FORGE HILL RECYCLING, FORGE HILL,LEHENAGHMORE, Co. Cork

Traffic and Transport Assessment

March 2018

MHL & Associates Ltd.
Consulting Engineers

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M.H.L. & Associates Ltd.
Consulting Engineers
Carraig Mór House,
10 High Street,
Douglas Road,
Cork.
Tel 021-4840214 Fax: 021-4840215
E-Mail: info@mhl.ie

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1. NON – TECHNICAL SUMMARY

MHL Consulting Engineers have been engaged by Forge Hill Recycling (FHR) to prepare a Traffic Impact Assessment (TIA) as part of an application to extend its Materials Recycling Facility at Forge Hill, Co. Cork.

The scope of this study has been agreed with Cork County Council's Traffic & Transportation Department and includes Junction 1: The Forge Hill/Kinsale Road Signalised Junction. It was agreed that 12-hour junction turning count surveys be carried out at Junction 1 over a three-day period, Thursday 18th January 2018 through to Saturday 20th January 2018. The junction counts will form the basis for analysing the affected junctions for the identified peak periods.

The proposed development consists of the construction of two extensions to the existing development. Extension 1 is a proposed 1,468 m² Waste Reception Area with Extension 2 being a 140 m² increase to the existing Waste Handling Building.

As part of this assessment Junction 1 was analysed for current flows, for future year scenarios both with and without development traffic and for future year scenarios with/without proposed junction upgrades. LinSig Ver. 3.2 was used to generate these traffic models.

The opening year is the year of expected completion for the development and is taken to be 2020. In accordance with the NRA's "Traffic and Transport Assessment Guidelines", a traffic analysis is required to be undertaken for the, **Base Year – 2018, Opening Year – 2020, Opening Year +5 – 2025 and Opening Year +15 – 2035 (each year analysed with and without development traffic)**.

An assessment of the traffic generated by the current facility when compared with existing background traffic flows shows that the current development contributes at worst 1.1% of traffic to the Forge Hill Road. When compared to peak hour flows this falls to 0.6% which is considerably lower than the 5% requirement as set out in the Traffic Management Guidelines Thresholds for Transport Assessments in areas where congestion exists. If compared to the overall flow through Junction 1 the figure falls to just 0.2%.

Section 4 of this report presents the expected peak hour traffic generation from the expanded facility, 1 additional articulated truck, implying that the future year assessments of Junction 1 for with and without development traffic are effectively the same. Using current delivery patterns to the FHR site the morning peak hour, 08:00-09:00, is the critical time period for Junction 1 when considering the impact of the proposed development.

The results of the LinSig assessment of Junction 1 shows that the junction currently operates with a ratio of flow to capacity (r.f.c) of 86.0%. Projecting forward and applying TII medium growth rates to background traffic flows the following results are modelled:

Year	Ratio of Flow to Capacity (rfc)
2020	87.9%
2025	92.8%
2035	99.0%

An r.f.c of greater than 90% for a traffic signal-controlled junction implies that the junction has reached capacity with significant delay being experienced. Given the low level of traffic generated by the development the impact of the proposed scheme is negligible. With the additional flexibility on delivery times afforded by the proposed extension, the operators intend to schedule all such activities to off-peak periods to increase the efficiency of their operation. The results of this TTA will inform management of the optimum times to receive and transport their product.

This report has been prepared in accordance with the NRA's 2014 publication "Traffic and Transport Assessment Guidelines" and the "Guidelines for Traffic Impact Assessments" as published by the Institution of Highways & Transportation U.K. in 1994. The purpose of a TTA is to assess the traffic impact of a development on the existing road network and propose any necessary mitigation measures to best accommodate the expected traffic volumes generated by the proposed development.

2. EXISTING CONDITIONS

Figure 2.1 presents the existing site with reference to the identified critical junctions the subject of the traffic modelling.

Figure 2.1: Site Location Map

2.1 LOCAL ROAD NETWORK

The Forge Hill Road links the Pouladuff Road (and the nearby Pouladuff Interchange with the N40 South Ring Road) to the N27 Airport Road. Junction 1 identified above, serves as the main access junction to the existing facility.

