28	179	179	0.1%
N28 – East of Shanbally	1487	1502	1.0%
L2492 Shanbally Link Rd – South of N28	358	358	0.0%
R613 Barnahely Rd – South of N28	478	478	0.1%
N28 – West of Ferry Port Access	996	1011	1.6%
L2545 Haulbowline Road – East of Ferry Port Access	221	236	7.2%
L6517 Loughbeg Road – South of N28	381	381	0.0%

\*All traffic flows in Passenger Car Units (PCUs) per hour

The above analysis shows that the proposed development will have little or no effect on the local road network during the Network PM Peak period, similar to the Network AM Peak. The greatest increase is on the link east of the Ferry Port Junction – an increase of 15 PCUs in the hour. This link is lightly trafficked in the PM peak, resulting in an overall increase of 7.2%.

### 7.10.4 Projected Junction Operation

In urbanised and industrialised areas, it is recognised that it is the capacity of the junctions on the road links rather than the road links themselves which determine the capacity of the road network. The following junctions were assessed both with and without traffic from the proposed development. These assessments were carried out to measure the effect of the generated traffic on the local road network. The locations of all junctions assessed are shown in **Figure 7.2**.

- Junction 1            Shannon Park Roundabout;
- Junction 2            Raffeen Bridge Junction;
- Junction 3            Shanbally Roundabout;
- Junction 4            Raffeen Road (adjacent to Shanbally Roundabout);
- Junction 5            Barnahely Junction (N18/R613);
- Junction 6            Ferry Port Access Junction; and
- Junction 7            Proposed Indaver Entrance.

The effect of the generated traffic on the local junctions has been assessed using Junctions 9, and by using the ARCADY and PICADY modules contained in the software. These computer applications determine the projected operation of the junctions based on a number of geometric parameters and traffic flow conditions.

Each junction has been assessed based on the following scenarios outlined in **Table 7.22**.

**Table 7.22 Assessment Scenarios for Modelling**

Scenario	Construction Peaks / Operational Peaks			Existing Network Peaks	
	06:00 - 07:00	14:00 - 15:00	18:00 - 19:00	08:00 - 09:00	16:45 - 17:45
2019 Base Year	✓	✓	✓	✓	✓
2022 Construction Year	✓		✓		
2023 Opening Year	✓	✓	✓	✓	✓
2028 Opening Year + 5	✓	✓	✓	✓	✓
2038 Opening Year + 15	✓	✓	✓	✓	✓

The results of the junction assessments are provided in **Appendix 7.1**, and are briefly summarised for each junction below.

### 7.10.5 Shannon Park Roundabout

As outlined above, the existing roundabout junction at Shannon Park is currently the subject of an improvement scheme, construction of which is ongoing. The proposed upgrades to the junction have been included in all assessment scenarios so as to ensure a 'like-with-like' comparison between all scenarios.

The improvement measures at the junction are seen to have a significant positive effect on the junction performance. In the 2019 Base Year scenario, all arms of the junction have sufficient capacity, with the N28 entry arm from the north having the maximum capacity value of 57% in the 08:00-09:00 AM Network Peak.

In the 2022 Construction Year, the construction traffic and workforce traffic travelling to the Indaver site is restricted to specific times outside the local morning and evening peak periods. All arms of the junction are seen to have sufficient capacity in both the 06:00-07:00 and 18:00-19:00 hours, with the maximum capacity value of 55% present on the R611 entry arm from Carrigaline in the 18:00-19:00 hour. The construction year represents the most significant effect from the RRRC, with associated traffic flows being much higher than operational traffic for the facility.

For the Opening Year (2023) and for +5 (2028) and +15 (2038) assessment years, the operational traffic is also restricted in the morning and evening at local peak hour periods. The junction is seen to have sufficient capacity in all scenarios to accommodate the proposed development. The maximum increase in capacity at the junction due to the introduction of the scheme is approximately 2%. Therefore, the Shannon Park roundabout has sufficient capacity to accommodate the scheme, which itself has a very minor effect.

### 7.10.6 Raffeen Bridge Junction

As with Shannon Park roundabout, the priority T-junction at Raffeen is also the subject of an improvement scheme, with construction works ongoing at the junction. Unlike the Shannon Park roundabout, however, the improvement works at Raffeen Bridge are primarily traffic-calming works and are expected to have an effect on the vehicular capacity of the junction as a result. The improvement measures have been included in all assessment scenarios, so as to ensure a 'like-with-like' comparison between all scenarios.

