7 Traffic & Transportation

7.1 Introduction

This section of the EIAR identifies and evaluates the likely significant effects of the traffic generated by the Site Sustainability Project, both during its construction and operational phases.

Additionally, a specific additional assessment has been undertaken for the transportation of bottom ash to Drogheda Port (for recovery elsewhere in Europe) (as opposed to the current situation whereby bottom ash is sent to landfill).

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.

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 Duleek 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 October 1st, 2019 and form the basis of subsequent analysis.

Step 2 defines the assessment base case figures:

- The proposed development is to be constructed in two phases, with Phase 1 due to commence construction in 2021 and open in 2022. Phase 2 will then commence construction. An opening year for the proposed development of 2022 is therefore assumed, and consequently the peak construction period is also assumed to occur in 2022 (when Phase 1 will be operational and Phase 2 under construction);
- Background traffic growth rates were obtained from the 'Transport Infrastructure Ireland Project Appraisal Guidelines (2019)' for the Meath area; these growth rates were used to increase 2019 traffic levels to the future years for analysis – a construction/opening year of 2022 (for opening of Phase 1) and future years of 2027 and 2037; and
- In addition to growth of background traffic, which will ensure that other potential developments in the Duleek area are accounted for, specific additional allowances were made for a number of other applications in the locality which have either received planning permission or have been submitted for planning, based on traffic flow information contained in the relevant submitted planning documentation for each development.

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

- An appraisal of the traffic generation during the construction phase is undertaken, appraising heavy goods vehicles (HGV) traffic and workforce traffic associated with the proposed development (for both Phase 1 and Phase 2 of construction);
- An appraisal of the traffic generation during the operational phase is also undertaken, split into two categories: HGV traffic generated by the proposed development and car traffic generated by the workers commuting to the site and by visitors to the site (again this is undertaken for Phase 1 and Phase 2 of operation the proposed development); 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;
- The traffic surveys undertaken have identified morning and evening peak hours on the local road network (08:15-09:15 and 17:00-18:00 respectively); these form the basis of assessment for the proposed scheme;

- The operational traffic associated with the scheme will generate additional trips to and from the site, with staff working hours commencing before 08:00 and finishing at 16:30, thereby not coinciding with the morning and evening peak periods on the local road network;
- The construction traffic associated with the scheme will generate additional trips to and from the site, with construction working hours commencing at 07:00 and finishing at 19:00 (Monday to Friday);
- Phase 1 of the scheme is expected to conclude construction and become operational in 2022, with Phase 2 to commence construction thereafter; therefore, in 2022 there will be operational traffic associated with Phase 1 and construction traffic associated with Phase 2 present on site;
- 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 opening year for Phase 1) are assessed and reported;
- The actual numerical and relative percentage increases in traffic on all relevant roads during the morning (AM) and evening (PM) network peaks and the development peak when the proposed development would become operational (opening year of Phase 1 to be 2022) are assessed and reported;
- Subsequent future year scenarios, both 5 and 15-years post-opening (2027 and 2037 respectively) 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), and LinSig (for signalised junctions).

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

Duleek is a village in County Meath. It is situated along the convergence of the R150 regional road and a number of local roads, including Abbey Road and Station Road. The village is by-passable to the east by the R152, which is the principal route north to Drogheda and south to Cushenstown. The R150 links the village westwards to the N2. The village is located approximately 7.5km south of Drogheda.

7.3.2 Site Location

The site of the existing Indaver facility is located to the north-east of Duleek village, off the R152 Regional Road linking Drogheda and Duleek. The site has a priority junction with the R152 (with a dedicated right-turning facility) and is located opposite DSG Stores, which also has a priority junction with the R152 opposite the site entrance.

To the north-east, junctions 8 and 9 of the M1 motorway are located approximately 5km from the village (the R152 links the site directly to junction 8 of the M1, which is approximately 2.4km from the site). To the south-west, the R152/R150 junction at New Lanes Cross (the main junction into Duleek Village) is located approximately 1.8km from the site.

Figure 7.1 below shows the site location.

Figure 7.1: Site Location. Source Open Street Map.

7.3.3 Local Road Network

The R152 in the vicinity of the Indaver site is a single-carriageway road with a typical road width of 7m, and at the site entrance the route widens to approximately 10m to include a ghost island right-turning lane (approximately

100m long) and a deceleration lane (approximately 70m long) for traffic turning left into the site, as shown in **Figure 7.2**.

Figure 7.2: Site Entrance [© Google]

A speed limit of 80kph applies on the R152 in the vicinity of the site.

7.3.3.1 Future Transport Proposals

Although the Meath County Development Plan 2020 update is currently at submissions stage, with a draft expected later in 2020, it is an objective of the current Meath County Development Plan (2013 – 2019) to provide a new bypass link to the southwest of the village thus removing the existing R150 from Duleek village centre. The Development Plan (Volume 5) notes that '*Government funds have been allocated towards the route selection and costing and it is anticipated that work should be pursued during the lifetime of the current Meath County Development Plan 2013-2019.'*

The Duleek Local Area Plan (adopted in August 2009, but not updated since) refers to this bypass having a preferred location to the south of the village.

No further information is available at this time regarding the status of the proposed bypass.

7.3.3.2 Relevant Junctions

In addition to the existing Indaver site entrance itself, the principal junction in the immediate site vicinity is the junction of the R152 and R150 (New Lanes Cross) to the south of the site.

To the north, in the context of the transport of bottom ash off-site, traffic leaving the site routing to Drogheda Port is expected to cross the M1 via the R152 and then route north-west and on to Donore Road, and from there to route eastwards and join the R132 in Drogheda and to access the north quays via the junction of the R132 and Shop Street in Drogheda itself – this is the second principal junction in terms of assessment of the scheme and will be assessed for the scenario involving the export of bottom ash from the site. Thus, there are three individual junctions that will be subject to assessment.

Figure 7.3 below illustrates the key junctions of significance which will form the basis of the assessment of the scheme.

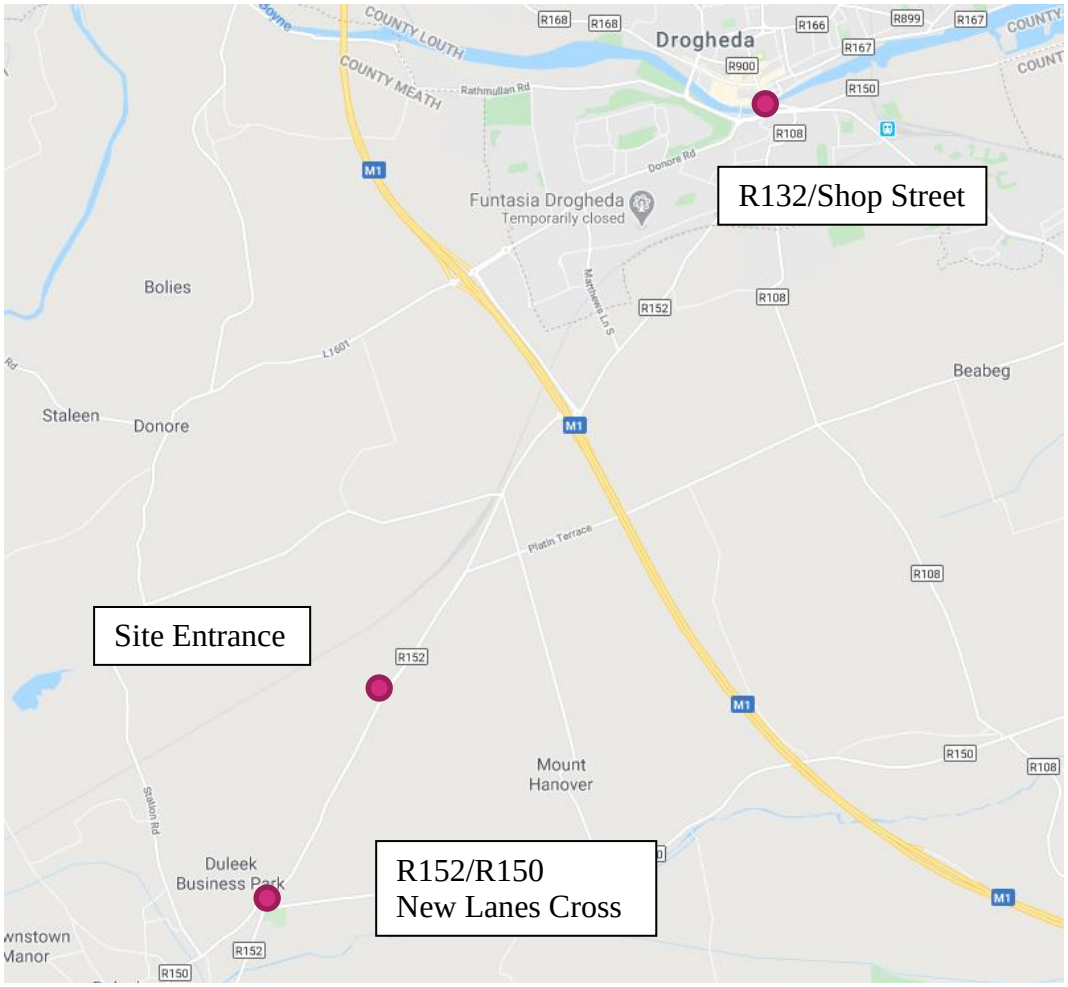

Figure 7.3: Junctions assessed [© Google]

7.3.3.3 Assessment scenarios for analysis

As outlined above, it is proposed to assess the development and the relevant junctions on the local road network under the scenarios indicated in **Table 7.1**. The assessment scenarios for the future year scenarios will evaluate the junctions both with and without the proposed development. Further details of the assessment scenarios are outlined later in this chapter.