A second junction, Junction 2 is a priority junction of Forge Hill and the Pouladuff Road with Forge Hill operating as the secondary road. This junction experiences significant delay during evening peak periods. Drivers (primarily driving articulated trucks) bringing materials to the plant are instructed to avoid this route due to the sub-standard nature of the road and its junctions. Section 8.0 of this report presents proposed upgrades to Junction 2 that are currently being designed to planning stage. It is unclear when these works will be carried out, but the operators of the FHR plant do not intend to change their haul routes at present.

Junction 1 is a staggered cross roads signalised junction on the N27 Airport Road (known locally as the Bull McCabes Junction). On-site measurements were taken at this junction to feed directly into the traffic modelling software to build the base year model (2018).

2.2 RECORDED TRAFFIC FLOWS

The following figures present the recorded traffic flows at Junction 1 over the 12-hour time periods for each of the three days. Evident from these graphs are the recorded peak hours with the highest flows being recorded on Thursday 18th Jan 2018. For this time period there are three peak periods, 07:30-09:30, 13:00-14:00 and 16:30-18:00.

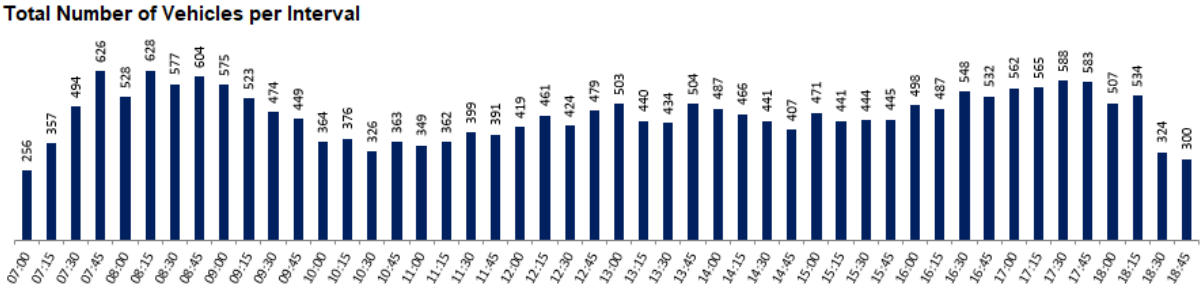


Figure 2.2: 12-Hour traffic profile for junction 1 – Thurs 18th Jan 2018.

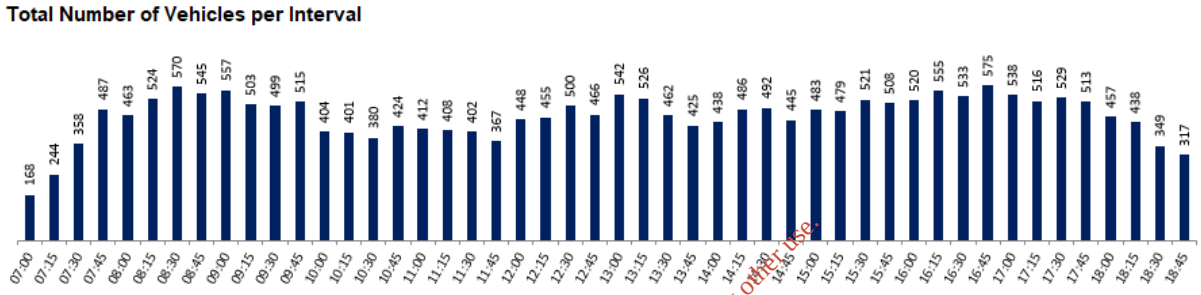


Figure 2.3: 12-Hour traffic profile for junction 1 – Fri 19th Jan 2018.

Figure 2.4: 12-Hour traffic profile for junction 1 – Sat 20th Jan 2018.

The following graphics present the morning (08:00-09:00) and evening (17:00-18:00) traffic peak turning movements at Junction 1 for Thursday 18th Jan 2018.

