

SECTION 6: Traffic and Transportation

6.1 Introduction

The traffic and transportation section has been designed to assess the potential traffic related impacts associated with the construction and operation of the Castletroy Wastewater Treatment Plant (WwTP) Upgrade.

6.2 Assessment Methodology

6.2.1 Methodology

The methodology adopted for this report is summarised as follows:

- Reference was made to site layout drawings;
- Existing and proposed access arrangements for the development onto the surrounding road network were considered;
- The traffic survey location and survey times were selected so as to best reflect the likely traffic impacted by the Proposed Development;
- Existing traffic volumes on the surrounding road network were analysed;
- The project's trip generation was estimated for the construction phase; and
- The junctions considered to be most likely to be impacted upon by traffic movements associated with the Proposed Development were assessed in terms of capacity and road safety.

In preparing this assessment, reference has been made to the following documents:

- TII Traffic and Transport Assessment Guidelines;
- TII PE-PAG-02017 - Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections;
- Design Manual for Urban Roads and Streets (DMURS); and
- Limerick Development Plan 2022–2028, which replaces the specific policies and objectives of the Castletroy Local Area Plan 2019-2025.

The assessment is based on the findings of site visits, observations, on-site traffic counts and plans associated with the Proposed Development. Consultation meetings were also held with the Design Team. Consultation, Limerick City and County Council (LCCC) and University of Limerick (UL) Buildings and Estates department.

6.2.2 Modelling Methodology

Construction Phase

Traffic survey has been conducted in order to obtain the baseline traffic flows. To establish the future year traffic flows during construction phase, the traffic count survey data will be factored up to the construction year 2026, which is an anticipated completion date of the construction works, using TII Project Appraisal Guidelines for National Roads: Unit 5.3 Travel Demand Projections (Transport Infrastructure Ireland, 2021).

Due to the nature of project, element of works, including earthworks, concreting of stormwater storage tanks, removal of cofferdam and backfilling, mechanical installations, and electrical installations, etc., will be constructed sequentially and will not be undertaken concurrently. In this regard, traffic volumes of HGV associated with the construction phase of the Castletroy Wastewater Treatment Plant Upgrades were estimated based on the highest number of HGV traffic per hour of element of works.

An assessment of the distribution of construction traffic throughout the junctions in the area has been carried out. As part of the baseline traffic model, the trips generated during the construction phase have been applied to the road network, along the identified haul route. The peak turn-in and turn-out flows calculated for the Proposed Development were assigned to relative junctions and considered with reference to the proportions of overall traffic flows.

Operational Phase

For operational phase, an exercise has been carried out to quantify the expected development generation as a proportion of existing traffic flows on the surrounding road network. If the estimated trips associated with the Proposed Development represents a tiny proportion of existing traffic flows on the surrounding road network and less than the thresholds for traffic impact assessment stated in the Table 2.1 of TII Traffic and Transport Assessment Guidelines (i.e. 10% of the traffic flow on the existing road network and 5% in sensitive environments or where congestion exists), a full traffic impact assessment is not required for the affected junctions. The details are discussed in Section 6.6 below.

6.2.3 Consultation with the University of Limerick

As part of the traffic assessment, high level initial consultation was carried out with University of Limerick (UL) Buildings and Estates office with regard to construction traffic movements. They were requested to review and provide feedback on information regarding construction traffic numbers and the nature of materials and plant that will need to be transported to and from the site.

It is a concern of the project team that the LCCC Access Road is not wide enough for two lorries to pass and does not have any lay-by area. Therefore, during the busiest phase of the project (excavation and concrete pour periods) there is potential for hazardous back-ups onto the Plassey Road. A traffic light or stop/go system has been considered to control movements on the LCCC Access Road, but use of the internal UL campus road may also be required. It is also expected that certain large plant and equipment, as such as temporary offices and/or storage units, may need to be transported via the internal UL campus road. In order to minimise the impacts on UL the contractor will be required, as far as reasonably possible, to schedule these operations out of term months and/or teaching hours.

Feedback points from the university are listed below and subsequent mitigation measures are outlined further in Section 6.7.

- UL are not opposed to construction traffic accessing the site via the internal campus road. However, it is requested that HGVs using this route will be clean and empty.
- It has been requested that there is zero disruption during exam periods due to construction traffic.
- UL have an agreement with Limerick City and County Council to use the LCCC Access Road for inward traffic during term months, between the peak hours of 8 and 10am;
- Approx. 500 cars per day enter the campus via the LCCC Access Road during peak hours, so it needs to remain a one-way system only at that time;
- The flow of traffic on the LCCC Access Road is good throughout the morning so the addition of light construction (one way) traffic will not be an issue;
- Outside peak hours a two direction by stop/go control system can be implemented for construction traffic;
- Campus traffic can be heavy in the afternoons, therefore, the LCCC Access Road is likely to be the best route for all construction traffic;
- There have been safety issues in the past regarding pedestrians and cyclists at the cross roads near the site entrance and also at points along the LCCC Access Road. A health and safety plan will need to be put in place during construction, particularly during the busy periods; and
- Other future projects on campus may have potential for cumulative traffic impacts. UL were unable to provide details at this time, but they will update the project team if there are any significant developments.

6.3 Receiving Environment

6.3.1 Site Location

The existing WwTP is located at the L1117 Plassey Park Road and is bounded to the north by the Lower River Shannon, to the west by the University of Limerick Rowing Club, to the south by the University of Limerick Western Carpark and attendant Nexus Innovation Centre, and to the east by ruins of the old Plassey Mills and beyond this Dromore Student Village as shown in Figure 6-1.



Figure 6-1: Site Location Plan

6.3.2 Local Road Network

The main access to the site will be gained via the existing access (Limerick City and County Council Access Road), which is connecting to Plassey Park Road directly. Currently, the Limerick City and County Council Access Road is a one-way road (northbound direction), and it is only open for public use between the hours of 08:00am and 10:00am Monday to Friday. Also, the internal roads of the University of Limerick (UL) provide connection between the site and Plassey Park Road. The Limerick City and County Council Access Road has a road pavement width of approximately 4 metres without pedestrian footpath and it prohibits pedestrian and cyclist to use this road as shown in Figure 6-2.



Figure 6-2: Limerick City and County Council Access Road

Dublin Road (R445) is a bi-directional two-lane/ three-lane/ four-lane road running between Limerick City and the Newport roundabout with road pavement width of approximately 9 - 13.5 metres. The location of Dublin Road (R445) is illustrated in Figure 6-5. A pedestrian footpath is present along Dublin Road and cycle track is partially present for the road section between Junction 6 - Dublin Road/ Childers Road roundabout and Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road roundabout as shown in Figure 6-3.



Figure 6-3: Dublin Road

Plassey Park Road is a bi-directional two-lane road connecting between Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road roundabout and Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road roundabout with road pavement width of approximately 6.5 metres as shown in Figure 6-4. A pedestrian footpath is present along Plassey Park Road while cycle track/ lane is partially present along the western side of Plassey Park Road, but no cycle track/ lane exists along the eastern side of Plassey Park Road.