Table 7.1: Assessment Scenarios

Junction Name	2019 Base Year	2022 Opening Year**	2027 Opening Year + 5	2037 Opening Year + 15	2022 Opening Year – Bottom Ash Transport
Indaver Site Entrance	✓	✓	✓	✓	
R152/R150 Junction (New Lanes Cross)	✓	✓	✓	✓	
R132/Shop Street Junction					✓

***Note that Phase 1 is assumed to be constructed in 2021/early 2022. Construction of Phase 2 will occur following opening of Phase 1, in 2022. The 2022 Opening Year will therefore include operational traffic associated with Phase 1 of the development and construction traffic associated with Phase 2. This is the most intensive period in terms of combined construction/operational traffic and has been used for assessment.*

7.3.4 Relevant Traffic Data

7.3.4.1 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

7.3.4.2 Traffic Survey Data

Traffic surveys were undertaken in October 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.

An 18-hour (06:00-24:00) traffic count was undertaken at all of the junctions listed in **Section 7.3.3.2** above on Tuesday, 1st October 2019, on a typical working day, during school term time. This data represents the 'base' year data which is then used for the assessment of the proposed scheme.

The traffic surveys on the local road network identified a morning peak hour of 08:15-09:15, and an evening peak hour of 17:00-18:00.

Peak periods (used for assessment) associated with the two construction phases of the development will be during 06:00-07:00 in the morning (when construction personnel arrive on site ahead of construction commencing at 07:00) and 19:00-20:00 in the evening (when construction personnel depart the site following conclusion of construction working hours at 19:00).

Peak periods associated with the two operational phases of the development will be during 07:00-08:00 in the morning and 16:00-17:00 in the evening, as operational working hours will commence and finish during these times.

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 7.3.** Note that traffic flows are presented in vehicles (veh).

Table 7.4 shows the peak hour link counts converted to passenger car units (PCU).

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

Junction/Roadway	Construction Peak Periods		Operational Peak Periods		Existing Network Peaks	
	06:00-07:00	19:00-20:00	07:00-08:00	16:00-17:00	08:15-09:15	17:00-18:00
Indaver Site Entrance						
Indaver Site Entrance (internal road)	12	10	32	33	14	11
R152 (north of Indaver entrance)	678	662	1,330	1,292	1,393	1,644
R152 (south of Indaver entrance)	686	664	1,326	1,298	1,393	1,658
R152/R150 Junction (New Lanes Cross)						
R152 (north of New Lanes Cross)	692	759	1,352	1,362	1,407	1,668
R152 (south of New Lanes Cross)	583	326	966	812	796	1,046
R150 (west of New Lanes Cross)	283	579	719	828	934	983

R150 (east of New Lanes Cross)	152	192	293	306	339	375
R132/Shop Street Junction						
R132 (west of Shop Street)	493	1,054	850	1,235	1,158	1,288
R132 (east of Shop Street)	841	1,500	1,268	1,520	1,582	1,664
Barrack Lane (south of R132)	131	93	152	109	137	118
Shop Street (north of R132)	685	995	900	988	1,009	1,050

**All traffic flows in Vehicles (Veh) per hour*

Table 7.4: Existing Two-Way Link Flows – Base Year 2019 (PCU)

Junction/Roadway	Construction Peak Periods		Operational Peak Periods		Existing Network Peaks	
	06:00-07:00	19:00-20:00	07:00-08:00	16:00-17:00	08:15-09:15	17:00-18:00
Indaver Site Entrance						
Indaver Site Entrance (internal road)	12	10	41	43	20	17
R152 (north of Indaver entrance)	721	681	1,439	1,394	1,511	1,701
R152 (south of Indaver entrance)	729	683	1,438	1,405	1,513	1,721
R152/R150 Junction (New Lanes Cross)						
R152 (north of New Lanes Cross)	741	779	1,466	1,469	1,527	1,731
R152 (south of New Lanes Cross)	619	339	1,031	871	855	1,087
R150 (west of New Lanes Cross)	305	591	788	886	1,009	1,009
R150 (east of New Lanes Cross)	159	196	316	324	369	381
R132/Shop Street Junction						
R132 (west of Shop Street)	527	1,077	920	1,300	1,239	1,317
R132 (east of Shop Street)	889	1,519	1,345	1,582	1,659	1,693

Barrack Lane (south of R132)	131	92	151	108	136	117
Shop Street (north of R132)	728	1,014	979	1,051	1,100	1,082

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

A number of distinct time periods have been determined as having the most significant effect by traffic generated by the proposed development. These time periods are as follows:

- Between 06:00-07:00 and 19:00-20:00, when construction personnel will arrive at the site in the morning peak and depart in the evening peak; and
- Between 07:00-08:00 and 16:00-17:00, when new operational staff will arrive at the site in the morning peak and depart in the evening peak. HGV's associated with the construction and operational phases will also be arriving and departing the site during these time periods.

Daily HGV trips to and from the site during the construction and operation stages will typically be distributed throughout the day, whereas personnel associated with construction and operation at the facility will arrive or depart immediately prior to or just after commencement of their working hours. Therefore, the personnel movements to and from the site are more significant in terms of traffic impact.

7.3.5 Assessment Years and assumptions

It is anticipated that the proposed development will be constructed in two distinct phases, with Phase 1 expected to commence construction in early 2021, for a period of approximately 16 months. Following completion of Phase 1, operational traffic associated with the proposed development will be present on site (assumed to be mid-2022). Phase 2 will also commence construction in mid-2022, for a period of approximately 12 months.

Phase 1 is anticipated to be the most intensive construction phase in terms of personnel; however, upon opening of the proposed development in mid-2022 there will be additional operational traffic and construction traffic associated with Phase 2 present on site at the same time. This combined traffic flow is more significant than the construction traffic associated with Phase 1; therefore, this has been used for assessment purposes.

Background traffic levels for 2019 have been forecasted to future years by applying the following growth rates:

- For 2019-2021 – light vehicles increased by 3.5%, heavy vehicles increased by 7.4%;
- For 2019-2022 – light vehicles increased by 5.3%, heavy vehicles increased by 11.4%;
- For 2019-2027 – light vehicles increased by 14.7%, heavy vehicles increased by 33.2%; and

- For 2019-2037 – light vehicles increased by 26.8%, heavy vehicles increased by 68.8%.

These growth rates have been established using the guidelines in the '*TII Project Appraisal Guidelines (2019), Unit 5.5 – Link-Based Traffic Growth Forecasting*', and by utilising the specific growth rates therein for the Meath area.

The guidelines present 'Low Sensitivity', 'Central Growth' and 'High Sensitivity' growth rates for the Meath area.

A 'Central Growth' scenario was therefore assumed for the Meath area in the coming years, and this is considered to allow for all committed and likely future development in the area, notwithstanding the specific allowances made for a number of relevant developments in the site locality.

7.3.6 Site Access Routes

The main access routes to the facility that carry traffic to and from the development are the R152, the R150, the N2 to the south and the M1 motorway to the north as shown on **Figure 7.1** above.

Traffic surveys were undertaken on Tuesday 1st October 2019, at a number of junctions in the site vicinity.

It is also noted that Indaver require operational HGV deliveries to and from the site to avoid routing through Duleek Village, and this requirement will be maintained as part of the proposed development. General car traffic is not subject to this requirement. This requirement will also apply to HGVs during the construction phases.

7.3.6.1 Existing Facility Traffic Flows

The existing facility treats up to 235,000 tonnes per annum of residual household, commercial and industrial non-hazardous and hazardous waste and recovers energy. The existing facility extracts and recovers valuable material (in the form of ferrous and non-ferrous metals) and energy (in the form of 21.5 megawatts of electricity MW_e) resources from residual waste.

The existing facility employs 60 personnel on various shifts, with the majority arriving on site before 08:00 daily, which is outside of the morning network peak period of 08:15-09:15.

The facility accepts waste six days per week between the hours outlined below but the installation runs 24 hours per day and for over 8,000 hours per annum.

- Monday – Friday 07:00 to 18:30 (11.5 hours); and
- Saturday 08:00 to 14:00 (6 hours).

Existing plant operations have been analysed based on data provided by Indaver as recorded at the weighbridge for HGV's entering or leaving the site.

A record of delivery traffic to the facility between September 2018 and September 2019 (i.e. one year) shows that there was a total of 14,756 individual delivery records for trucks accessing the site for the entire year, and on an average weekday there were 57 HGVs accessing the facility.