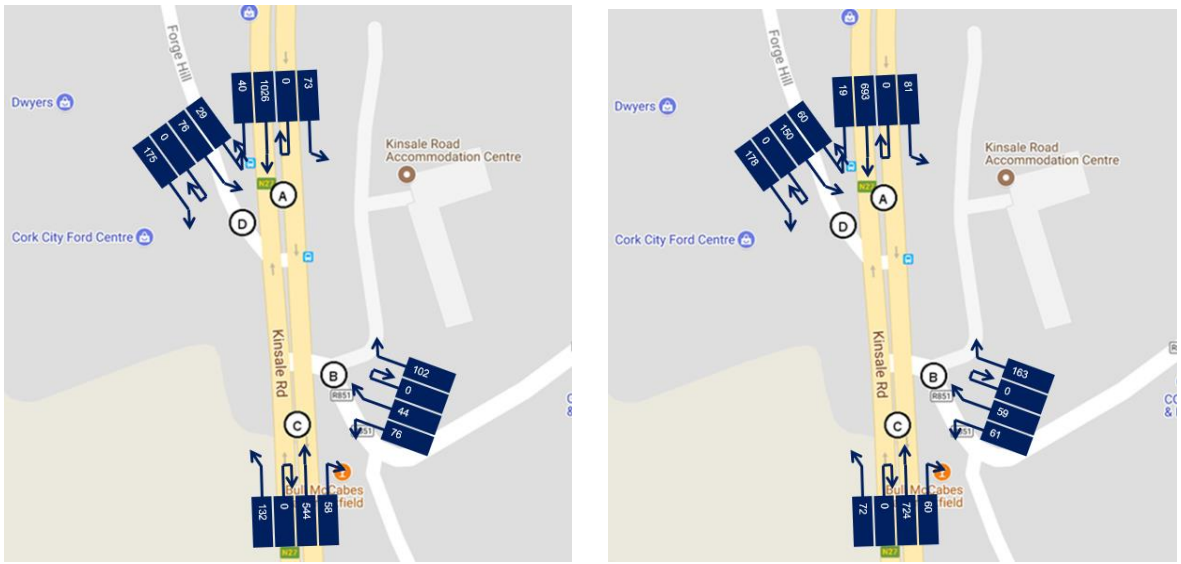


Figure 2.5: Junction 1 Recorded Turning Movements. (AM and PM Peak)

2.3 EXISTING TRAFFIC GENERATED BY FHR

The following graphs are derived from operational data received from Forge Hill Recycling and include 2017 Annual figures as well as figures over a week-long period in March 2017. The recorded movements are based on a total weight-in of 81,000 tonnes. These graphs will be used to determine if operational traffic, to and from the plant, coincides with background traffic peak periods.