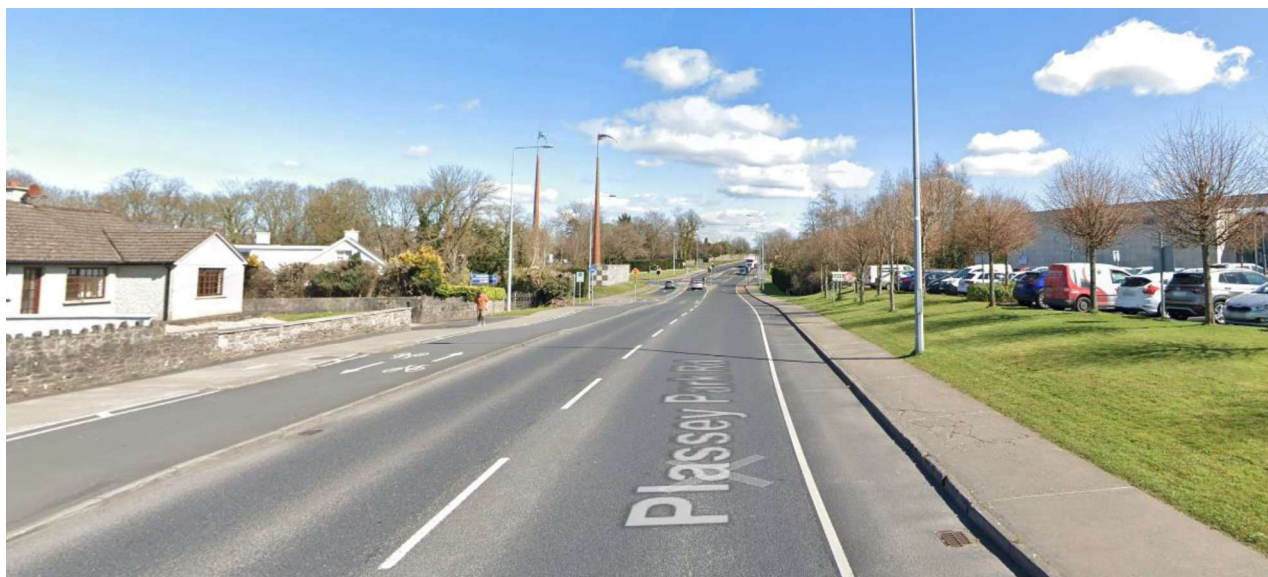


Figure 6-4: Plassey Park Road

6.3.3 Traffic Surveys

In order to determine traffic behaviour in the vicinity of the subject site for the baseline scenario, vehicle turning movement surveys were conducted for six junctions near the subject site. The locations obtained are illustrated in Figure 6-5 and comprise:

- Junction 1- Plassey Park Road/ Limerick City and County Council Access Road
- Junction 2- Plassey Park Road/ Dublin Road/ Groody Road roundabout
- Junction 3- Plassey Park Road/ Plassey Road
- Junction 4- Plassey Road/ Dublin Road/ Kilmurry Road roundabout
- Junction 5- Plassey Park Road/ Dublin Road/ Castletroy College Road roundabout
- Junction 6- Dublin Road/ Childers Road roundabout

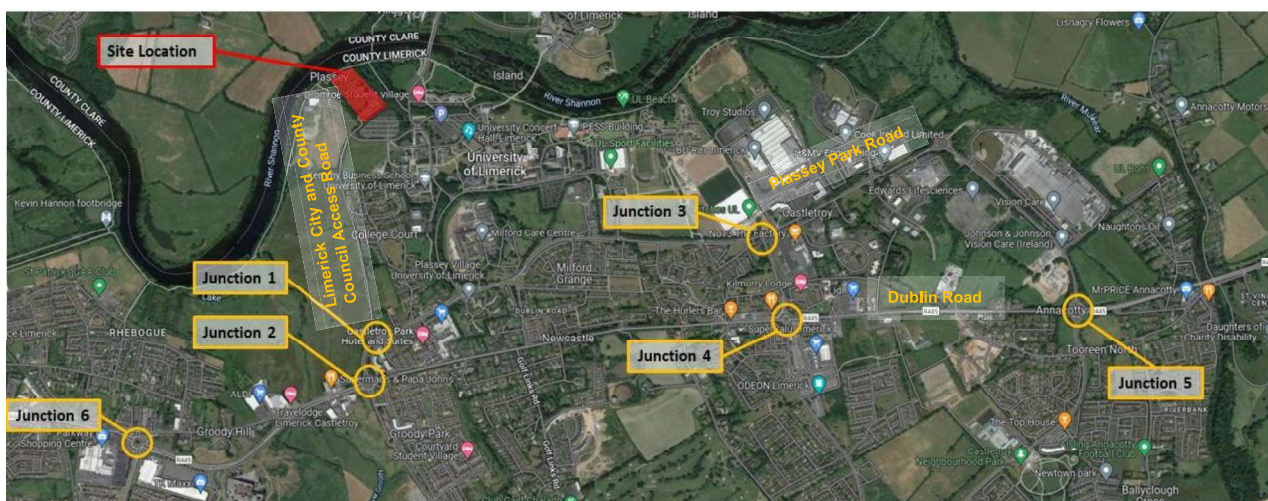


Figure 6-5: Location of the Site and Surveyed Junctions

The vehicle turning movement surveys were undertaken on Thursday 12nd May 2022 while schools, including the University of Limerick, were still open before the summer break to ensure the typical daily volume of traffic during school term was included. The counts were carried out over a 12-hour period from 07:00 hours to 19:00 hours including both the morning and evening peak periods.

The counts captured all turning movements at these junctions and data was collected in 15-minute intervals. The morning peak hours, including lunch time peak, were identified as 08:00-09:00 for Junction 1 to Junction

5 and 13:00 – 14:00 for Junction 6. The evening peak hours were identified as 15:00-16:00 for Junction 4, 16:00-17:00 for Junction 1, Junction 3 and Junction 5, and 17:00-18:00 for Junction 2 and Junction 6. The following count classifications were employed, Light Vehicles (LV) and Heavy Goods Vehicles (HGV).

The morning and evening peak hour traffic flows through the junction are illustrated in Figure 6-6 and Figure 6-7:.

2022 – Base Year AM Peak

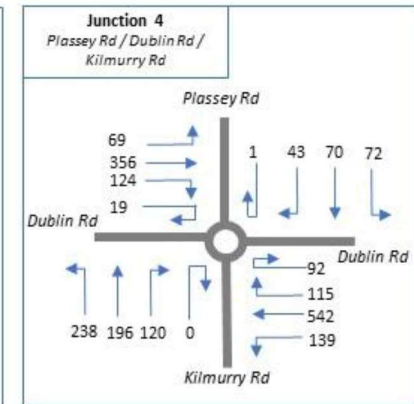
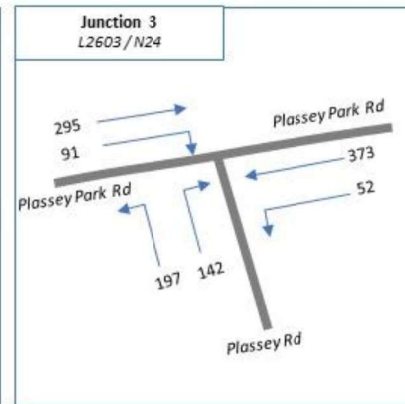
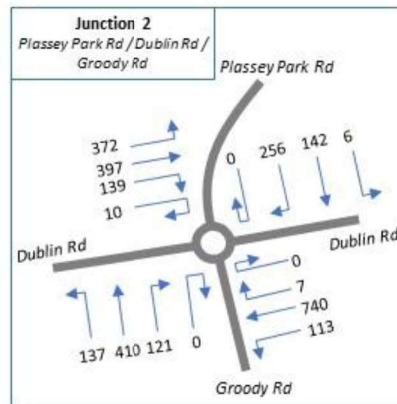
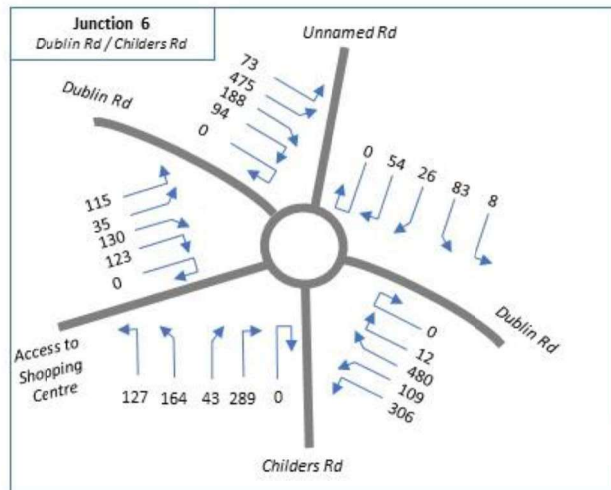
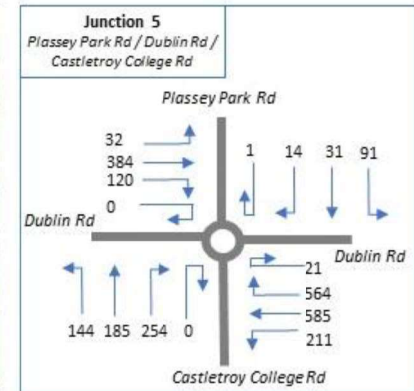
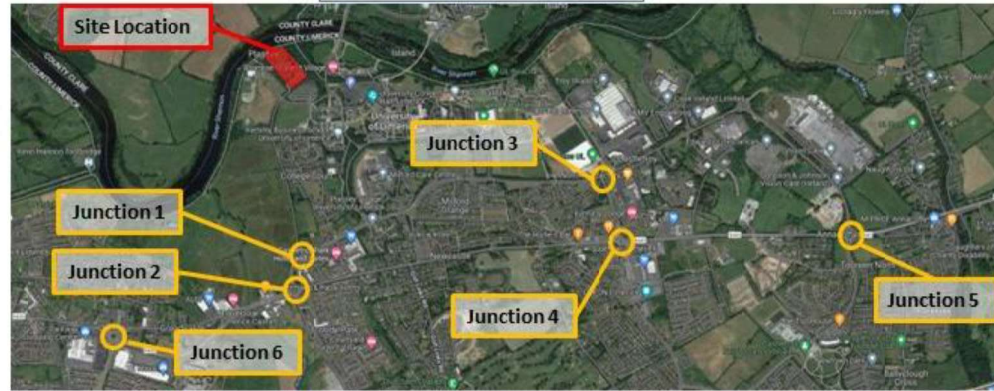
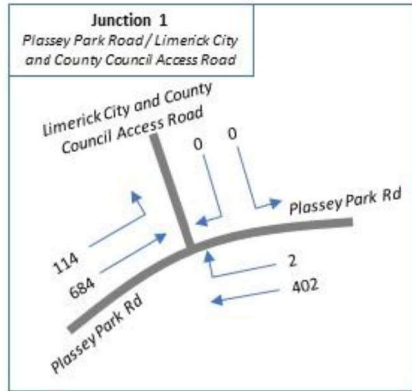