The arrival profile of HGVs is typically evenly distributed across the typical day, with the following arrival profile:

- 07:00-09:00 – 20.0% of HGVs;
- 09:00-11:00 – 20.8% of HGVs;
- 11:00-13:00 – 21.5% of HGVs;
- 13:00-15:00 – 20.9% of HGVs;
- 15:00-18:00 – 15.6% of HGVs; and
- After 18:00 – 1.2% of HGVs.

Figure 7.4 and **Figure 7.5** illustrate the daily arrival and departure profiles of general traffic and HGV traffic at the existing site, based on the traffic surveys undertaken in October 2019. It is seen that the general traffic profile reflects the morning arrival and afternoon peak periods for staff, whereas the HGV profiles are more dispersed across the typical day.

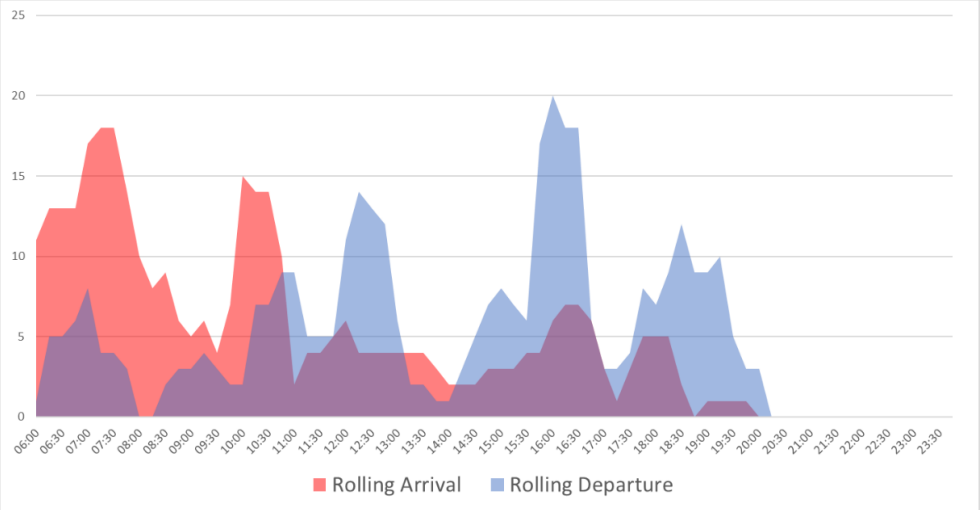

Figure 7.4: Vehicle (General staff traffic) arrival and departure profile on site.

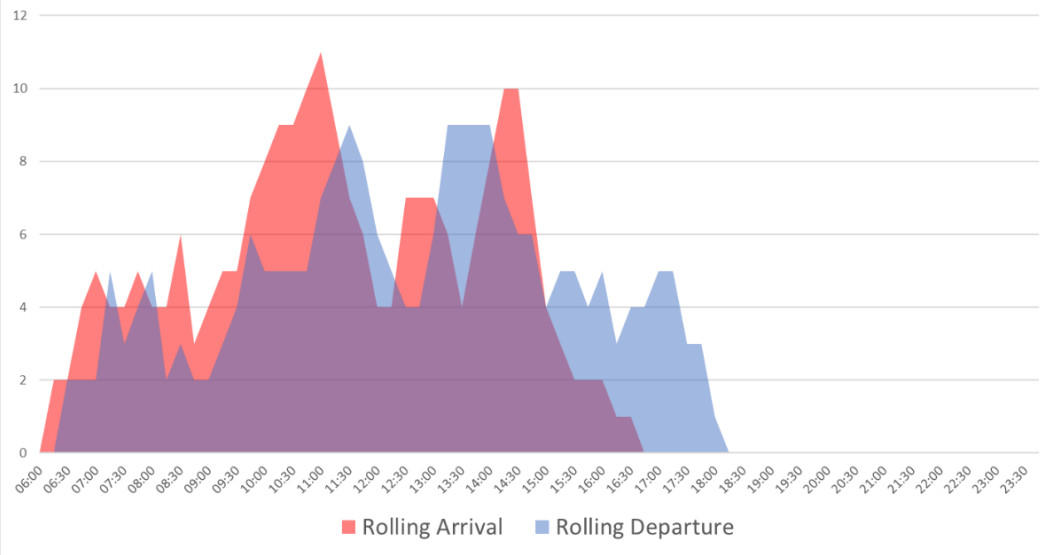

Figure 7.5: HGV arrival and departure profile on site.

7.4 Characteristics of the Proposed Development

As outlined in Chapter 4, the proposed development will consist of the following main elements:

1. Increase in the amount of hazardous waste accepted at the facility for treatment in the waste to energy plant from the current permitted 10,000 tonnes per annum up to a maximum of 25,000 tonnes per annum;
2. This will result in an increase in the annual total waste accepted at the site for treatment in the waste to energy facility from the currently permitted 235,000 tonnes per annum to 250,000 tonnes per annum;
3. Development of an aqueous waste tank farm and unloading area for the storage and processing of aqueous liquid wastes currently accepted at the facility;
4. Development of a 10MW$_e$ hydrogen generation unit for connection to the natural gas distribution network and for mobile hydrogen transport applications and other potential uses;
5. Development of a bottom ash storage building for the storage of up to 5,000 tonnes of bottom ash which is produced on site;
6. Waste acceptance capacity and infrastructure to accept up to 30,000 tonnes per annum (bringing the site total to 280,000 tpa) of third-party boiler ash and flue gas cleaning residues and other similar residues for treatment in the existing ash pre-treatment facility on site;
7. Development of a warehouse, workshop and emergency response team (ERT)/office building to support existing maintenance activities on the site;

8. Development of a new concrete yard and parking area for up to 10 trucks, tankers or containers on the site;
9. Demolition and re-building of an existing single storey modular office building on site with a slightly increased footprint.; and
10. Other miscellaneous site upgrades.

7.4.1 Construction Phase

7.4.1.1 Construction Programme

As outlined in **Section 7.3.5**, it is anticipated that the proposed development will be constructed in two distinct phases, with Phase 1 (which represents the bulk of the construction works) expected to commence construction in early 2021, for a period of approximately 16 months.

Following completion of Phase 1, operational traffic associated with the proposed development will be present on site (assumed to be mid-2022). Hence, 2022 is assumed to be the 'opening' year for the proposed development.

Phase 2 (construction of the hydrogen generation unit) will also commence construction in mid-2022, for a period of approximately 12 months. Phase 1 of the construction programme is anticipated to be the most intensive construction phase; however, upon opening of Phase 1 of the proposed development in mid-2022 there will be additional operational traffic and construction traffic associated with Phase 2 present on site at the same time.

7.4.1.2 Construction Personnel

As outlined above, construction will take place over two distinct phases.

For each of the phases, there will be an initial 'peak' period during which time clearance works and enabling works will occur – during this 'peak' period there will be a larger number of HGV traffic to and from the site, and a lower number of construction personnel on site.

Following the completion of the initial 'peak' period (for both phases), construction traffic will then adjust to a more typical (referred to as a 'nominal max') scenario, comprising less HGV traffic and more construction personnel on site.

Table 7.5: Breakdown of Proposed Development Construction Traffic Generation

Construction Phase/Sub-Phase	Expected Duration	No. Daily HGV's	No. Daily Personnel	Total Daily Vehs	Daily % HGV	Total Daily PCU
Phase 1 – Peak	Initial 8 weeks	50	30	80	63%	145
Phase 1 – Nominal Max	Remaining 60 weeks (approx.)	20	120	140*	14%	166*
Phase 2 – Peak	Initial 8 weeks	40	30	70	57%	122

Construction Phase/Sub-Phase	Expected Duration	No. Daily HGV's	No. Daily Personnel	Total Daily Vehs	Daily % HGV	Total Daily PCU
Phase 2 – Nominal Max	Remaining 44 weeks (approx.)	20	100	120	17%	146

**Used for assessment*

It can be seen above that the 'nominal max' stages of both construction phases will result in higher traffic flows to and from the site (both in terms of vehicles and PCU). Furthermore, it is seen that the 'nominal max' traffic associated with the construction of Phase 1 of the scheme is slightly greater than that of Phase 2 (this is due to the fact that there are an additional 20 personnel expected on site during Phase 1 of construction).

As outlined above, during construction of Phase 2, there will be operational traffic to and from the site associated with Phase 1 (which will open in 2022), and therefore the two traffic flows in combination (construction of Phase 2 plus operation of Phase 1) are more significant.

Therefore, the construction of Phase 2 has been used for assessment purposes, and an assessment year of 2022 has been used. However, to ensure a robust assessment, the higher number of construction personnel associated with Phase 1 of construction has been used for assessment (essentially, the assessment of construction traffic is based on the highest number of construction traffic flow to and from the site).

7.4.1.3 Construction Working Hours

Construction will take place on site daily from 07:00-19:00. The following assumptions have also been applied to construction traffic flows to and from the site during the construction of Phase 1:

- For construction personnel, average vehicle occupancy is estimated to be 1.2 persons per car;
- Construction workers will arrive on site before commencement of construction at 07:00 and after conclusion of construction at 19:00;
- Therefore, 100 cars will arrive during the 06:00-07:00 morning peak hour and 100 cars will depart during the 19:00-20:00 evening peak hour; and
- 20% of the daily HGV traffic (i.e. 4 of the total of 20 daily HGV's) will arrive at the site between 06:00-07:00 (in advance of commencement of construction at 07:00) and the same number will depart the site between 19:00-20:00 (following cessation of construction activities on site at 19:00).