In the 2019 Base Year, the junction is seen to perform satisfactorily in all assessment scenarios, with the exception being the Network PM Peak (16:45-17:45). This peak hour is characterised by heavy returning traffic flow from Ringaskiddy to Cork and Carrigaline. A portion of this traffic uses the R610 via the Raffeen Bridge junction to avoid queuing and delay on the approach to Shannon Park roundabout and on the N28 mainline itself heading north towards Cork. Consequently, in the Network PM Peak, the right-turning movement from the N28 is over capacity. The traffic calming measures proposed for this junction are also reducing the operational capacity. In the Network AM Peak (08:00-09:00) the dominant movement is on the N28 heading east to Ringaskiddy, and the minor arm of the junction is therefore afforded little opportunity to access the N28 mainline, with this arm at approximately 77% capacity.

In the 2022 Construction Year, the construction traffic associated with the proposed development is scheduled to avoid the Network AM and PM Peak periods (08:00-09:00 and 16.45-17.45, respectively) and consequently the junction at Raffeen Bridge has sufficient capacity to accommodate the construction traffic without any issues.

The 2023, 2028 and 2038 scenarios, with the addition of background traffic growth from 2019, sees the Network AM and PM Peaks experience further capacity issues, primarily associated with the minor arm entry to the junction in the Network AM Peak, and the right-turning movement from the N28 in the Network PM Peak. However, the proposed development will be scheduled to have minimal operational traffic during these periods, with Operational Peak Periods in the early morning (06:00-07:00), the afternoon peak (14:00-15:00) and the later evening peak (18:00-19:00). The junction has sufficient capacity to accommodate the operational traffic during these operational peak periods, and the effect of the scheme during the Network AM and PM Peaks is minimal.

As outlined above, the ongoing works at this junction are intended to serve as traffic calming measures for this junction, and this will serve to discourage the use of the R610 as an alternative route for traffic. The upgrade of Shannon Park roundabout is also expected to significantly improve the performance of that junction, which is expected to attract traffic flow which would otherwise use the Raffeen Bridge junction. No allowance has been made for this expected trip redistribution following these works, or for any longer-term reduction in traffic flows due to the implementation of the M28 Motorway Scheme.

### 7.10.7 Shanbally Roundabout

In the 2019 Base Year scenario, the roundabout at Shanbally experiences heavy eastbound traffic flow in the morning period, particularly in the Network AM Peak (08:00-09:00). The tidal nature of the N28 flow to and from Ringaskiddy means that this heavy eastbound traffic flow is relatively unopposed, and the junction itself does not break down; rather it develops a slow-moving platoon of vehicles entering the roundabout from the west. This can lead to increased queuing and delay on this approach.

In the evening peak periods the returning traffic from the east and south through the junction lead to queuing and delay, particularly during the Network PM Peak (16:45-17:45), but also in the 18:00-19:00 period (although this typically levels off over the hour as traffic in the area clears).

In the 2022 Construction Year, these issues with eastbound traffic in the AM Peak and westbound traffic in the PM Peak are exacerbated due to the background traffic growth and the introduction of the Port of Cork re-development traffic (for Phases 1 and 2). The construction traffic associated with the proposed development are seen to have a minor effect on the junction in the Operational AM and PM Peak periods (06:00-07:00 and 18:00-19:00, respectively), with the AM and PM Network Peaks avoided entirely due to the scheduling of construction activity at the site.

In the 2023 Opening Year and the +5 (2028) and +15 (2038) design years, the growth in background traffic sees the Network AM and PM Peak periods suffer from increased queuing and delay due to the heavy eastbound flows in the AM Peak and heavy westbound flows in the PM Peak. Again, the scheduling of operational peaks at the development at times outside of the Network AM and PM Peaks ensures that operational traffic is minimised at these times, with a resultant very minor effect. It must be noted that in future years with background traffic growth this junction will see continued congestion and delay, regardless of the additional traffic associated with the proposed development.

As with the other junctions in the vicinity, no allowance has been made for the expected reduction in traffic due to the proposed M28 Motorway Scheme.

### 7.10.8 L6473 Raffeen Road T-junction

At the adjacent T-junction with the L6473 (Raffeen Road), in the 2019 Base Year scenario queuing is common during the Network AM Peak, due to the heavy eastbound traffic flows on the N28 mainline leaving little opportunity for traffic from the L6473 to join the N28. The proposed development is seen to have minimal effect on the performance of this junction; again, it is noted that in future years with background traffic growth congestion and delay will continue.

As with other junctions, the scheduling of both construction traffic outside of the Network AM and PM Peaks, and the minimisation of operational traffic during the Network AM and PM Peaks ensures that the development itself will have minimal effect on the performance of the junction.