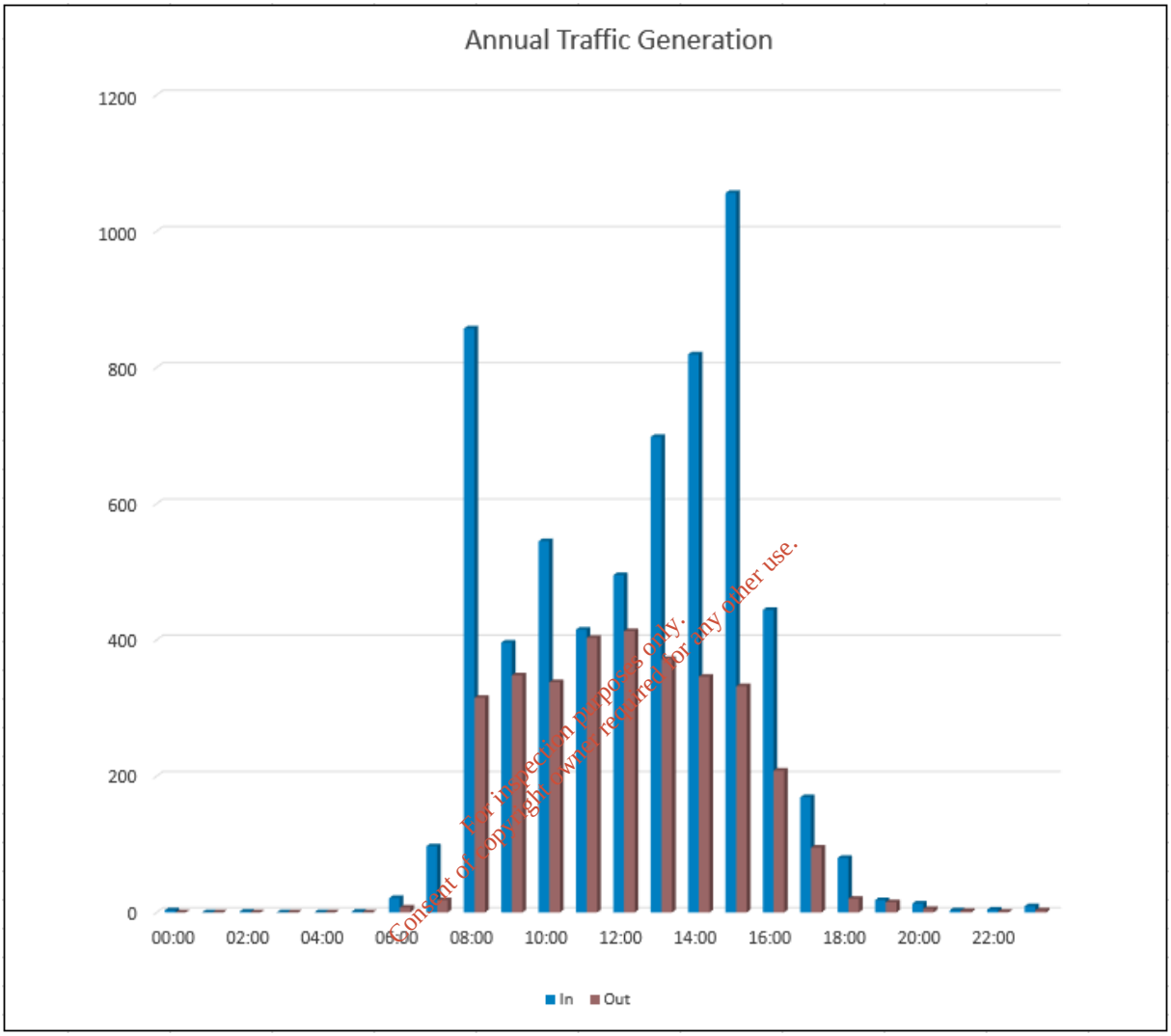


Figure 2.6: 2017 Annual Traffic Generation

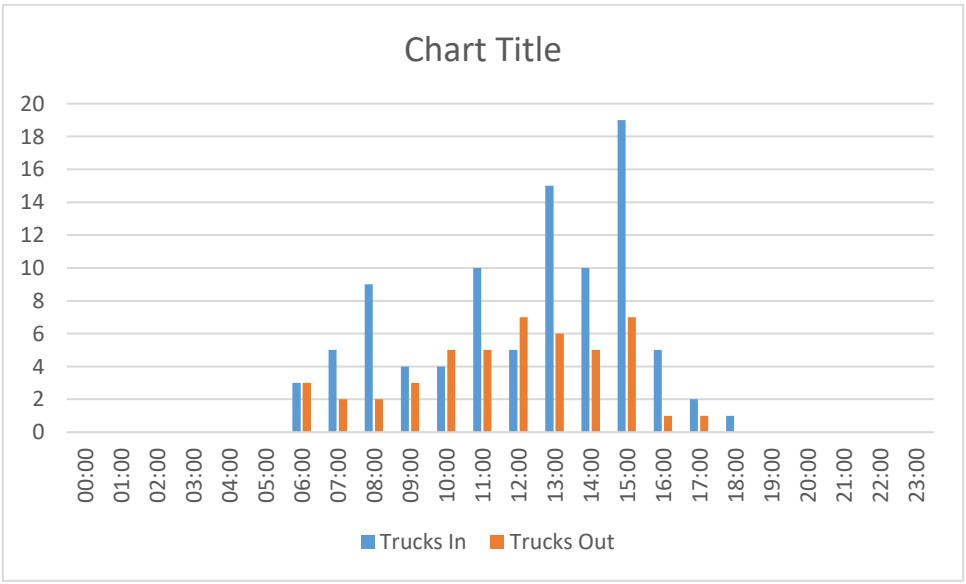


Figure 2.7: 2017: 13th -18th - Weekly March Traffic Generation

Using the above data, it is evident that the time period between 14:00-15:00 coincides with one of the three identified peak periods at the critical junctions. Figure 2.8 below represents the 1-hour traffic movements at Junction 1 between 14:00-15:00 on Thursday 18th Jan 2018. Figure 2.9 presents the daily traffic generation for the plant recorded on Thursday 16th March 2017.