Table 7.6: Proposed Development Construction Traffic Generation – Phase 1 Nominal Max

Construction Phase/Sub-Phase	AM Peak Period (06:00-07:00)			PM Peak Period (19:00-20:00)		
	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic
Phase 1 – Nominal Max	100	0	100	0	100	100

**All traffic flows in Vehicles (Veh) per hour. The above values are based on 100 construction personnel arriving on site between 06:00-07:00 and departing the site between 19:00-20:00. Construction HGVs are assumed to begin arriving/departing on site after 07:00 and to finish arriving/departing the site before 19:00.*

Similar arrival and departure flows will apply during Phase 2 of construction.

Table 7.7: Proposed Development Construction Traffic Generation – Phase 2 Nominal Max

Construction Phase/Sub-Phase	AM Peak Period (06:00-07:00)			PM Peak Period (19:00-20:00)		
	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic
Phase 2 – Nominal Max	84	0	84	0	84	84

**All traffic flows in Vehicles (Veh) per hour. Values above have been rounded up for clarity. The above values are based on 84 construction personnel arriving on site between 06:00-07:00 and departing the site between 19:00-20:00. Construction HGVs are assumed to begin arriving/departing on site after 07:00 and to finish arriving/departing the site before 19:00.*

As outlined above, the personnel flows for Phase 1 are slightly higher than those of Phase 2; therefore, the Phase 1 personnel flows have been used for assessment. Daily HGV traffic flows for the nominal max construction of Phases 1 and 2 are the same.

7.4.2 Operational Traffic Generation

7.4.2.1 Delivery Traffic

The anticipated breakdown of additional vehicles associated with the proposed development is as follows:

- Additional Liquid and Hazardous waste (an additional 15,000 tonnes) – this would equate to 1,764 HGV's per year, which is an average of 35.3 (rounded up to **36**) HGV's per week (based on 50 weeks). These HGV's will arrive full with waste and leave empty;
- Additional residues associated with the treatment of this waste requires an average of **4** HGV's per week to arrive empty and leave full to transport the residual product off site;

- The additional 30,000 tonnes of boiler ash/flue gas cleaning residues generate a total of 27.3 (rounded up to **28**) HGV's per week, arriving full and leaving empty;
- This material which is treated (with the addition of water) has its' overall tonnage increased to 39,000 tonnes as a result, which need to be removed off site. This equates to 32.5 HGV's per week (rounded up to **33**) – these arrive empty and leave full; and
- Additional vehicles refuelling at the Hydrogen plant (assumed to be new traffic), which would equate to a theoretical maximum of **75** HGV's per week.

This therefore represents a total increase of **176** HGVs per week.

Although the facility is open from Monday to Saturday (with Saturday having reduced opening hours), for robustness it has been assumed that all additional development traffic arriving weekly will only be on weekdays (Mon-Fri only).

It is therefore seen above that the typical increase in HGV's to the site is **35** HGV's per day (allowing for some rounding up). This would equate to **70** daily HGV movements to and from the facility.

It is also anticipated that the arrival profiles outlined in **Section 7.3.6.1** would apply to any additional traffic.

For the purpose of analysis, it has been assumed that 20% of the daily HGVs (i.e. a total of 7 out of the 35 daily HGVs, allowing for rounding) arrive and depart in the morning and evening peak periods at the same time as operational staff arrive and depart (07:00-08:00 and 16:00-17:00 respectively).

Distribution profiles associated with the additional traffic is anticipated to be similar to the existing profile at the facility (i.e. traffic approaching from the north and south on the R152 respectively).

Table 7.8: Breakdown of Proposed Development Operational Traffic Generation

Delivery Type	No. Tonnes Annually	No. weekly HGV's	No Daily HGV's (5 days)*	Comments
Phase 1				
Additional Liquid and Hazardous Waste	15,000	36	8	HGV's arrive full and leave empty
Additional residues associated with treatment of Liquid and Hazardous Waste	N/A	4	1	Typical number of HGV's weekly to arrive empty and transport waste off site

Delivery Type	No. Tonnes Annually	No. weekly HGV's	No Daily HGV's (5 days)*	Comments
Additional Boiler Ash/Flue Gas Cleaning Residues	30,000	28	6	HGV's arrive full and leave empty
Pre-treated Boiler Ash/Waste	39,000	33	7	HGV's arrive empty and leave full
Phase 2				
Hydrogen Plant Refuelling Vehicles	N/A	75	15	
TOTAL		**176**	**35**	

**Values have been rounded for clarity.*

Table 7.9: Proposed Development Operational HGV Traffic Generation

Development Phase	AM Peak Period (07:00-08:00)			PM Peak Period (16:00-17:00)		
	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic
Phase 1	4	4	8	4	4	8
Phase 2	3	3	6	3	3	6
Total	**7**	**7**	**14**	**7**	**7**	**14**

**All flows in vehicles. Values have been rounded for clarity.*

7.4.2.2 Personnel

The existing facility employs a total of **60** personnel at present, across various shift times throughout the day. There are also occasional visitors on site, which can be up to 6 additional persons present on site.

The proposed development is expected to result in an additional **20** personnel being employed, in the areas outlined in **Table 7.10**. It is seen in the table that all of the additional personnel will arrive on site before 08:00 and depart just after 16:30.

Table 7.10: Additional daily operational staff associated with each phase

Description	No. People	Start Time	End Time	Phase of Development
Tank Farm	2	07:45	16:30	Phase 1
Bottom Ash	1	07:45	16:30	Phase 1
Logistics	1	07:45	16:30	Phase 1
Office Staff	16	08:00	16:30	Phase 2

**All flows in vehicles. Values have been rounded for clarity.*

Table 7.11: Proposed Development Operational Staff Traffic Generation

Development Phase	AM Peak Period (07:00-08:00)			PM Peak Period (16:00-17:00)		
	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic
Phase 1	4	0	4	0	4	4
Phase 2	16	0	16	0	16	16
Total	**20**	**0**	**20**	**0**	**20**	**20**

**All flows in vehicles. Values have been rounded for clarity.*

The additional traffic associated with the proposed development (both HGVs and personnel) is summarised below in **Table 7.12**. For clarity, the below table is sub-divided into the respective phases.

Table 7.12: Proposed Development Combined Traffic Generation

Development Phase	AM Peak Period (07:00-08:00)			PM Peak Period (16:00-17:00)		
	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic	Total Traffic IN	Total Traffic Out	Total Two-Way Traffic
Phase 1	8	4	12	4	8	12
Phase 2	19	3	22	3	19	22
Phases 1 and 2	27	7	34	7	27	34

**All flows in vehicles. Values have been rounded for clarity.*

7.4.2.3 Combination of Construction and Operational staff

As outlined above, Phase 1 is expected to be constructed and operational in mid-late 2022, with Phase 2 to commence construction thereafter.

Consequently, there will be an overlap at the site of the construction of Phase 2 and the operation of Phase 1. During this time, the following movement patterns are expected to occur over the course of a typical day:

- Construction personnel associated with Phase 2 will arrive on site between 06:00-07:00 ahead of construction commencing at 07:00);
- Construction HGVs associated with Phase 2 will commence arriving/departing the site from 07:00 (with the assumption that 20% of the daily HGV total will arrive and depart between 07:00 and 08:00);
- Operational staff associated with Phase 1 will arrive on site between 07:00 and 08:00;
- Operational HGVs associated with Phase 1 will begin arriving/departing the site between 07:00 and 08:00 (with the assumption that 20% of the daily HGV total associated with Phase 1 will arrive and depart between 07:00 and 08:00);
- Operational staff associated with Phase 1 will depart the site between 16:00-17:00;
- 20% of the daily operational HGVs will arrive and depart the site during 16:00-17:00;
- 20% of the construction HGVs associated with Phase 2 will arrive and depart the site between 16:00-17:00; and
- Construction personnel associated with Phase 2 will depart the site between 19:00-20:00.

7.4.3 Sensitivity Test Scenario – Export of Bottom Ash via Drogheda Port

In addition to the analyses outlined above for the operational traffic associated with the proposed development, a further assessment scenario has been undertaken whereby bottom ash produced by the facility is no longer sent to landfill, and instead is exported to mainland Europe for recovery. This scenario assumes that the export of bottom ash would be via Drogheda Port.

Bottom ash would be stored on site in this scenario periodically throughout the year (likely to be 6-8 times per annum), for a period of two days the material would be transported by truck to Drogheda Port. It has been assumed that a 3,000-tonne capacity ship would be used, which would equate to a total of 150 HGVs (based on a 20-tonne capacity per vehicle).

Over a two-day period, this would then equate to 8 HGVs per hour (i.e. 16 HGV movements) between the site and Drogheda Port (assuming a 10-hour working day).

In this scenario, bottom ash removal to Drogheda Port would occur at the same time as general operations. There would be a minor reduction in the typical daily operational traffic associated with bottom ash disposal to landfill, which would not occur if export was to occur; however, this reduction in operational traffic

would be very minor, and so has not been applied to the development operational traffic flows.