As with the other junctions in the vicinity, no allowance has been made for the expected reduction in traffic due to the proposed M28 Motorway Scheme.

### 7.10.9 Barnahely Junction (N28-R613)

In the 2019 Base Year, the Barnahely Road junction has sufficient capacity to accommodate the prevailing traffic flows without experiencing any problems. During the Network AM and PM Peak periods the available capacity at the junction is reduced slightly; however, there is still ample capacity at the junction.

During the 2022 Construction Year, the scheduling of construction traffic to and from the site to avoid the Network AM and PM Peaks ensures that the junction has sufficient capacity to accommodate the development construction traffic.

Similarly, in the 2023, 2028 and 2038 assessment years, the junction has sufficient capacity to accommodate the growth in background traffic and the additional development traffic has minimal effect.

### 7.10.10 Ferry Port Junction

In the 2019 Base Year, the Ferry Port junction is lightly-trafficked outside of specific peak times, and consequently the junction has sufficient residual capacity.

During the 2022 Construction Year, with the additional background traffic growth and the Port of Cork Phases 1 and 2 traffic, the junction is still seen to have sufficient residual capacity to accommodate construction traffic associated with the proposed development, which is scheduled to arrive and depart the site outside of the Network AM and PM Peaks.

Similarly, during the 2023, 2028 and 2038 assessment years the junction has sufficient residual capacity and proposed development is seen to have minimal effect on the junction.

### 7.10.11 Proposed Entrance to Ringaskiddy Resource Recovery Centre

During the construction of the facility in 2022, the proposed site access at the site has sufficient capacity to accommodate the projected traffic flows associated with the construction of the facility.

Similarly, in the 2023, 2028 and 2038 assessment years, the junction has sufficient capacity to accommodate the projected traffic flows associated with the facility.

### 7.10.12 'Do Nothing' Scenario

If the proposed development were not to proceed (i.e. in a 'Do Nothing' scenario), traffic conditions in the local area would continue to experience periodic capacity issues at critical junctions at specific times of the day, primarily during the morning and evening peak periods. This would continue in line with future traffic growth and the realisation of any other planned developments in the study area over the coming years.

Whilst the proposed M28 upgrade scheme would be expected to provide relief to the local road network through the removal of a degree of traffic, including more 'strategic' traffic flows, nevertheless there will still be a need to ensure that the local road network is adequately managed so as to maintain operational capacity at key junctions during peak periods.

## 7.11 Mitigation and Monitoring Measures

As part of the design process for the proposed development, a number of mitigation measures were included to control the effect of the generated traffic on the local road network.

### 7.11.1 Mitigation Measures During Construction

#### 7.11.2 Construction Traffic Management Plan

Indaver will appoint a construction management team for the duration of the construction phase. The team will supervise the construction of the project, including monitoring the performance of the contractors to ensure that all of the proposed construction phase mitigation measures are implemented and that construction effects and nuisance are minimised. Indaver will liaise with neighbours and the general community during the construction phase to ensure that any disturbance is kept to a minimum.

A number of significant construction management measures have already been committed and factored into this assessment, including the scheduling of construction activities outside peak periods in order to ensure that the capacity of the N28 corridor is maintained at peak periods. As outlined in this assessment, construction staff and vehicles will not be present on the local road network from 07:00-09:00 and from 16:00-18:00.

These commitments will establish the principles that will inform the full development of a Construction Traffic Management Plan, which will be prepared by the appointed main contractor prior to construction commencing. The Construction Traffic Management Plan will comprise all of the construction traffic mitigation measures which are set out in this EIA and any additional measures which are required by the conditions attached to the Board's decision. The Construction Traffic Management Plan will also include any specific requirements of Cork County Council during the construction phase including any monitoring and reporting requirements. This Plan will be submitted to and agreed with Cork County Council prior to construction commencement. An indicative outline of the structure and content of the CTMP is outlined in **Appendix 5.1**.

### 7.11.3 Mitigation Measures During Operation

#### 7.11.4 Indaver Staff Mobility Management Plan

Indaver has prepared a Mobility Management Plan (MMP) for staff employed at the facility, which is intended to reduce the amount of single-occupancy car trips to and from the site. Note that for the purpose of this assessment, no reductions in single-occupancy car trips have been assumed to result from the implementation of the MMP.

This MMP will be reviewed and revised on an annual basis. The review will comprise the undertaking of staff travel-to-work surveys and the review of targets set in the MMP. In the longer term, this MMP will remain part of company policy in order to ensure that the longer-term capacities of the existing N28 and upgraded M28 are still considered.

The Indaver Staff Mobility Management Plan is included in **Appendix 7.2**.