Figure 2.8: 2018: 18th January 14:00-15:00 Recorded Traffic Flows

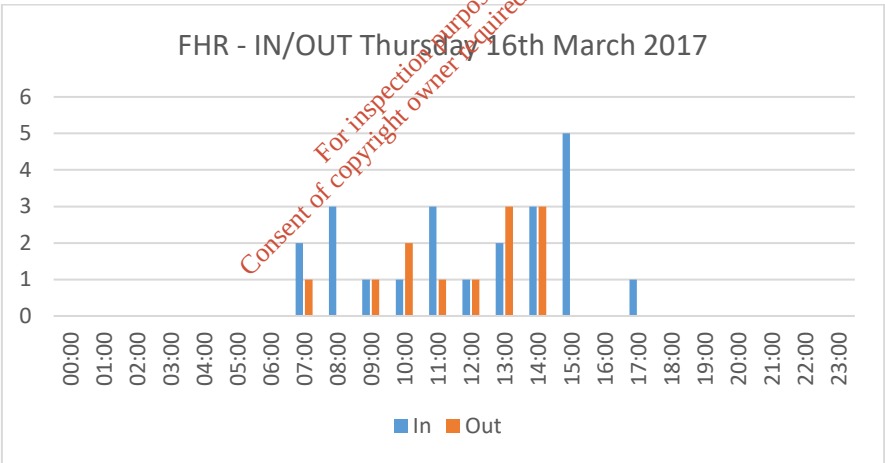


Figure 2.9: 16th March 2017 Recorded Traffic Flows IN/OUT FHR

Taking the worst-case scenario for traffic generation from the plant as per Figure 2.9, a total of 5 trucks entered the site with 0 leaving between 14:00-15:00. Referring to Figure 2.8 a two-way flow of 548 vehs travelled on the Forge Hill Road for this same time period so in terms of traffic flow the FHR facility contributes approximately 1.1% of traffic to the adjoining road. This is less than the 5% outlined in the Traffic Management Guidelines Thresholds for Transport Assessments in areas where congestion exists. When the morning peak hour is examined, the percentage contribution is lower again at 0.6%.

2.4 CONCLUSION

Having reviewed the recorded traffic flows it is clear that the peak period for traffic generation from the FHR Plant coincides with the morning and mid-day peak periods for background traffic flows. The morning peak between 08:00-09:00 is the critical time for the N27 (Junction 1). It is also evident that traffic generation from the site contributes a very low percentage of traffic to the background flows. In conclusion an analysis of Junction 1 for the morning peak period will adequately assess the impact of the proposed development on the surrounding roads network.

3. PROPOSED DEVELOPMENT

The proposed scheme is to develop a new Waste IN reception area which will allow the plant to accept and store dry waste prior to recycling. This will facilitate the plant receiving waste at off-peak periods between 06:30 and 23:30 with the facility operations continuing 24 hours a day. As this is a merchant facility material acceptance times can be scheduled and are not linked to household collection times. In-line with the proposed investment the plant will be able to handle an increase in waste of 20% (100,000 tonnes annually). An associated increase in traffic generation from the site will be mitigated through the scheduling of deliveries to avoid congested peak periods on the existing roads network.