Staff arrivals and departures for the export of bottom ash would also remain unchanged from typical operations.

7.5 Cumulative Assessment

A number of planning applications were reviewed from a number of sources including planning lists from Meath County Council and An Bord Pleanála. The purpose of this exercise was to identify planned or proposed projects that have the potential to have a significant cumulative effect on the environment due to the construction and operation of the proposed development in question.

7.5.1 Irish Cement Ltd. (Planning Ref. LB150375)

The development will consist of the installation of a Flue Dust Portland Cement Silo at Kiln 3. The development will include the provision of a silo of circa 40m in height and 12m in diameter, together with filter, access gantries, bucket elevator and truck loading facility all on an application site of circa 0.75 hectares located within Platin Cement Works. Permission was granted in June 2015. The current timeline for construction is unknown.

No detail relating to anticipated traffic movements was available for this project; however, it is stated in the planning report on file that *'The planning authority would anticipate that during construction works the proposed development will have an imperceptible to slight impact on traffic but at operational stage there will be no impact'.*

Therefore, it is anticipated (based on the information above) that there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.

Therefore, no further allowance has been made for this scheme within this chapter.

7.5.2 Irish Cement Ltd. (Planning Ref. PL17.PA0050)

This planning application was for a 10-year permission to facilitate further replacement of fossil fuels and allow for the introduction of alternative raw materials in the manufacturing of cement at Platin Cement Works, Platin, Co. Meath. The proposed development is for the use of an additional 480,000 tonnes per annum of alternative fuels and alternative raw materials. Permission was granted in April 2018. The current timeline for construction is unknown. Nevertheless, the traffic flows associated with this scheme have been obtained from the planning documentation and have been included within this chapter for assessment purposes (it is noted that the majority of estimated construction and operational traffic flow associated with this development is assumed in the relevant planning documentation to be via the M1 and R152 to the north of the proposed development site).

Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.

7.5.3 SSE Generation Ireland Ltd. (PL17.303678)

This planning application refers to an air-insulated switchgear 110kVand for a transmission substation (Ref. PL17.303678). The substation application was submitted to An Bord Pleanála as a Strategic Infrastructure development in February 2019 and was granted permission in January 2020.

It is noted that the substation scheme above appears to be an enabling component for a separate planning application for an open cycle gas turbine (OCGT) power plant, which was submitted to Meath County Council and permission granted in July 2019, but was subsequently appealed to An Bord Pleanála, where it was ultimately refused in December 2019. The OCGT plant therefore does not have a grant of planning.

Given the grant of permission received by the 110kV substation there is potential for this scheme to proceed as a standalone project.

Within the associated Environmental Report for the proposed developments (both schemes are presented as one single 'project'), the construction stage is expected to be 18 months duration. No distinction is provided within the report between the OCGT construction traffic and the substation construction traffic.

Furthermore, the report outlines that the proposed development will require a new priority junction to be constructed on the R152, to the north of the Indaver site, and it is also stated that construction HGV traffic will only access the site from the north (via the M1).

On this basis, with construction likely to be complete before 2022 and construction traffic only permitted to route to and from the M1, no further allowance has been made within this chapter for the proposed substation element of the scheme.

Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.

7.5.4 Highfield Solar Ltd. (Planning Refs. PL17.303568 and 17.248146)

These two applications (for a scheme titled 'Garballagh Lower Solar Farm') comprise an application for the development of a Solar Farm (17.248146) and a separate application for an electrical substation and associated 110kV and MV infrastructure required (17.303568) to connect the ground-mounted solar PV generation to the electrical transmission system, including underground cabling and all associated ancillary site development work.

Both applications were granted planning permission by An Bord Pleanála (in March 2019 and July 2019, respectively). Construction is underway; however, the estimated opening date is unknown.

It is assumed that this scheme will be constructed before construction commences for the Site Sustainability Project. Operationally, the solar farm will have a negligible impact. Therefore, no further allowance has been made for this scheme within this chapter.

Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the projects above.

Finally, from a traffic perspective, taking the Indaver Site Sustainability Project in in combination with all of the five projects listed above, it is considered that there is no potential for any significant negative direct or indirect cumulative impact to arise given the differences in construction programmes and construction routes and operational traffic flows between the projects.

7.6 Likely Significant Effects

7.6.1 "Do Nothing" Scenario

In the 'Do Nothing' scenario, traffic flows to and from the existing facility will remain as they currently are, and consequently there will be no change in the impact of the existing development on the surrounding road network.

7.6.2 2022 Construction/Opening Phase

7.6.2.1 Link Flow Analysis - Phase 2 Construction Personnel

The development traffic associated with construction personnel, as described in **Section 7.4.1** was applied to the local road network during the morning between 06:00-07:00 and in the evening between 19:00-20:00. These time periods are when the construction personnel arrive on site in the morning and depart in the evening, respectively, in the proposed assessment year of 2022.

Table 7.13: 2022 Construction Stage Two-Way Link Flows on surrounding road network

Junction/Arm	AM Peak Period (06:00-07:00)			PM Peak Period (19:00-20:00)		
	Without Dev	With Dev	% Change	Without Dev	With Dev	% Change
Indaver Site Entrance Junction						
Indaver Arm	13	113	100 (+870%)	11	111	100 (+1,009%)
R152 (North)	716	766	50 (+7%)	698	748	50 (+7.2%)

Junction/Arm	AM Peak Period (06:00-07:00)			PM Peak Period (19:00-20:00)		
	Without Dev	With Dev	% Change	Without Dev	With Dev	% Change
Indaver Site Entrance Junction						
R152 (South)	725	775	50 (+6.9%)	700	750	50 (+7.1%)
R150/R152 New Lanes Cross Junction						
R152 (North)	732	782	50 (+6.8%)	800	850	50 (+6.2%)
R152 (South)	616	641	25 (+4.1%)	344	369	25 (+7.3%)
R150 (West)	299	324	25 (+8.4%)	610	635	25 (+4.1%)
R150 (East)	160	160	0	202	202	0

**All flows in vehicles (two-way flows). Values have been rounded for clarity.*

It can be seen in the above table that the proposed development construction traffic increases the traffic on the local road network by approximately 7-8% in the majority of instances, with the exception being the Indaver entrance where the existing very low traffic flows during the morning and evening peak periods resulting in a proportionately high increase. However, the junction is more than capable of accommodating the additional traffic associated with the construction phase of the proposed development (as described in **Section 7.6.5** below).

Traffic flows on the surrounding road network are also relatively low, reflecting the early morning and later evening peak times for arrival and departure of construction personnel.

7.6.2.2 Link Flow Analysis - Phase 2 Construction HGV Traffic and Phase 1 Operational/HGV Traffic

The development traffic associated with construction HGV traffic, as described in **Section 7.4.1** was applied to the local road network during the morning between 07:00-08:00 and in the evening between 16:00-17:00. These time periods are when it has been assumed that 20% of the daily construction HGVs arrive/depart the site in both the morning and the evening respectively, in the proposed assessment year of 2022.

Furthermore, the development traffic associated with operational staff and operational HGV traffic for Phase 1 of the proposed development have been added to the local road network during the same time periods. As with construction HGV traffic, it has been assumed that 20% of the daily anticipated HGV movements associated with Phase 1 of the development arrive/depart the site in both the morning and evening time periods.

Table 7.14: 2022 Construction/Operational Stage Two-Way Link Flows on surrounding road network

Junction/Arm	AM Peak Period (07:00-08:00)			PM Peak Period (16:00-17:00)		
	Without Dev	With Dev	% Change	Without Dev	With Dev	% Change
Indaver Site Entrance Junction						
Indaver Arm	34	54	20 (+59%)	35	55	20 (+57%)
R152 (North)	1,405	1,413	8 (+0.6%)	1,365	1,373	8 (+0.6%)
R152 (South)	1,401	1,414	13 (+0.9%)	1,371	1,384	13 (+0.9%)
R150/R152 New Lanes Cross Junction						
R152 (North)	1,429	1,441	12 (+0.8%)	1,439	1,451	12 (+0.9%)
R152 (South)	1,020	1,030	10 (+1%)	858	869	11 (+1.3%)
R150 (West)	760	762	2 (+0.3%)	874	875	1 (0.1%)
R150 (East)	310	310	0	323	323	0

**All flows in vehicles (two-way flows). Values have been rounded for clarity.*

It can be seen in the table above that the addition of HGV traffic associated with construction of Phase 2 of the development, plus operational HGVs and vehicles associated with the opening of Phase 1 collectively have a negligible impact on the local road network, with typical increases of 0.3%-1.3%. Again, the exception is the Indaver entrance, where the existing low flows result in a proportionately high increase. Nevertheless, the proposed development will only result in an additional 20 vehicles on the road network during these two assessment hours.

7.6.3 Link Flow Analysis - 2027 Opening Year +5 Scenario

In 2027, the proposed development is fully constructed and operational. Therefore, the development traffic associated with operational staff and operational HGV traffic for Phases 1 and 2 of the proposed development have been added to the local road network during the relevant time periods (07:00-08:00 and 16:00-17:00, respectively). As with the 2022 scenario, it has been assumed that 20% of the daily anticipated HGV movements associated with Phases 1 and 2 of the development arrive/depart the site in both the morning and evening time periods.