#### 7.11.5 Staff Operational Hours

As outlined in this assessment, Indaver has structured staff working hours in order to ensure that arrivals and departures will occur outside of the AM and PM network peak periods. This will ensure that the traffic flows associated with staff movements at the site will occur during hours where there will be sufficient reserve capacity on the local road network to accommodate the projected increase in traffic.

Similarly, during the construction stage in 2022, restrictions on arrivals and departures have been proposed which will ensure that no vehicles (construction staff and HGV's) will arrive or depart the site during the AM and PM network peaks. Instead, these movements will occur during hours with sufficient reserve capacity on the local road network.

#### 7.11.6 Indaver HGV Mobility Management Plan

The strategic development proposals submitted by the Port of Cork for an expansion of their facility at Ringaskiddy include a Freight Mobility Management Plan, developed to assist the Port in managing and controlling the flow of traffic to and from Ringaskiddy during peak hours. The Port's approach includes a number of key elements, as outlined in **Section 8.7.1** of the **Traffic & Transportation** chapter of the EIS documentation submitted as part of their planning application:

- Development and use of a booking system to manage freight arrivals and departures;
- Controlling and optimising gate operations to regulate HGV flow;
- Extended operating hours to allow the Port to operate outside of the AM and PM peaks; and
- The use of IT solutions to disseminate information to hauliers regarding port operations and traffic conditions.

Through the above measures, it is stated that the number of arrivals and departures can be controlled and reduced to an acceptable level.

The principle of mobility management is key in the Ringaskiddy area, where there are peak periods that experience high traffic flow, and corresponding inter-peak periods with significant spare capacity on the road network. Though the Port of Cork has completely different operational requirements to an incinerator with energy recovery, Indaver recognise the need for a similar approach to mobility management of HGV traffic.

In a similar manner to systems already in use at its Meath facility, Indaver proposes to implement a mobility management plan for HGVs. This will include a dedicated waste planner who manages the SAP delivery booking system, control of gate operations at the site entrance, extended operating hours to allow customers to avoid the morning and evening peak periods on the local road network and a web-text service to disseminate information to customers. This will optimise the volume of waste delivery HGV traffic travelling to and from the site on the road network over the course of the whole day, allowing for traffic arrivals to be controlled and scheduled during peak periods.

The above measures will allow Indaver to control the arrival and departure of HGVs in the 07:00-09:00 and 16:00-18:00 peak periods and reduce HGV trips to and from the RRRC during these times to a minimal level.

It is noteworthy that regardless of traffic conditions in the Ringaskiddy area, Indaver must have control over the delivery of waste material, including advanced notification of the type of waste material to be delivered, and the date of delivery. This is due to the need to control the calorific value of the mix of waste accepted at the facility at any one time. Consequently, Indaver already adopt a robust approach to the advance planning of the acceptance of waste at specific times.

Adopting this system will ensure that the effect of HGV traffic flows associated with the facility will be minimised during peak periods, and that truck queuing in and out of the facility will be nominal. The HGV mobility management plan covers all stages of delivery, from pre-arrival, through to arrival and presence on-site, and departure. The system works as follows:

- Step 1 – The Indaver waste planner uses the booking system to create a high-level waste delivery plan;
- Step 2 – A week in advance, the waste planner in consultation with clients, creates a sales order for each delivery. This includes information about the customer, the waste type and the allocated delivery slot;
- Step 3 – The waste delivery arrives at the facility – note that drivers cannot enter the facility without checking in with the gate-keeper and receipt of a swipe card;
- Step 4 – The gate-keeper matches the delivery in question with the relevant sales order, the booking system records the arrival time and vehicle registration number, the driver receives a swipe card and a delivery docket;
- Step 5 – The driver swipes the card at the weighbridge, recording the entry weight and time, and the driver enters the site;
- Step 6 – The driver proceeds to the waiting zone outside the tipping hall, hands in the delivery docket, and proceeds to a tipping gate when instructed to do so;
- Step 7 – After tipping, the driver returns to the weighbridge;

- Step 8 – The driver swipes his card at the weighbridge, recording the exit weight and time, completing the delivery. An automatic record of the delivery is printed at the gatehouse; and
- Step 9 – The driver parks outside the gatehouse, returns his swipe card to the gatekeeper and received the printed delivery record. The driver then leaves.

At restriction periods, the number of available slots at the facility will be restricted in order to control the arrival of vehicles at the site. Turnaround time at the facility is approximately 25 minutes.