Figure 6-6: 2022 Baseline Year (AM Peak Hour Traffic Flows)

2022 – Base Year PM Peak

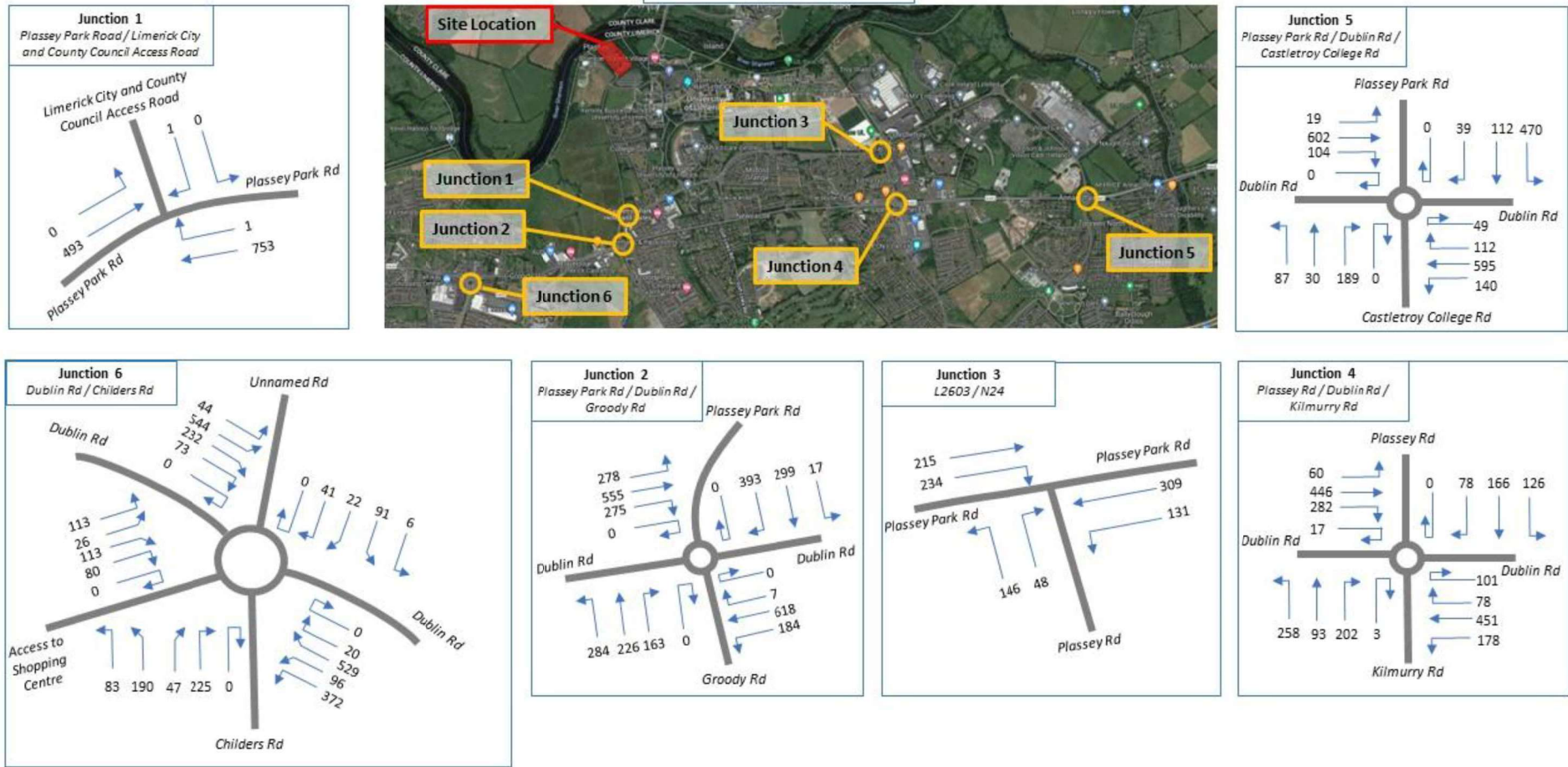


Figure 6-7: 2022 Baseline Year (PM Peak Hour Traffic Flows)

6.3.4 Junction Capacity Assessment for Base Year 2022

A traffic capacity assessment of the six junctions in the vicinity of the subject site was undertaken utilising the surveyed results shown in Figure 6-6 and Figure 6-7: above and the Transport Research Laboratory's (TRL) Priority Intersection Capacity and Delay (PICADY) & Assessment of Roundabout Capacity and Delay (ARCADY) traffic modelling software for priority junction and roundabout junction.

Junction 1 - Plassey Park Road/ Limerick City and County Council Access Road

A summary of the results of the analysis of Junction 1 - Plassey Park Road/ Limerick City and County Council Access Road for the morning and evening peak hours is shown in Table 6.1.

Table 6.1: 2022 Baseline Year Junction Capacity Analysis for Junction 1

Approach Arm	Max. RFC		Max. Queue (PCU1)		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Plassey Park Road West	0	0	0	0	0	0
Limerick City and County Council Access Road	0	0	0	0	0	0
Plassey Park Road East	0.01	0	0	0	8	7

The normal design standard for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 6.1 demonstrate that Junction 1 - Plassey Park Road/ Limerick City and County Council Access Road is operating within the normal design standard in the morning and evening peak hours under the 2022 baseline scenario.

Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road Roundabout

A summary of the results of the analysis of Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road roundabout for the morning and evening peak hours is shown in Table 6.2.

Table 6.2: 2022 Baseline Year Junction Capacity Analysis for Junction 2

Approach Arm	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Plassey Park Road	0.29	0.59	0	2	4	7
Dublin Road East	0.48	0.54	1	1	4	5
Groody Road	0.65	0.67	2	2	10	10
Dublin Road West	0.44	0.52	1	1	3	3

The normal design standard for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 6.2 demonstrate that Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road

¹ PCU means Passenger Car Unit. A passenger car equivalent is essentially the impact that a mode of transport has on traffic variables (such as headway, speed, density) compared to a single car. For example, 1 private car is equal to 1 pcu and 1 HGV is equal to 2.3 pcu.

roundabout is operating within the normal design threshold in the morning and evening peak hours under 2022 baseline scenario.

Junction 3 - Plassey Park Road/ Plassey Road

A summary of the results of the analysis of Junction 3 - Plassey Park Road/ Plassey Road for the morning and evening peak hours is shown in Table 6.3.