Table 7.15: 2027 Construction/Operational Stage Two-Way Link Flows on surrounding road network

Junction/Arm	AM Peak Period (07:00-08:00)			PM Peak Period (16:00-17:00)		
	Without Dev	With Dev	% Change	Without Dev	With Dev	% Change
Indaver Site Entrance Junction						
Indaver Arm	38	72	34 (+89%)	39	73	34 (+87%)
R152 (North)	1,541	1,558	17 (+1.1%)	1,497	1,514	17 (+1.1%)
R152 (South)	1,537	1,554	17 (+1.1%)	1,504	1,521	17 (+1.1%)
R150/R152 New Lanes Cross Junction						
R152 (North)	1,567	1,584	17 (+1.1%)	1,577	1,594	17 (+1.1%)
R152 (South)	1,119	1,127	8 (+0.7%)	941	951	10 (+1.1%)
R150 (West)	833	842	9 (+1.1%)	956	963	7 (+0.7%)
R150 (East)	339	339	0	354	354	0

**All flows in vehicles (two-way flows). Values have been rounded for clarity.*

It can be seen in the table above that the addition operational HGVs and vehicles associated with the full development (both Phases) collectively have a negligible impact on the local road network, with typical increases of approximately 1%. As with previous scenarios, the exception is the Indaver entrance where the existing low flows result in a proportionately high increase. Nevertheless, the proposed development will only result in an additional 34 vehicles on the road network during these two assessment hours.

7.6.4 Link Flow Analysis - 2037 Opening Year +15 Scenario

As with the 2027 scenario the development traffic associated with operational staff and operational HGV traffic for Phases 1 and 2 of the proposed development have been added to the local road network during the relevant time periods in the 2037 assessment year (07:00-08:00 and 16:00-17:00, respectively). As with the 2022 and 2027 scenarios, it has been assumed that 20% of the daily anticipated HGV movements associated with Phases 1 and 2 of the development arrive/depart the site in both the morning and evening time periods.

Table 7.16: 2037 Construction/Operational Stage Two-Way Link Flows on surrounding road network

Junction/Arm	AM Peak Period (07:00-08:00)			PM Peak Period (16:00-17:00)		
	Without Dev	With Dev	% Change	Without Dev	With Dev	% Change
Indaver Site Entrance Junction						
Indaver Arm	44	78	34 (+77%)	45	79	34 (+76%)
R152 (North)	1,723	1,740	17 (+1%)	1,672	1,689	17 (+1%)
R152 (South)	1,719	1,736	17 (+1%)	1,681	1,698	17 (+1%)
R150/R152 New Lanes Cross Junction						
R152 (North)	1,753	1,769	16 (+0.9%)	1,761	1,778	17 (+1%)
R152 (South)	1,249	1,258	9 (+0.7%)	1,052	1,062	10 (+1%)
R150 (West)	932	941	9 (+1%)	1,065	1,072	7 (+1%)
R150 (East)	379	379	0	395	395	0

**All flows in vehicles (two-way flows). Values have been rounded for clarity.*

As with the 2027 assessment year, it can be seen in the table above that the addition operational HGVs and vehicles associated with the full development (both Phases) collectively have a negligible impact on the local road network, with typical increases of approximately 1%. As with previous scenarios, the exception is the Indaver entrance where the existing low flows result in a proportionately high increase. Nevertheless, as with the 2027 assessment year the proposed development will only result in an additional 34 vehicles on the road network during these two assessment hours.

7.6.4.1 Link Flow Analysis – Summary

The above tables demonstrate that the proposed development, once constructed and operational, will have a negligible impact on the local road network, with typical increases in the order of approximately 1% in the majority of locations.

The construction traffic associated with the scheme is seen to have a higher impact on the local road network; however, this is due to the background traffic being lower in the morning and evening assessment hours for construction purposes.

Construction traffic and the impact associated with the construction of the proposed development will be temporary in nature.

Additionally, construction working hours on site will be from 07:00-19:00, coinciding with time periods on the local road network that are outside the existing network peak time periods in the morning and evening.

7.6.5 Junction Assessment

In addition to the link flow analyses above, junction analyses were carried out at the Indaver site entrance/R152 junction and the R152/R150 junction at New Lanes Cross to the south, for the same assessment scenarios outlined above. The assessments were carried out using the PICADY module of the Junctions 9 software package. PICADY is an assessment tool used for analysis of priority-controlled junctions.

The assessment results are summarised in the following sections. The results are presented and discussed in terms of the Ratio of Flow to Capacity (RFC) values for the junction arms (RFC is a measure of how close a junction or an arm of a junction is operating to its theoretical maximum capacity and is expressed as a percentage value) and Mean Maximum Queue.

For all scenarios assessed, traffic flows were converted from vehicles to PCU.

7.6.5.1 2019 Base Year

Indaver Site Entrance Junction

Table 7.17: 2019 Base Year Analysis Results – Indaver Site Entrance – AM Peak Periods

Arm	AM Network (08:15-09:15)		AM (06:00-07:00)		AM (07:00-08:00)	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R152 S/B	41%	<1	29%	<1	46%	<1
R152 N/B	37%	<1	8%	<1	27%	<1
Indaver Arm	1%	<1	<1%	<1	3%	<1

Table 7.18: 2019 Base Year Analysis Results – Indaver Site Entrance – PM Peak Periods

Arm	PM Network (17:00-18:00)		PM (16:00-17:00)		PM (19:00-20:00)	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R152	35%	<1	32%	<1	14%	<1

S/B						
R152 N/B	52%	1	39%	<1	21%	<1
Indaver Arm	6%	<1	7%	<1	1%	<1

In 2019, the Indaver site entrance junction has significant reserve capacity throughout the day, and during all relevant time periods. Minimal queuing is seen on all of the arms of the junction, with all arms performing well under all scenarios.

In particular, the junction has significant spare capacity during the relevant time periods for the proposed development traffic (06:00-07:00, 07:00-08:00, 16:00-17:00 and 19:00-20:00).

R152/R150 New Lanes Cross Junction

Table 7.19: 2019 Base Year Analysis Results – R152/R150 New Lanes Cross (AM Peak Periods)

Arm	AM Network (08:15-09:15)		AM (06:00-07:00)		AM (07:00-08:00)	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R150 E/B Left	74%	3	14%	<1	57%	1
R150 E/B St/Right	42%	1	23%	<1	53%	1
R152 N/B	13%	<1	2%	<1	8%	<1
R150 W/B Left	14%	<1	6%	<1	14%	<1
R150 W/B St/Right	36%	1	8%	<1	27%	<1
R152 S/B	61%	2	12%	<1	35%	1

Table 7.20: 2019 Base Year Analysis Results – R152/R150 New Lanes Cross (PM Peak Periods)

Arm	PM Network (17:00-18:00)		PM (16:00-17:00)		PM (19:00-20:00)	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R150 E/B Left	75%	3	57%	1	37%	1
R150 E/B	28%	<1	24%	<1	16%	<1

Arm	PM Network (17:00-18:00)		PM (16:00-17:00)		PM (19:00-20:00)	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
St/Right						
R152 N/B	15%	<1	9%	<1	4%	<1
R150 W/B Left	16%	<1	11%	<1	2%	<1
R150 W/B St/Right	57%	1	46%	1	17%	<1
R152 S/B	86%	5	72%	3	34%	1

In 2019, the junction of the R152/R150 at New Lanes Cross performs relatively well throughout most of the day, with the approach arm from Duleek Village on the R150 and the southbound approach on the R152 experiencing the highest capacity results during the morning and evening peak periods on the surrounding road network. However, during the relevant time periods for the proposed development (06:00-07:00, 07:00-08:00, 16:00-17:00 and 19:00-20:00) the junction is operating well and has spare capacity.

7.6.5.2 2022 Construction/Operation Scenario

In 2022, the principal development impacts are outside of the morning and evening network peaks (08:15-09:15 and 17:00-18:00, respectively). Results are therefore presented for the relevant hours (06:00-07:00, 07:00-08:00, 16:00-17:00 and 19:00-20:00) in the tables below.

Indaver Site Entrance Junction

Table 7.21: 2022 Construction/Operational Year Analysis Results – Indaver Site Entrance (AM Peaks - 06:00-07:00 and 07:00-08:00)

Arm	AM (06:00-07:00) Without Development		AM (06:00-07:00) With Development		AM (07:00-08:00) Without Development		AM (07:00-08:00) With Development	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R152 S/B	31%	<1	34%	<1	49%	1	50%	1
R152 N/B	9%	<1	12%	<1	29%	<1	30%	<1

Indaver Arm	<1%	<1	<1%	<1	3%	<1	7%	<1

Table 7.22: 2022 Construction/Operational Year Analysis Results – Indaver Site Entrance (PM Peaks - 16:00-17:00 and 19:00-20:00)

Arm	PM (16:00-17:00) Without Development		PM (16:00-17:00) With Development		PM (19:00-20:00) Without Development		PM (19:00-20:00) With Development	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R152 S/B	34%	<1	34%	<1	15%	<1	15%	<1
R152 N/B	41%	<1	42%	<1	22%	<1	22%	<1
Indaver Arm	7%	<1	12%	<1	1%	<1	12%	<1

In 2022, the Indaver site entrance junction again has significant reserve capacity throughout the day, and during all relevant time periods. Minimal queuing is seen on all of the arms of the junction, with all arms performing well under all scenarios.