In addition to the proposed HGV Mobility Management Plan, the proposed extended operating hours of 06:00-20:00 will allow hauliers to schedule their deliveries to the proposed facility outside of the prevailing AM and PM network peak hours. Discussions with operators has suggested a strong preference for the proposed extended operating hours at the site, allowing these clients to schedule their deliveries outside of peak traffic times.

Indaver already employ a dedicated waste planner for the Meath facility who maintains communications with customers as part of their role; Indaver also already uses a web-text service for the Meath facility, to disseminate general announcements. Indaver proposes to have a dedicated waste planner and associated communications tools including a web-text service in Cork to allow hauliers and other customers to communicate with the Indaver Waste Planning Department quickly and efficiently regarding operations at the facility and prevailing road and traffic conditions.

The booking system allows Indaver to keep records of all arrivals and departures at the facility and can generate records for review by the local authority in order to demonstrate the efficacy of the proposed Mobility Management Plan, including arrival, entry and departure times, turnaround times and longer-term delivery trends.

**Figure 7.3** shows a screenshot of the existing online planning tool in operation at the Meath facility. A step-by-step process flowchart of the HGV Mobility Management Plan is included in **Appendix 7.3**.

### 7.11.7 Monitoring Measures During Construction

There are no specific monitoring measures proposed during the construction stage of the scheme.

### 7.11.8 Monitoring Measures During Operation

As outlined in this report, Indaver have an established practice for the scheduling of arrivals and departures of waste delivery vehicles. This system creates and maintains arrival and departure records and can be reviewed as necessary.

Indaver have also prepared a staff Mobility Management Plan, which is subject to annual review to establish the success of the plan and to set out targets for the subsequent year of operation.

## 7.12 Cumulative Effects

As outlined in **Section 7.6**, a number of committed projects in the vicinity of the proposed RRRC site have been identified. Many of these projects are constructed and operational. Traffic data from January 2019 therefore includes this traffic that is already present on the local road network.

The baseline traffic data has also been growthed for future year assessments using a 'Medium' growth profile as per the Transport Infrastructure Ireland Project Appraisal Guidelines. Therefore, it is considered that this growthed traffic is sufficient to account for the majority of the committed developments in the vicinity of the site. The Port of Cork operational traffic has also been included as a specific additional development (i.e. additional to the growthed traffic).

As outlined in this assessment, the local road network is subject to delay and congestion at a number of key junctions at specific times; however, there is significant residual capacity available on the local road network outside of these times, and these issues remain at these junctions with the addition of traffic associated with the aforementioned committed developments.

However, the proposed RRRC development will seek to co-ordinate construction and operational traffic to avail of the capacity that is present on the N28 corridor outside of the morning and evening peak periods. As such, the effect of the proposed RRRC scheme is minimal.

## 7.13 Residual Effects

Regardless of whether or not the RRRC proceeds, there are ongoing capacity issues on the local road network at a number of key junctions, particularly at Shannon Park and Shanbally roundabouts, and at the Raffeen Bridge junction. The majority of the issues at these junctions are associated with the morning and evening network peak periods (08:00-09:00 and 16:45-17:45), with the Shannon Park roundabout and Raffeen Bridge junction also quite busy in the early portion of 18:00-19:00 period (although less so than the two periods mentioned above).

However, as outlined above, ongoing improvement works at Shannon Park roundabout are expected to significantly improve the performance of the junction. These works have commenced as of February 2019 and are expected to be complete by mid-2019.

The introduction of the RRRC has a moderate effect during the construction phase in the 18:00-19:00 evening period. This effect is temporary in nature as it is associated with construction activity at the site. Post-opening, the facility has minimal effect on the local road network.

Indaver have committed to scheduling construction traffic during the construction phase in 2022, and operational phase in 2023 (and beyond) so as to have a minimal amount of traffic flow to and from the site in two-hour periods in the morning and evening, thereby avoiding the peak periods outlined above in the morning and evening, and instead availing of the capacity on the local road network outside of these times.

As part of this assessment, no allowance has been made for the construction of the M28 Motorway Scheme, recently announced in the Government Capital Investment Programme (note that this scheme has received planning permission but is currently the subject of a Judicial Review). It is expected that the M28 scheme will significantly improve the operation of Shannon Park and Shanbally roundabouts by removing strategic traffic flows from these junctions, and indeed from other junctions on the local road network.

## 7.14 References

Transport Infrastructure Ireland (TII) (2016) *Project Appraisal Guidelines, Unit 5.5: Link-Based Traffic Forecasting, Table 5.5.1: National Traffic Growth Forecasts: Annual Growth Factors*, TII, Dublin, Ireland

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Transport for London (2010) *Traffic Modelling Guidelines*, Transport for London, UK