Table 6.3: 2022 Baseline Year Junction Capacity Analysis for Junction 3

Approach Arm	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Plassey Park Road East	0	0	0	0	0	0
Plassey Road	0.81	0.43	4	1	39	13
Plassey Park Road West	0.16	0.40	0	1	7	9

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 6.3 demonstrate that Junction 3 - Plassey Park Road/ Plassey Road is operating within the normal design threshold in the morning and evening peak hours under 2022 baseline scenario. The Plassey Road arm on this Junction during the morning peak hour is beginning to approach the design threshold with minor queues and delays for motorists occurring.

Junction 4 - Plassey Road/ Dublin Road/ Kilmurry Road Roundabout

A summary of the results of the analysis of Junction 4 - Plassey Road/ Dublin Road/ Kilmurry Road roundabout for the morning and evening peak hours is shown in Table 6.4.

Table 6.4: 2022 Baseline Year Junction Capacity Analysis for Junction 4

Approach Arm	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Plassey Road	0.24	0.60	0	2	6	14
Dublin Road East	0.68	0.71	2	3	9	11
Kilmurry Road	0.66	0.62	2	2	12	11
Dublin Road West	0.48	0.66	1	2	6	9

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 6.4 demonstrate that Junction 4 - Plassey Road/ Dublin Road/ Kilmurry Road roundabout is operating within the normal design threshold in the morning and evening peak hours under 2022 baseline scenario.

Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road Roundabout

A summary of the results of the analysis of Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road roundabout for the morning and evening peak hours is shown in Table 6.5.

Table 6.5: 2022 Baseline Year Junction Capacity Analysis for Junction 5

Approach Arm	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Plassey Park Road	0.15	0.73	0	3	4	15
Dublin Road East	0.69	0.46	2	1	6	3
Castletroy College Road	0.60	0.25	2	0	9	4
Dublin Road West	0.45	0.45	1	1	5	4

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 6.5 demonstrate that Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road roundabout is operating within the normal design threshold in the morning and evening peak hours under 2022 baseline scenario.

Junction 6 - Dublin Road/ Childers Road Roundabout

A summary of the results of the analysis of Junction 6 - Dublin Road/ Childers Road roundabout for the morning and evening peak hours is shown in Table 6.6.

Table 6.6: 2022 Baseline Year Junction Capacity Analysis for Junction 6

Approach Arm	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
	AM	PM	AM	PM	AM	PM
Unnamed Road	0.24	0.22	0	0	7	6
Dublin Road East	0.44	0.48	1	1	4	4
Childers Road	0.46	0.40	1	1	5	4
Access to Shopping Centre	0.32	0.26	1	0	4	4
Dublin Road West	0.64	0.66	2	2	8	8

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 6.6 demonstrate that Junction 6 - Dublin Road/ Childers Road roundabout is operating within the normal design threshold in the morning and evening peak hours under 2022 baseline scenario.

6.4 Characteristics of the Proposed Development

The Proposed Development involves upgrades to the existing wastewater treatment plant by means of installation of stormwater storage tank and an Integrated fixed film activated sludge (IFAS) system, as well as improvement to sludge treatment facilities. The plant is currently operating at a capacity of 39,00PE with a design capacity of 45,000PE. The Proposed Development intends to upgrade the plant to a capacity of 77,500 PE.

6.5 Potential Impacts During Construction Phase

It is anticipated that the construction works will commence in 2024, with all works completed in 2026. Traffic analysis associated with the impact of the construction works will, therefore, focus on the following future scenarios:

- Final Year of Construction – 2026.

6.5.1 Do-Nothing Impacts

The future operation of the road network was examined in the “Do-nothing” scenario. To establish the future year traffic flows, the traffic count survey data on 12nd May 2022 will be factored up to the construction year 2026, which is an anticipated completion date of the construction works, using TII Project Appraisal Guidelines: Unit 5.3 Travel Demand Projections.

6.5.2 Construction Phase Impacts

The future operation of the road network was examined in the “Do-something” scenario during the construction phase. The results of this “Do-something” assessment were compared to the “Do-nothing” scenarios to determine the impact of the proposed scheme on the road network.

To establish the future year flows, the traffic count survey data on 12nd May 2022 will be factored up to the Final Year of Construction - 2026, which is an anticipated completion date of the construction works, using TII Project Appraisal Guidelines: Unit 5.3 Travel Demand Projections. Construction traffic associated with the Proposed Development was then applied to these future year flows to develop the “Do-something” scenario.

Construction Traffic Trip Generation during Construction Phase

A) HGV for the Element of Works

Due to the nature of works, the element of works, including earthworks, concreting of stormwater storage tanks, removal of cofferdam and backfilling, mechanical installations, and electrical installations, etc., will be constructed sequentially and not be undertaken concurrently. For example, the mechanical and electrical installation works shall only be commenced after completion of civil works. Based on the information provided by the design team, the activities for “excavation” and “construction of stormwater storage tanks” will be the top two highest trip generation/ attraction activities during construction. In reality, the arrival/ departure trips for excavation (i.e. dump trucks) and construction of stormwater storage tanks (i.e. concrete trucks) will evenly distribute throughout a day. To strike a balance between the robust assessment and the real situation, it has been assumed that those HGVs associated with the construction phase will only arrive or departure to/ from the site within 4 hours per day instead of normal working period (i.e. 8 hours per day). Table 6.7 following summarises the anticipated construction traffic trips associated with these two elements of works.

Table 6.7: Total Trip Generation During Construction

Element	Volume (m ³)	Load per Truck (m ³)	Period	HGV (Veh/day)		HGV (Veh/hr)**		HGV Total (Veh/hr)
				Arrivals	Departures	Arrivals	Departures	
Excavation	9,800	10	40 days	25	25	6	6	12
Stormwater storage tank construction	1,500	8	90 days	50*	50*	13	13	26

Note: * it is assumed that maximum 50 loads per day during concreting.

** it is assumed that working hour per day is 8 hours. To provide a robust analysis of the impact caused by construction traffic, it has been assumed that HGV associated with the construction phase will only arrive or departure to/from the site within 4 hours per day.

According to the above table, the highest trip generation of the element of works is “construction of stormwater storage tank” and it will be used for estimation of construction traffic trips in the morning and evening peak hour.

B) HGV for Daily Operation

It is also anticipated that the site will attract 7 HGV arrivals and 7 HGV departures for daily operation (i.e. delivery of materials and diesel). In order to provide a robust assessment of the impact of the Proposed Development, it has been assumed that these daily arrivals and departures occur in the AM and PM peak hour.

C) Staff Vehicles

Estimates of the future staff numbers associated with the development was obtained from the design team. It has been estimated that 40 staffs will be based on site during construction and it has been conservatively estimated that all staffs will arrive on site in single occupancy vehicles.

D) Total Trip Generation

In view of above figures, the site will attract 13 HGV and 7 HGV for the “construction of stormwater storage tank” and daily operation respectively. Overall, the site will totally attract 20 HGV arrivals and 20 HGV departures in the morning and evening peak hour during construction phase.

The combined AM peak hour trip generation for HGVs and staff is presented in Table 6.8.

Table 6.8: AM Peak Trip Generation During Construction

	HGVs		Staff		Total	
	Veh/hr	PCU/hr*	Veh/hr	PCU/hr**	Veh/hr	PCU/hr
Arrivals	20	46	40	40	60	86
Departures	20	46	4	4	24	50
Total	40	92	44	44	84	136

Note: * 2.3 pcu factor is applied for HGV

** 1.0 pcu factor is applied for staff vehicle

The PM peak hour is assumed to be the inverse of the AM peak hour presented in Table 6.8, with 40 staff departures and 4 staff arrivals.

Trip Distribution and Trip Assignment

To minimize the impact to the University of Limerick, it is proposed that staff vehicles/ construction vehicles will mainly use the Limerick City and County Council Access Road travelling to/ from the site via the Junction 1 – Plassey Park Road/ Limerick City and County Council Access Road.

The haul routes were identified for staff vehicles/ construction vehicles travelling to/ from the site as shown in the Figure 6-8.