The additional arriving construction personnel in the morning (between 06:00-07:00) has a minor impact on the capacity of the junction, increasing the RFC by approximately 3%, but significant spare capacity remains at the junction.

During the 07:00-08:00 morning period, the arrival of operational staff and HGVs associated with Phase 1 of the scheme and construction HGVs associated with Phase 2 of the scheme has a very minor impact on the capacity of the junction, increasing the RFC by between 1-4%, with the largest increase recorded on the Indaver arm of the junction.

In the afternoon period (16:00-17:00), the operational and construction traffic arriving and departing the site result in minor increases in RFC, between 1-5%.

In the evening period (19:00-20:00), the departure of construction personnel from the site is seen to impact the Indaver arm of the junction only, increasing the RFC by approximately 10%.

The junction therefore has ample capacity to accommodate the construction traffic and the operational traffic associated with the proposed development.

R152/R150 New Lanes Cross Junction

Table 7.23: 2022 Construction/Operational Year Analysis Results – R152/R150 New Lanes Cross (AM Peak Periods – 06:00-07:00 and 07:00-08:00)

Arm	AM (06:00-07:00) Without Development		AM (06:00-07:00) With Development		AM (07:00-08:00) Without Development		AM (07:00-08:00) With Development	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R150 E/B Left	15%	<1	18%	<1	62%	2	63%	2
R150 E/B St/Right	25%	<1	25%	<1	60%	2	61%	2
R152 N/B	2%	<1	2%	<1	9%	<1	9%	<1
R150 W/B Left	6%	<1	6%	<1	16%	<1	16%	<1
R150 W/B St/Right	9%	<1	9%	<1	30%	1	30%	1
R152 S/B	12%	<1	12%	<1	38%	1	38%	1

Table 7.24: 2022 Construction/Operational Year Analysis Results – R152/R150 New Lanes Cross (PM Peak Periods – 16:00-17:00 and 19:00-20:00)

Arm	PM (16:00-17:00) Without Development		PM (16:00-17:00) With Development		PM (19:00-20:00) Without Development		PM (19:00-20:00) With Development	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R150 E/B Left	62%	2	62%	2	39%	1	40%	1
R150 E/B St/Right	28%	1	28%	1	17%	<1	18%	<1
R152 N/B	10%	<1	10%	<1	4%	<1	4%	<1
R150 W/B Left	12%	<1	12%	<1	3%	<1	3%	<1
R150 W/B	50%	1	51%	1	18%	<1	19%	<1

Arm	PM (16:00-17:00) Without Development		PM (16:00-17:00) With Development		PM (19:00-20:00) Without Development		PM (19:00-20:00) With Development	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
St/Right								
R152 S/B	78%	4	78%	4	36%	1	40%	1

In 2022, the R152/R150 junction at New Lanes Cross has sufficient reserve capacity during all relevant time periods. Minimal queuing is seen on all of the arms of the junction, with all arms performing well under all scenarios.

The additional arriving construction personnel in the morning (between 06:00-07:00) has a minor impact on the capacity of the junction, increasing the RFC by approximately 3%, but significant spare capacity remains at the junction.

During the 07:00-08:00 morning period, the arrival of operational staff and HGVs associated with Phase 1 of the scheme and construction HGVs associated with Phase 2 of the scheme has a very minor impact on the capacity of the junction, increasing the RFC by approximately 1%.

In the afternoon period (16:00-17:00), the operational and construction traffic arriving and departing the site result in minor increases in RFC of a maximum of 1%.

In the evening period (19:00-20:00), the departure of construction personnel from the site is seen to have a minor impact on the junction, increasing RFC values by 1-4%.

The junction therefore has ample capacity to accommodate the construction traffic and the operational traffic associated with the proposed development.

7.6.5.3 2027 Opening Year +5 Scenario

In 2027, as with 2022 the principal development impacts are outside of the morning and evening network peaks (08:15-09:15 and 17:00-18:00, respectively). Additionally, there is no construction traffic present.

Results are presented for the relevant hours (07:00-08:00 and 16:00-17:00) in the tables below.

Indaver Site Entrance Junction

Table 7.25: 2027 Opening Year +5 Analysis Results – Indaver Site Entrance (AM and PM Peaks - 07:00-08:00 and 16:00-17:00)

Arm	AM (07:00-08:00)	AM (07:00-08:00)	PM (16:00-17:00)	PM (16:00-17:00) With Development

	Without Development		With Development		Without Development			
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R152 S/B	54%	1	55%	1	37%	<1	38%	<1
R152 N/B	32%	<1	33%	<1	45%	<1	46%	<1
Indaver Arm	4%	<1	7%	<1	10%	<1	17%	<1

In 2022, the Indaver site entrance junction again has significant reserve capacity throughout the day, and during all relevant time periods.

Minimal queuing is seen on all of the arms of the junction, with all arms performing well under all scenarios.

During the 07:00-08:00 morning period, the arrival of operational staff and HGVs associated with Phases 1 and 2 of the scheme have a very minor impact on the capacity of the junction, increasing the RFC by between 1-3%, with the highest increase recorded on the Indaver arm.

In the afternoon period (16:00-17:00), the operational and construction traffic arriving and departing the site result in moderate increases in RFC on the R152 (in the order of 1%), and a greater increase on the Indaver arm of 7%.

The junction therefore has ample capacity to accommodate the construction traffic and the operational traffic associated with the proposed development.

R152/R150 New Lanes Cross Junction

Table 7.26: 2027 Opening Year +5 Analysis Results – R152/R150 New Lanes Cross Junction (AM and PM Peaks - 07:00-08:00 and 16:00-17:00)

Arm	AM (07:00-08:00) Without Development		AM (07:00-08:00) With Development		PM (16:00-17:00) Without Development		PM (16:00-17:00) With Development	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R150 E/B Left	73%	3	75%	3	72%	3	73%	3
R150 E/B St/Right	74%	3	75%	3	38%	1	40%	1
R152 N/B	10%	<1	10%	<1	11%	<1	11%	<1

R150 W/B Left	19%	<1	19%	<1	15%	<1	15%	<1
R150 W/B St/Right	37%	1	37%	1	58%	1	59%	2
R152 S/B	42%	1	43%	1	89%	7	90%	8

In 2027, the R152/R150 junction at New Lanes Cross is beginning to approach capacity on the R152 southbound approach to the junction in the evening peak period; however, this is based on the traffic at the junction having increased from 2019-2027 based on the growth factors outlined earlier in this chapter.

Despite this, minor levels of queuing are seen on all of the arms of the junction, and the remaining arms of the junction are seen to perform well and have sufficient residual capacity.

During the 07:00-08:00 morning period, the arrival of operational staff and HGVs associated with Phases 1 and 2 of the scheme has a very minor impact on the capacity of the junction, increasing the RFC by approximately 1-2% and having no impact on queue lengths.

In the afternoon period (16:00-17:00), the operational and construction traffic arriving and departing the site result in minor increases in RFC of a maximum of 1-2%, with a very minor impact on queue lengths.

Despite the junction itself approaching its' theoretical capacity on the R152 southbound approach arm, the proposed development is seen to have an almost negligible impact on the junction performance.

7.6.5.4 2037 Opening Year +15 Scenario

In 2037, as with 2027 the principal development impacts are outside of the morning and evening network peaks (08:15-09:15 and 17:00-18:00, respectively). Results are presented for the relevant hours (07:00-08:00 and 16:00-17:00) in the tables below.

Indaver Site Entrance Junction

Table 7.27: 2037 Opening Year +5 Analysis Results – Indaver Site Entrance (AM and PM Peaks - 07:00-08:00 and 16:00-17:00)

Arm	AM (07:00-08:00) Without Development		AM (07:00-08:00) With Development		PM (16:00-17:00) Without Development		PM (16:00-17:00) With Development	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R152	61%	1	62%	1	42%	<1	43%	<1

S/B								
R152 N/B	37%	<1	38%	<1	51%	1	51%	1
Indaver Arm	6%	<1	9%	<1	14%	<1	22%	<1

As with the 2027 scenario, in 2037 the Indaver site entrance junction again has significant reserve capacity throughout the day, and during all relevant time periods. Minimal queuing is seen on all of the arms of the junction, with all arms performing well under all scenarios.

During the 07:00-08:00 morning period, the arrival of operational staff and HGVs associated with Phases 1 and 2 of the scheme have a very minor impact on the capacity of the junction, increasing the RFC by between 1-3%.

In the afternoon period (16:00-17:00), the operational and construction traffic arriving and departing the site result in minor increases in RFC, between 1-8%, with the highest increase seen on the Indaver arm of the junction.

The junction therefore has ample capacity to accommodate the construction traffic and the operational traffic associated with the proposed development.