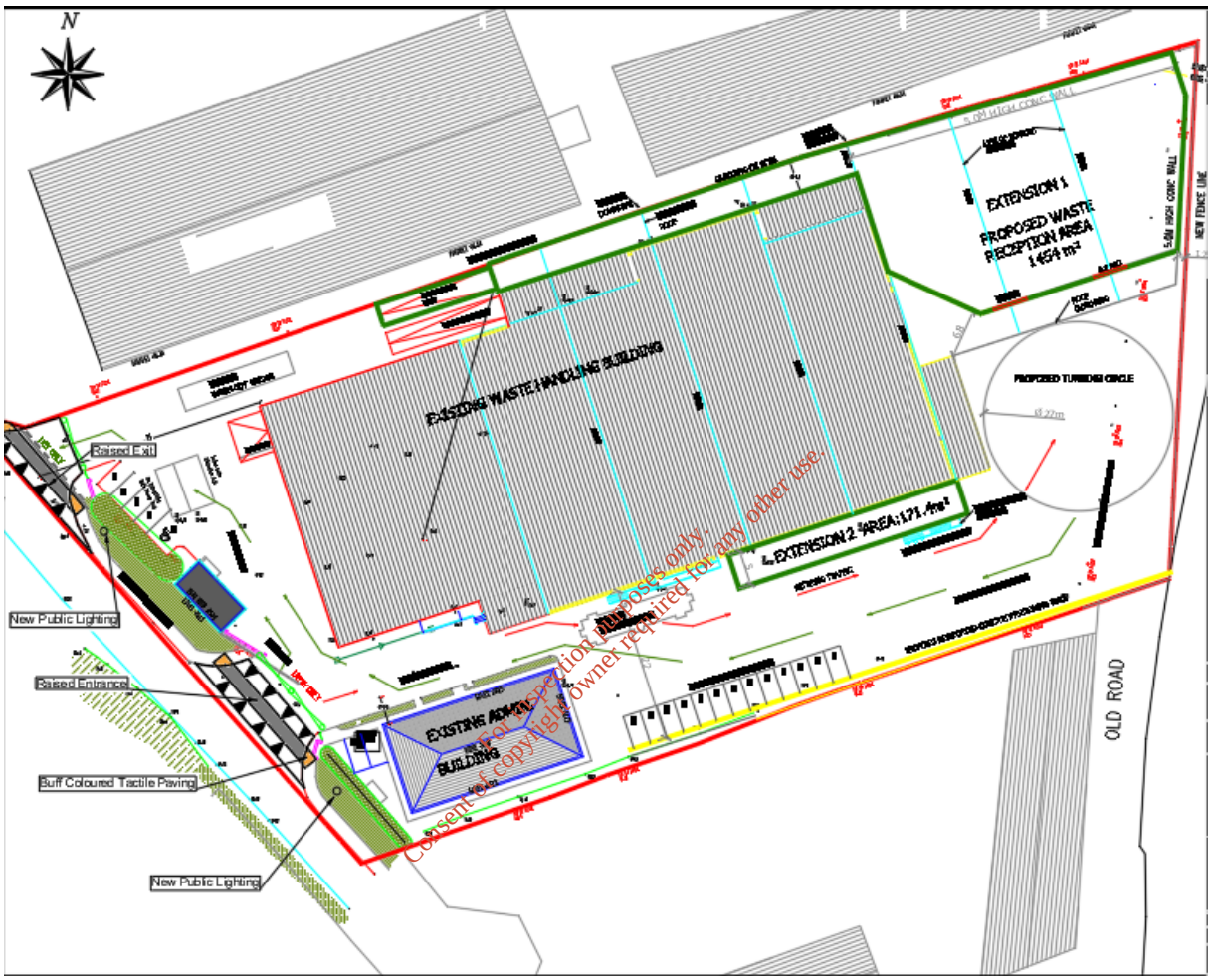


Figure 3.1: Site Layout Map

4. TRAFFIC GENERATION

4.1 EXISTING TRAFFIC FLOWS

Daily traffic generation based on recorded flows are as per Figure 2.9. A two-way flow of 34 trucks was recorded over a 24-hour basis in March 2017. As previously outlined this generated flow is based on 81,000 tonnes of waste being processed at the FHR facility annually. The peak hourly flow is taken to be 5 articulated trucks.

4.2 MODAL CHOICE

To predict the level of traffic that will be generated by the proposed development, the means of transport (modal choice) and quantity of traffic generated (trip attraction) must be considered. In this instance the traffic generated by the existing plant will be factored accordingly to represent the proposed increase in annual tonnage being handled (+20%).

4.3 PROPOSED DEVELOPMENT TRAFFIC GENERATION

Based on existing hourly flows the upgraded plant would be expected to generate 6 vehicles at peak hours. This is a negligible increase in traffic flow over the hour and will have little or no impact on the operation of Junction 1.

4.4 TRIP DISTRIBUTION

The current distribution of traffic from the plant will be used to determine directional split. The bulk of trips to and from the site use Junction 1 as the main access to the existing roads network. This pattern is expected to continue.

5. ASSIGNMENT OF DEVELOPMENT TRAFFIC

5.1 EXISTING TRAFFIC FLOWS

As outlined in Section 4 the pattern of existing traffic to and from the site will be used to assign newly generated traffic to the network.