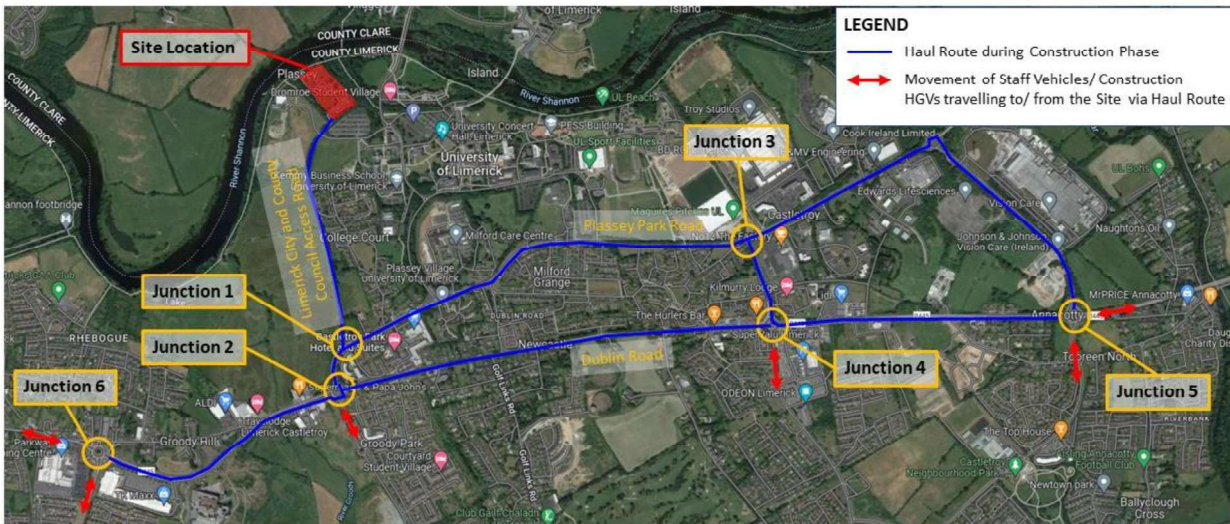


Figure 6-8: Identified Haul Routes to/ from the Site during Construction Phase

A) Trip Generation

All vehicles from the sites will travel to Junction 1 – Plassey Park Road/ Limerick City and County Council Access Road via the Limerick City and County Council Access Road and then either travel to Plassey Park Road eastbound or westbound. Based on the traffic count survey data, the trip generation in morning and evening peak hour from the site at Junction 1 is shown in below Table 6.9.

Table 6.9: Trip Distribution (Generation) at Junction 1

Movement	Morning Peak Hour		Evening Peak Hour	
	Traffic Count Data	Model Split	Traffic Count Data	Model Split
Plassey Park Road Eastbound	684	63%	492	39%
Plassey Park Road Westbound	402	37%	753	61%

According to the above table, in morning peak hour, 63% of vehicles from the site will turn left from the Limerick City and County Council Access Road to Plassey Park Road eastbound and 37% of vehicles from the site will turn right from the Limerick City and County Council Access Road to Plassey Park Road westbound. In evening peak hour, 39% of vehicles from the site will turn left from the Limerick City and County Council Access Road to Plassey Park Road eastbound and 61% of vehicles from the site will turn right from the Limerick City and County Council Access Road to Plassey Park Road westbound. It is assumed that all vehicles will travel through the identified haul routes and leave the study area as shown in following locations (refer to Figure 6-8):

- Junction 2 – to Groody Road.
- Junction 4 – to Kilmurry Road.
- Junction 5 – to Dublin Road east.
- Junction 5 – to Castletroy College Road.
- Junction 6 – to Dublin Road west.
- Junction 6 – to Childers Road.

B) Trip Attraction

All vehicles access to the site will enter the identified haul routes from the following locations:-

- Junction 2 – from Groody Road.

- Junction 4 – from Kilmurry Road.
- Junction 5 – from Dublin Road east.
- Junction 5 – from Castletroy College Road.
- Junction 6 – from Dublin Road west.
- Junction 6 – from Childers Road.

Based on the traffic count survey data, the trip generation in morning and evening peak hour from the above-mentioned locations is shown in below Figure 6-10: 2026 Design Year (PM Peak Hour Traffic Flows) during Construction :

Table 6.10: Trip Distribution (Attraction)

Junction	Movement	Morning Peak Hour		Evening Peak Hour	
	From	Traffic Count Data	Model Split	Traffic Count Data	Model Split
Junction 2	Groody Road	410	14%	226	12%
Junction 4	Kilmurry Road	196	7%	93	5%
Junction 5	Castletroy College Road	329	12%	117	6%
Junction 5	Dublin Road east	1,149	40%	707	37%
Junction 6	Dublin Road west	475	17%	544	28%
Junction 6	Childers Road	289	10%	225	12%

C) Trip Distribution

It has been assumed that HGVs associated with the development, and light vehicles associated with staff and smaller deliveries are likely to be attracted to and distributed from the subject site, following the identified haul route, with reference to the baseline traffic model. In this regard, the peak turn-in and turn-out flows calculated for the Proposed Development were distributed and assigned throughout the six junctions considered with reference to the proportions of overall traffic flows established recorded as part of the baseline traffic model.

6.5.3 Future Traffic Flows in Design Year 2026

The morning and evening peak hour traffic flows through the junction for Final Year of Construction – 2026 under “Do-nothing” scenario and “Do-something” scenario are illustrated in Figure 6-9 and Figure 6-10.

2026 – Design Year AM Peak during Construction Phase

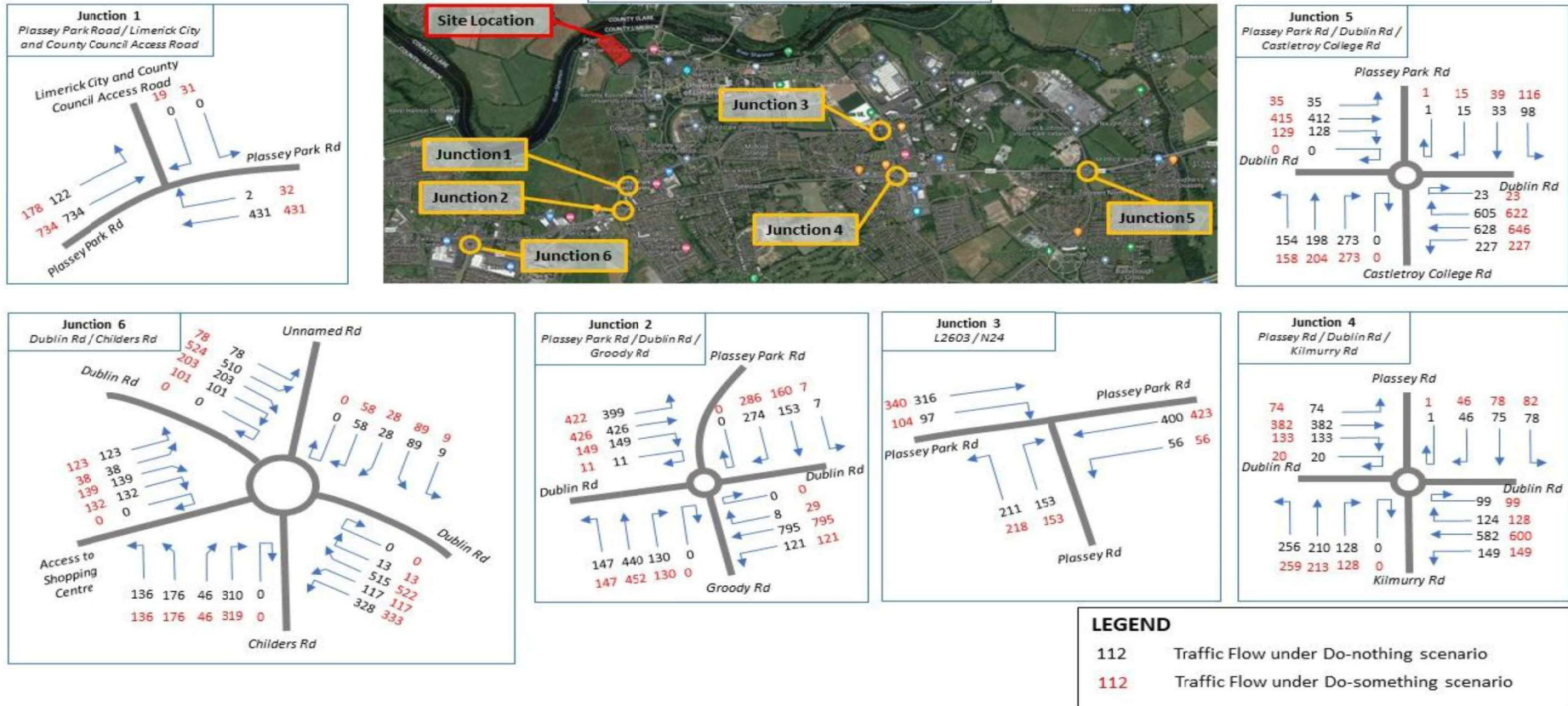


Figure 6-9: 2026 Design Year (AM Peak Hour Traffic Flows) during Construction Phase