R152/R150 New Lanes Cross Junction

Table 7.28: 2037 Opening Year +5 Analysis Results – R152/R150 New Lanes Cross Junction (AM and PM Peaks - 07:00-08:00 and 16:00-17:00)

Arm	AM (07:00-08:00) Without Development		AM (07:00-08:00) With Development		PM (16:00-17:00) Without Development		PM (16:00-17:00) With Development	
	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R150 E/B Left	90%	8	92%	9	96%	10	99%	12
R150 E/B St/Right	101%	12	103%	13	73%	2	80%	3
R152 N/B	13%	<1	13%	<1	13%	<1	13%	<1
R150 W/B Left	24%	<1	25%	<1	22%	<1	22%	<1
R150 W/B St/Right	49%	1	50%	1	71%	2	72%	3
R152 S/B	49%	1	50%	1	106%	26	108%	30

By 2037, the R152/R150 junction at New Lanes Cross is experiencing capacity issues on a number of arms, predominantly the entry arm on the R150 from Duleek in the morning and evening and the southbound arm on the R152 in the evening. As with the 2027 scenario, traffic has been factored up to 2037 in line with the relevant growth factors outlined earlier in this chapter.

These results are indicative of a tidal flow pattern from Duleek in the morning towards the M1, and the reverse in the evening. Other arms of the junction are seen to have sufficient residual capacity.

During the 07:00-08:00 morning period, the arrival of operational staff and HGVs associated with Phases 1 and 2 of the scheme have a very minor impact on the capacity of the junction, increasing the RFC by approximately 1-2%.

In the afternoon period (16:00-17:00), the operational and construction traffic arriving and departing the site result in minor increases in RFC of between 1-7%.

Despite the junction itself approaching its' theoretical capacity on a number of arms, the proposed development is seen to have an almost negligible impact on the junction performance.

7.6.5.5 Sensitivity Test – Export of Bottom Ash

As outlined earlier in this chapter, a specific additional sensitivity test was undertaken for a scenario where bottom ash is transported to Drogheda Port to be exported elsewhere in Europe for recovery, as opposed to via landfill in Ireland. In this scenario, approximately once per month the stockpile of bottom ash stored on site would be transported by HGV to Drogheda Port over a two-day period. Traffic flows in this instance would comprise an additional 8 HGV's per hour arriving at the Indaver site and departing the Indaver site, heading north on the R152 and approaching Drogheda Port from the west, turning left at the junction of the R132 and Shop Street in Drogheda.

Export of bottom ash from Drogheda Port would involve the following:

- Bottom ash would be stored on site (the site will have capacity for on-site storage of up to 5,000 tonnes of ash);
- Every month, for a two-day period, bottom ash would be transported from the site to Drogheda Port in covered HGV's;
- These HGV's would commence arrival on site at 07:00 and would work throughout the typical day, finishing at 19:00; and
- These HGV movements would be confined to the local road network between the Indaver site and Drogheda Port.

To evaluate the impact of this, a sensitivity test was carried out at this junction, for an assessment year of 2022, in the morning and evening peak periods on the local road network (08:15-09:15 and 17:00-18:00, respectively).

A LinSig model of the signalised junction was built of the R132 and Shop Street. Signal phasing and staging and timings were obtained from Louth County Council

and were cross-referenced against site observations. LinSig is an analytical software package used for the evaluation of signal-controlled junctions.

Traffic growth factors outlined earlier in this chapter were used to increase the traffic flows from 2019 to 2022. Although these growth rates relate to the Meath area, they were also applied to the traffic flows at this junction, which is in Co. Louth, as the Meath growth rates were seen to be slightly higher than the corresponding growth rates for Louth, and therefore were retained for robustness.

Table 7.29: 2022 Opening Year Analysis Results – R132/R167 Shop Street junction, Drogheda – Export of Bottom Ash (AM and PM Peaks - 08:15-09:15 and 17:00-18:00)

Arm	Movement	AM (08:15-09:15) Without Develop.		AM (08:15-09:15) With Develop.		PM (17:00-18:00) Without Develop.		PM (17:00-18:00) With Develop.	
		RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q	RFC (%)	Mean Max Q
R167 S/B	Left	33%	5	33%	5	36%	6	35%	5
R167 S/B	St/Right	62%	10	64%	11	62%	10	63%	11
R132 W/B	Left/St	64%	15	65%	16	57%	13	60%	13
R132 W/B	St/Right	63%	11	65%	11	62%	10	63%	10
R132 E/B	Left/St	59%	7	61%	7	61%	7	64%	8
R132 E/B	St	49%	7	50%	7	53%	8	55%	8
R132 E/B Slip Lane	Left	54%	1	55%	1	59%	3	59%	3

It is seen in the table above that the additional HGV traffic associated with the transport of bottom ash to and from Drogheda Port has a minor impact at the junction in the morning and evening peak periods. RFC values are increased by between 1-3%, and the impact on queuing is seen to be minimal. It must be noted that the above assessment is based on a hypothetical scenario where bottom ash is no longer sent to landfill, and instead is exported.

Furthermore, the additional traffic flow associated with this activity would be temporary only, with the transport of bottom ash to the port taking place over a two-day period approximately once every month.

7.6.5.6 Junction Analysis – Summary

The analysis undertaken for the proposed development is based on the arrival and departure profiles that will be generated by the development, which lie outside of the morning and evening peak periods on the wider road network (08:15-09:15 and 17:00-18:00, respectively).

It can be seen in the above analysis tables that the Indaver site entrance junction has and will continue to have significant residual capacity to accommodate the additional traffic flows associated with the construction and operational phases of the proposed development during the relevant time periods.

The R152/R150 junction at New Lanes Cross to the south will begin to experience some capacity issues by 2027 in the evening (between 16:00-17:00) as a result of forecasted traffic growth; however, the proposed development itself is seen to have a very minor impact on the junction.

By 2037, the capacity issues at this junction have increased (again, due to forecasted traffic growth), with certain arms of the junction over capacity in both the morning and evening peak periods; however, the proposed development is seen to have a very minor impact on the junction.

7.7 Mitigation Measures and Monitoring

7.7.1 Operational Phase

7.7.1.1 Staff Operational Hours

Arrival and departure times for the additional 20 personnel to be employed on site following completion of Phases 1 and 2 of the proposed development will result in all new personnel arriving on site before 08:00 and departing the site before 17:00, thereby avoiding the morning and evening peak periods on the local road network (08:15-09:15 and 17:00-18:00, respectively).

7.7.1.2 HGV Arrival and Departure Profiles

As outlined in **Section 7.3.6.1**, the arrival profile of HGVs to the site is distributed across the working day. This is as a result of specific deliveries to the site being co-ordinated by the Indaver planner, and also a result of the current operators and deliveries to the site settling into an established pattern since the existing facility became operational. It is expected that this will continue for the proposed development.

Furthermore, it is Indaver policy to instruct those companies that use the existing facility to ensure that HGV traffic does not route through Duleek Village, although some localised routing is sometimes necessary for specific cases.

7.7.2 Construction Phase

Construction hours will be from 07:00-19:00. This will result in construction personnel arriving on site before 07:00 and departing after 19:00, thereby avoiding the peak hours on the local road network.

Furthermore, HGV traffic associated with the construction of Phases 1 and 2 will not be permitted to route through Duleek Village.

A Construction Traffic Management Plan (CTMP) will also be in place for the duration of the construction phases of the proposed development (see Section 9 of the ***Construction Environmental Management Plan*** in **Appendix 5.1** of **Volume 3** of this EIAR).

This will be agreed with Meath County Council in advance of commencement of construction, and the overall goal of the CTMP will be to minimise insofar as possible the potential impacts arising from the construction phase of the development on the local road network.

7.8 Cumulative Effects

As outlined in **Section 7.5**, a number of committed projects in the vicinity of the proposed development site have been identified, and the relevant traffic flows have been obtained from the planning documentation and incorporated into the background network traffic where applicable.

The baseline traffic data has also been growthed for future year assessments using a 'Central' 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.

7.9 Residual Effects

7.9.1 Operational Phase

The Indaver site entrance junction on the R150 has significant spare capacity at present and will continue to have sufficient capacity into the future to accommodate the proposed development without any residual effects.

The junction of the R152/R150 at New Lanes Cross to the south is heavily-trafficked at present and will begin to experience capacity issues in 2027 and by 2037 the junction will be over-capacity on specific arms and at specific times during the day. However, the proposed development itself will have a minimal impact on this junction.

Furthermore, major upgrade proposals on the local road network (primary the proposed Duleek bypass) will provide significant relief to the junction at New Lanes Cross once constructed. No allowance or reduction in traffic flows have been applied to this assessment to account for major upgrade proposals on the local road network.

7.9.2 Construction Phase

There will be no residual effects associated with the construction of the scheme, as construction traffic to and from the site will be temporary in duration and will be subject to a robust Construction Traffic Management Plan (CTMP), which will ensure that impacts on the local road network during construction are minimised.

The most significant impact associated with the construction stage is that on the Indaver site access junction itself, which has significant capacity and can comfortably accommodate the increased traffic flows.

7.10 References

Transport Infrastructure Ireland (TII) (2019) *Project Appraisal Guidelines, Unit 5.5: Link-Based Traffic Forecasting, Table 5.5.1: National Traffic Growth Forecasts: Annual Growth Factors*, TII, Dublin, Ireland

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