6. ASSESSMENT YEARS

The opening year is the year of expected completion for the development and is taken to be 2020. In accordance with the Guidelines for Traffic and Transportation Assessments as published by the NRA, a traffic analysis is required to be undertaken for the Opening Year – 2020 plus five and fifteen years from this date i.e., Opening year +5 – 2025 and Opening year +15 - 2035.

The growth of traffic from within the development will be expected to remain stagnant over the period 2020 to 2035. This is assumed because no new development will take place within the site.

The Transport Infrastructure Ireland "Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections – PE-PAG-02017, October 2016" was used to calculate growth factors for the existing road network traffic. Table 6.1 below shows the calculated growth factors to convert from 2018 to 2020, 2018 to 2025 and from 2018 to 2035.

			Cars/LGV	HGV	Combined
Count %			95%	5%	
2018	**to**	**2020**	1.021	1.048	**1.022**
2018	**to**	**2025**	1.074	1.178	**1.079**
2018	**to**	**2035**	1.136	1.416	**1.150**

TII Project Appraisal Guidelines for National Roads Unit 5.3
Travel Demand Projections (PE-PAG-0217)

Table 6.1: Future Growth Rates for Base Year, Opening year, Opening year +5 (2018 to 2025) & Opening Year +15 (2018 to 2035)

7. TRAFFIC MODDELLING RESULTS

LinSig Ver.3 was used to construct a traffic model of Junction 1 for the following scenarios;

- 2018 – Base year (AM)
- 2020 – Opening year (with / without development) (AM)
- 2025 – Opening year +5 (with / without development) (AM)
- 2035 – Opening year +15 (with / without development) (AM)