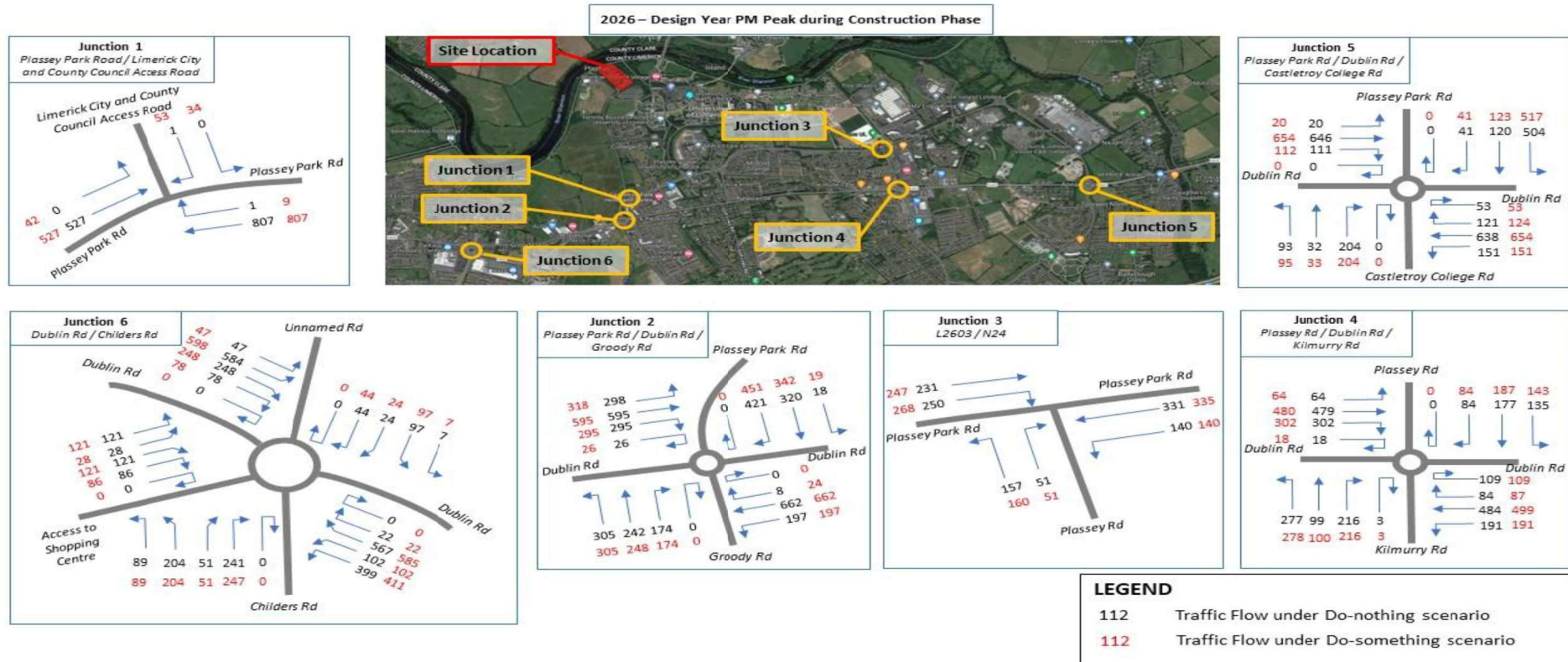


Figure 6-10: 2026 Design Year (PM Peak Hour Traffic Flows) during Construction Phase

6.5.4 Traffic Impacts for Do-Nothing Impacts and Do-Something Impacts during Construction Phase

In order to assess the future traffic impact of the Proposed Development for the final year of construction - 2026 with “Do-nothing” and “Do-something” scenarios as shown in Figure 6-9. Figure 6-10 above, capacity assessments were undertaken using TRL’s PICADY & ARCADY traffic modelling software for priority junction and roundabout junction.

Junction 1 - Plassey Park Road/ Limerick City and County Council Access Road

A summary of the results of the analysis of Junction 1 - Plassey Park Road/ Limerick City and County Council Access Road for the morning and evening peak hours is shown in Table 6.11.

Table 6.11: 2026 Design Year Junction Capacity Analysis for Junction 1

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Plassey Park Road West	Do-nothing	0	0	0	0	0	0
	Do-something	0	0	0	0	0	0
Limerick City and County Council Access Road	Do-nothing	0	0	0	0	0	0
	Do-something	0.17	0.31	0	0	13	17
Plassey Park Road East	Do-nothing	0.01	0	0	0	9	7
	Do-something	0.09	0.02	0	0	10	7

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 6.11 demonstrate that Junction 1 - Plassey Park Road/ Limerick City and County Council Access Road will operate within the normal design threshold in the morning and evening peak hours under 2026 “Do-nothing” and “Do-something” scenarios. The analysis indicates that traffic from the Proposed Development during construction will have a minimal impact on this junction.

Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road Roundabout

A summary of the results of the analysis of Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road roundabout for the morning and evening peak hours is shown in Table 6.12.

Table 6.12: 2026 Design Year Junction Capacity Analysis for Junction 2

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Plassey Park Road	Do-nothing	0.32	0.66	1	2	3	8
	Do-something	0.33	0.71	1	2	4	10
Dublin Road East	Do-nothing	0.53	0.60	1	2	4	6
	Do-something	0.54	0.62	1	2	4	6
Groody Road	Do-nothing	0.73	0.74	3	3	12	13
	Do-something	0.75	0.77	3	3	15	15
Dublin Road West	Do-nothing	0.48	0.56	1	1	3	3
	Do-something	0.49	0.57	1	1	3	4

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 6.12 demonstrate that Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road

roundabout will operate within the normal design threshold in the morning and evening peak hours under 2026 “Do-nothing” and “Do-something” scenarios. The Groody Road arm on this junction during the morning and evening peak hours under 2026 “Do-nothing” and “Do-something” scenarios will begin to approach the design threshold with minor queues and delays for motorists beginning to occur. The analysis indicates that traffic from the Proposed Development during construction will have a minimal impact on this junction.

Junction 3 - Plassey Park Road/ Plassey Road

A summary of the results of the analysis of Junction 3 - Plassey Park Road/ Plassey Road for the morning and evening peak hours is shown in Table 6.13.

Table 6.13: 2026 Design Year Junction Capacity Analysis for Junction 3

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Plassey Park Road East	Do-nothing	0	0	0	0	0	0
	Do-something	0	0	0	0	0	0
Plassey Road	Do-nothing	0.89	0.48	6	1	61	14
	Do-something	0.93	0.49	8	1	78	15
Plassey Park Road West	Do-nothing	0.17	0.44	0	1	7	10
	Do-something	0.18	0.47	0	1	7	11

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 6.13 demonstrate that Junction 3 - Plassey Park Road/ Plassey Road will operate within the normal design threshold in the evening peak hour under 2026 “Do-nothing” and “Do-something” scenarios. However, the Plassey Road arm on this junction during the morning peak hour under 2026 “Do-nothing” and “Do-something” scenarios will slightly exceed the normal design threshold (but still less than its theoretical capacity of 1.0) with queues and delays for motorists evident. Once a junction is nearing or at capacity, any slight increase, whether it is background traffic growth or a new development, will have a noticeable increase in queues/ delays. However, the analysis indicates that traffic from the Proposed Development during construction will have a minimal impact on this junction.

Junction 4 - Plassey Road/ Dublin Road/ Kilmurry Road Roundabout

A summary of the results of the analysis of Junction 4 - Plassey Road/ Dublin Road/ Kilmurry Road roundabout for the morning and evening peak hours is shown in Table 6.14.

Table 6.14: 2026 Design Year Junction Capacity Analysis for Junction 4

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Plassey Road	Do-nothing	0.26	0.68	0	2	6	18
	Do-something	0.27	0.71	0	2	6	20
Dublin Road East	Do-nothing	0.74	0.78	3	3	10	13
	Do-something	0.76	0.80	3	4	11	14
Kilmurry Road	Do-nothing	0.73	0.69	3	2	15	12
	Do-something	0.75	0.70	3	2	18	13
Dublin Road West	Do-nothing	0.52	0.72	1	3	6	10
	Do-something	0.52	0.72	1	3	6	10

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 6.14 demonstrate that Junction 4 - Plassey Road/ Dublin Road/ Kilmurry Road roundabout will operate within the normal design threshold in the morning and evening peak hours under 2026 “Do-nothing” and “Do-something” scenarios. The Dublin Road east arm and Kilmurry Road arm on this junction during the morning peak hour, and all arms on this junction during evening peak hour under 2026 “Do-nothing” and “Do-something” scenarios will begin to approach the design threshold with minor queues and delays for motorists beginning to occur. The analysis indicates that traffic from the Proposed Development during construction will have a minimal impact on this junction.

Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road Roundabout

A summary of the results of the analysis of Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road roundabout for the morning and evening peak hours is shown in Table 6.15.

Table 6.15: 2026 Design Year Junction Capacity Analysis for Junction 5

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Plassey Park Road	Do-nothing	0.16	0.81	0	4	4	21
	Do-something	0.19	0.83	0	5	5	24
Dublin Road East	Do-nothing	0.74	0.50	3	1	6	3
	Do-something	0.76	0.51	3	1	7	3
Castletroy College Road	Do-nothing	0.68	0.28	2	0	11	4
	Do-something	0.70	0.29	3	0	13	4
Dublin Road West	Do-nothing	0.50	0.49	1	1	6	4
	Do-something	0.51	0.50	1	1	6	4

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a roundabout junction. The results shown in Table 6.15 demonstrate that Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road roundabout will operate within the normal design threshold in the morning and evening peak hours under 2026 “Do-nothing” and “Do-something” scenarios. The Dublin Road east arm and Castletroy College Road arm on this junction during the morning peak hour under 2026 “Do-nothing” and “Do-something” scenarios and the Plassey Park Road arm on this junction during the evening peak hour under 2026 “Do-nothing” and “Do-something” scenarios will begin to approach the design threshold with minor queues and delays for motorists beginning to occur. The analysis indicates that traffic from the Proposed Development during construction will have a minimal impact on this junction.

Junction 6 - Dublin Road/ Childers Road Roundabout

A summary of the results of the analysis of Junction 6 - Dublin Road/ Childers Road roundabout for the morning and evening peak hours is shown in Table 6.16.

Table 6.16: 2026 Design Year Junction Capacity Analysis for Junction 6

Approach Arm	Scenario	Max. RFC		Max. Queue (PCU)		Average Delay (Seconds)	
		AM	PM	AM	PM	AM	PM
Unnamed Road	Do-nothing	0.27	0.25	0	0	7	6
	Do-something	0.28	0.25	0	0	8	6
Dublin Road East	Do-nothing	0.48	0.52	1	1	4	4
	Do-something	0.48	0.53	1	1	4	4
Childers Road	Do-nothing	0.51	0.44	1	1	5	4
	Do-something	0.51	0.45	1	1	6	5
Access to Shopping Centre	Do-nothing	0.35	0.29	1	0	5	4
	Do-something	0.35	0.29	1	0	5	4
Dublin Road West	Do-nothing	0.70	0.71	3	2	9	8
	Do-something	0.71	0.73	3	3	10	9

The normal design threshold for the ratio of flow to capacity (RFC) is 0.85 for a priority junction. The results shown in Table 6.16 demonstrate that Junction 6 - Dublin Road/ Childers Road roundabout will operate within the normal design threshold in the morning and evening peak hours under 2026 “Do-nothing” and “Do-something” scenarios. The Dublin Road west arm on this junction during the morning and evening peak hours under 2026 “Do-nothing” and “Do-something” scenarios will begin to approach the design threshold with minor queues and delays for motorists beginning to occur. The analysis indicates that traffic from the Proposed Development during construction will have a minimal impact on this junction.

Temporary Traffic Management

The Limerick City and County Council Access Road will be used as the main access to/ from the site. The Limerick City and County Council Access Road is a one-way road (northbound direction) with a road pavement width of approximately 4 metres. To facilitate smooth movement of construction vehicles/ staff vehicles at the Limerick City and County Council Access Road during construction, it is proposed to assign banksmen or implement “Stop and GO” traffic control method / temporary traffic signal system to control traffic movement at the Limerick City and County Council Access Road. To be conservative, we also obtained no objection in principle from the University of Limerick for using the internal roads of university, if needed. The duration of the impact of these works will be short term in nature, with no residual impacts.

6.6 Potential Impact During Operational Phase

6.6.1 Trip Generation during Operational Phase

For existing Castletroy wastewater treatment plant, there are three tankers of liquid sludge weekly to Bunlicky, five cake sludge trailers weekly to Bunlicky and one cake sludge trailer every 2 or 3 weeks to AQS in Kilkenny. Overall, there are about eight to nine trip generation per week under current operation.

However, after upgrading the captioned wastewater treatment plant, no liquid sludge, which contain more liquid and larger volume, will be generated. Instead, the plant will only generate cake sludge. Estimates of the total trip generation associated with development were obtained from the design team. It is anticipated that 10 cake sludge trailers will be required weekly to remove the sludge from the Proposed Development after completion of the project. In order to provide a robust assessment of the impact of the Proposed Development, it has been assumed that the above weekly trip generation has been treated as daily arrivals and departures occurring in the AM and PM peak period. Also, this study assumes that all of the trips generated by the Proposed Development will be by HGV. Table 6.17 following summarises the anticipated traffic trips associated with Proposed Development during operational phase.

Table 6.17: Total Trip Generation During Operational Phase

Peak Hour	Arrivals		Departures		Development Generated Traffic (PCU/hr)
	Veh/hr	PCU/hr*	Veh/hr	PCU/hr*	
Morning Peak Hour	10	23	10	23	46
Evening Peak Hour	10	23	10	23	46

Note: * 2.3 pcu factor is applied for HGV

6.6.2 Trip Distribution and Assessment Year during Operational Phase

After upgrading the captioned wastewater treatment plant, the trip generation (i.e. 10 sludge trailers per week) will travel from the Proposed Development to Bunlicky or other licenced facilities in Munster. In order to provide a robust assessment, it was assumed that the arrival and departure trip generation as shown in Table 6.17 will travel to/from the Proposed Development via all concerned junctions. Also, it is anticipated that the construction works will commence in 2024, with all works completed in 2026.

6.6.3 Trip Generation as a Percentage of Existing Traffic during Operational Phase

Based on the expected trip generation for the Proposed Development as shown in Table 6.16, an exercise was carried out to quantify the expected development trip generation as a proportion of existing traffic flows on the surrounding road network to determine if a detailed traffic impact assessment is required for all of the junctions included within the scoping study.

It is anticipated that the future background traffic flows shall be factored up in accordance with Table 6.1 of Transport Infrastructure Ireland Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections under medium growth factor scenario. Therefore, the existing traffic flows will be used instead of future traffic flows in order to provide a robust analysis and a “worst-case” scenario. The result of this assignment exercise is presented in Table 6.18 and Table 6.19 following.

Table 6.18: Development AM Peak Hour Trip Generation as a Percentage of Existing Road Network Traffic Flow

Junction	Junction AM Peak Traffic	Development Generated Traffic	Percentage
Junction 1 - Plassey Park Road/ Limerick City and County Council Access Road	1,202	46	3.83%
Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road Roundabout	2,850	46	1.61%
Junction 3 - Plassey Park Road/ Plassey Road	1,150	46	4.00%
Junction 4 - Plassey Road/ Dublin Road/ Kilmurry Road Roundabout	2,196	46	2.09%

Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road Roundabout	2,635	46	1.75%
Junction 6 - Dublin Road/ Childers Road roundabout	2,933	46	1.57%

Table 6.19: Development PM Peak Hour Trip Generation as a Percentage of Existing Road Network Traffic Flow

Junction	Junction PM Peak Traffic	Development Generated Traffic	Percentage
Junction 1 - Plassey Park Road/ Limerick City and County Council Access Road	1,246	46	3.69%
Junction 2 - Plassey Park Road/ Dublin Road/ Groody Road roundabout	3,320	46	1.39%
Junction 3 - Plassey Park Road/ Plassey Road	1,083	46	4.25%
Junction 4 - Plassey Road/ Dublin Road/ Kilmurry Road roundabout	2,538	46	1.81%
Junction 5 - Plassey Park Road/ Dublin Road/ Castletroy College Road roundabout	2,546	46	1.81%
Junction 6 - Dublin Road/ Childers Road roundabout	2,948	46	1.56%

As demonstrated by Table 6.18 and Table 6.19, the estimated trips associated with the Proposed Development represent a tiny proportion of existing traffic flows on the surrounding road network and less than the thresholds for traffic impact assessment as stated in the Table 2.1 of TII Traffic and Transport Assessment Guidelines (i.e. 10% of the traffic flow on the existing road network and 5% in sensitive environments or where congestion exists).

As a result of this negligible increase in traffic volumes on the surrounding road network under robust and “worst-case” scenario, it is *not* proposed to undertake any traffic capacity assessments of existing junctions in this study during the operational phase. It is reasonable to assume that the number of trips generated by the Proposed Development will remain close to a constant number in future years while background traffic levels will show a steady increase.

6.7 Mitigation Measures and Monitoring

Mitigation measures are listed in the sections below with regard to both general traffic management procedures and site-specific requirements, particularly with regard to interactions with the UL Campus. As outlined in **Section 6.2**, the traffic assessment and subsequent mitigation measures have been developed as a result of site visits, consultations with Limerick City and County Council and feedback received during communications with UL.

Mitigation outcomes of the EIAR traffic assessment have also been considered in the Outline CEMP, available in **Appendix 4A**. The outline CEMP will be conveyed to the appointed contractor in the tender documents. Ahead of the construction phase, the contractor will be required to liaise with both Limerick City and County Council and UL to develop a detailed CEMP and Construction Traffic Management Plan.

General Mitigation Measures During the Construction Phase

- A Preliminary Traffic Management Plan will be drafted by the Project Supervisor Design Process for the works in full consultation with Limerick City and County Council, An Garda Síochána, the Fire Service and the Ambulance service prior to the issuing of tender documents. When the works are awarded to a contractor, the Preliminary Traffic Management Plan will be developed by the Project Supervisor Construction Phase into a Detailed Traffic Management Plan in full consultation with the same stakeholders. All traffic management plans, including working times, will be agreed with and approved by Limerick City and County Council

Transportation Department in advance of implementation. Also, the contractor shall liaise and seek comments on the Detailed Traffic Management Plan from the University of Limerick.

- Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive on the street pavements.
- The Contractor is to arrange for staff parking on-site. Contractor's, subcontractor's or supplier's vehicles or staff vehicles, or any vehicles associated with the works are not permitted to park, idle or queue on the public road network.
- Wheel washers/ judder bars will be placed at all site access points to minimise the migration of detritus onto the public roads, where appropriate. The roads will be inspected and cleaned on a regular basis.
- Haul vehicles will be covered after loading to ensure there is no risk of construction material falling or to any prevent any nuisance due to dust particles.
- Water bowsers will be deployed within the sites during periods of hot weather to damp down potential dust generation from unbound surfaces.
- An Application for an Abnormal Load Permit will be made to Limerick City and County Council in advance for any abnormal loads exceeding the thresholds laid out in the Road Traffic (Construction and Use of Vehicles) (S.I. No. 5/2003) Regulations 2003. Where possible abnormal load movements will be restricted to evening or night-time to minimize disruption to local traffic and traffic on strategic routes.

Site-specific Mitigation Measures During the Construction Phase

- Provision of banksmen or implementation of "Stop and Go" traffic control method / temporary traffic signal system, when required, will be put in place at the LCCC Access Road to prevent back up onto Plassy Park Road.
- Health and safety of pedestrians and cyclists along the LCCC Access Road and in the vicinity of the site entrance will be addressed with the use of signage and manning of the hazard spots during busy periods. The contractor will be made aware of any existing health and safety issues and will be advised to liaise with the University of Limerick (UL) where necessary.
- All efforts will be made to schedule busy construction phases outside of college term months. If this is not possible, site access for HGVs will be restricted to outside of the peak hours 8-10am so as not to cause delays on the LCCC Access Road.
- It may be necessary, due to space confinement on the LCCC Access Road, for large plant and equipment to be delivered to site via the main campus route. The contractor will be required to agree this with UL ahead of scheduling the works. Such deliveries may include the contractor's compound, large construction plant (cranes, piling rigs, excavators, etc.), materials (prefabricated concrete units, sheet piles, etc.) and process equipment (centrifuges, IFAS system, etc.);
- UL are not opposed to construction traffic using the internal campus road during regular operational periods, however the following constraints will apply:
 - The LCCC Access Road will remain a one-way (in) route during term months between the hours 8-10am, as per the standing agreement between LCCC and UL;
 - Construction staff vehicles will use the LCCC Access Road as the primary travel route to minimise any potential for disruption in the main campus;
 - Construction vehicles such as tankers and HGVs that travel via the campus route must be clean and empty; and
 - There will be zero disruption during exam periods in traffic movements resulting from construction traffic.

6.7.1 Operational phase

No mitigation measures are proposed for the operational phase of the Castletroy Wastewater Treatment Plant Upgrades.

6.8 Residual Effects

6.8.1 Construction phase

The Proposed Development will result in a slight negative short-term impact during construction phase.

6.8.2 Operational phase

Referring to the **Section 6.6.3**, a full traffic impact assessment is *not* required for all concerned junctions in accordance with the Table 2.1 of TII Traffic and Transport Assessment Guidelines.

As demonstrated in Table 6.18 and Table 6.19 above, the Trip Generation associated with the Proposed Development will be less than 5% of the existing traffic flows on the adjoining road network under robust and “worst-case” scenario during operational phase. Also, referring to the **Section 6.6.1**, the exiting Castletroy wastewater treatment plant is currently generating about eight to nine trip generation per week under current operation. After upgrading the captioned wastewater treatment plant, about 10 cake sludge trailers will be required weekly to remove the sludge from the Proposed Development. It is anticipated that the impacts of the Proposed Development will be negligible.

6.8.3 Interactions

Air Quality and Climate

Construction impacts due to emissions from vehicular traffic and due to earthworks have been assessed in **Section 8**.

Noise and Vibration

Construction impacts due to noise and vibration from vehicular traffic, most notably HGVs (e.g. transporting earthworks material) have been assessed in **Section 9**.

Population & Human Health

The construction phase importation of material to the site during the construction phase is detailed in **Section 16**. All haulage of plant and materials to and from the construction site will be via Dublin Road, Plassey Park Road and the Limerick City and County Council Access Road.

As a result of the negligible increase in traffic volumes on the surrounding road network, it is not anticipated that the proposed Castletroy Wastewater Treatment Plant Upgrades will have any significant impact on the capacity of the local road network and have any significant interaction with Population and Human Health.

6.8.4 Cumulative impacts

The cumulative impact assessment for Traffic was informed by the scoping exercise undertaken in the development of this EIAR and through consultation with University of Limerick and Limerick City and County Council. No major future planned developments which would be constructed concurrently with the Castletroy Wastewater Treatment Plant Upgrades were identified.

6.9 Monitoring

No monitoring is proposed for the operational phase of the Castletroy Wastewater Treatment Plant Upgrades.

6.10 References

Google. (2021, May). [google.com/maps](https://www.google.com/maps/@52.6716416,-8.5590225,2546m/data=!3m1!1e3). Retrieved from [googlemaps.com: https://www.google.com/maps/@52.6716416,-8.5590225,2546m/data=!3m1!1e3](https://www.google.com/maps/@52.6716416,-8.5590225,2546m/data=!3m1!1e3).

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