7.1 LINSIG ANALYSIS

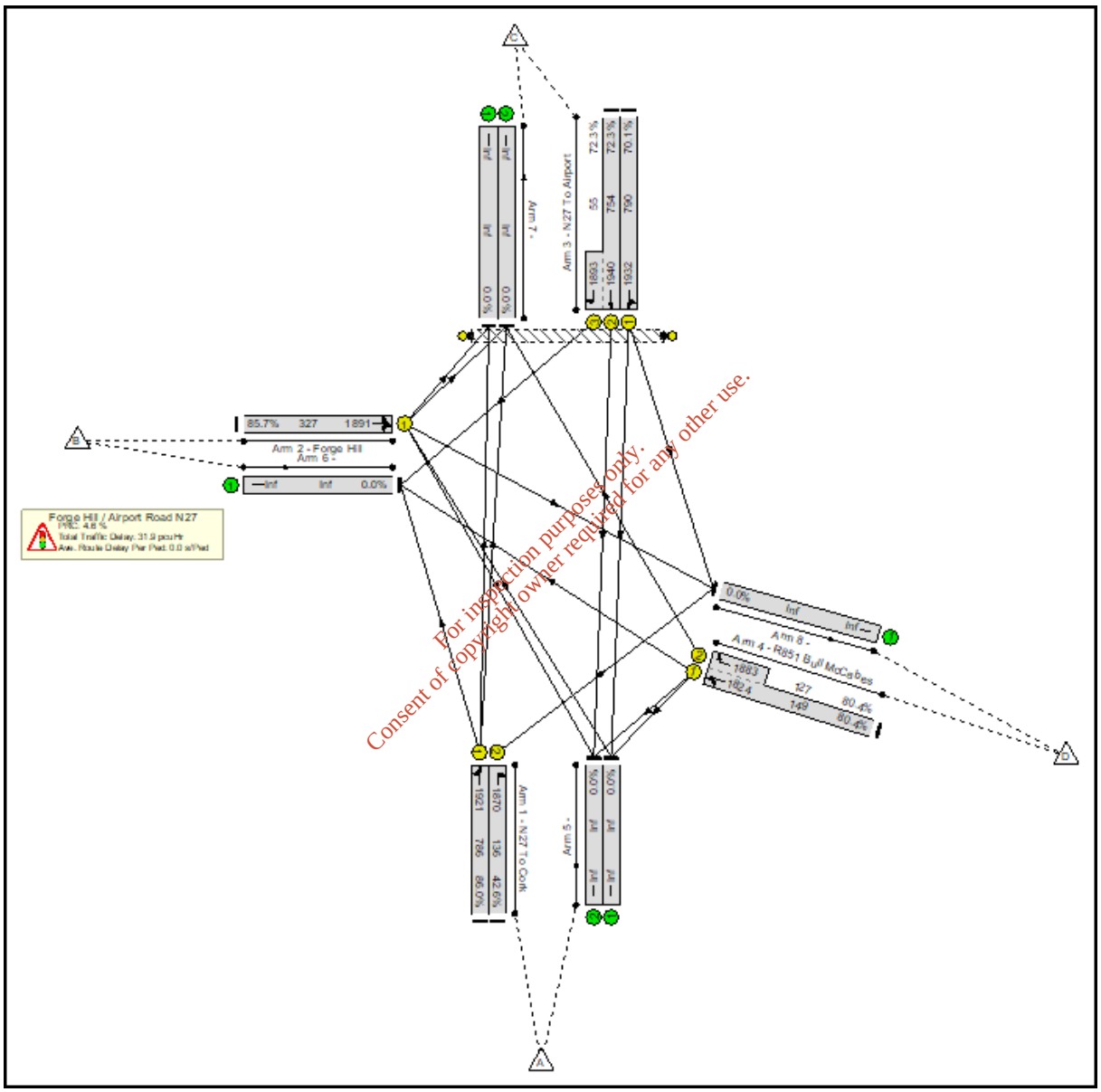


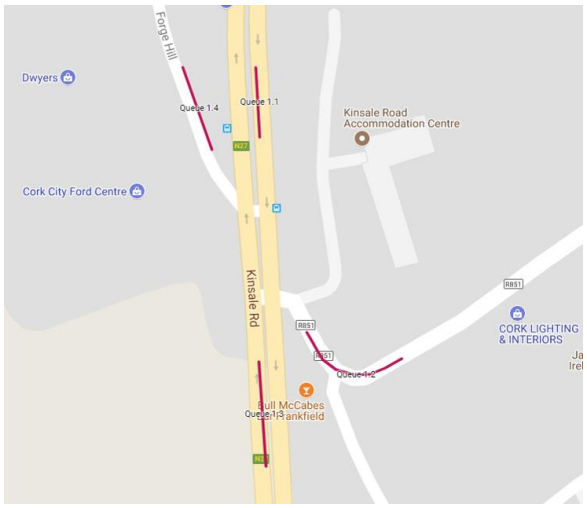
Figure 7.1: Junction 1: LinSig Model

The output results sheets from LinSig Ver 3.2 consist of tables of demand flow, capacities, queues and delays for each arm of the junction. These tables contain start and finish times for each arm, traffic demand, 'Ratio of Flow to Capacity' (RFC), start queue length and queuing delay.

The RFC provides the basis for judging the acceptability of the junction design and the capacity of the existing junction. For traffic signal-controlled junctions, an RFC of 0.90 or less is considered acceptable during the peak period. An RFC of this value would indicate that at peak times the junction is at 90% of its operational capacity and therefore has a practical reserve capacity of 10%.

The following diagram, Fig 7.3, outlines the results of the networked model comprising of Junction 1 for the current year 2018. The current year model was validated by comparing the traffic count information to the

modelled flows from LinSig, in this case as there is no route choice we will get a 100% match. The calibration of the current year model involved comparing on-site measurement of queue lengths and delay to model results. As expected on site observations included some minor fluctuations in queue lengths but in general were broadly in-line over the peak hour periods.



	Arm 1.1			Arm 1.2		Arm 1.3		Arm 1.4
	NS	Middle	OS	NS	OS	NS	OS	
07:00	30	15	0	0	5	25	5	15
07:05	25	5	0	5	0	0	5	5
07:10	0	10	0	0	0	10	5	15
07:15	0	0	0	0	0	10	5	5
07:20	15	20	15	0	0	65	5	5
07:25	15	10	5	0	0	25	10	30
07:30	15	35	0	5	15	40	15	35
07:35	45	55	0	5	10	55	15	40
07:40	20	35	5	10	5	100+	5	40
07:45	65	90+	0	10	15	100+	20	45
07:50	85	90	0	10	30	100+	20	50
07:55	25	90	10	5	5	95+	0	40
08:00	50	90	10	5	45	95+	15	40
08:05	45	55	15	5	15	45	5	30
08:10	45	90	10	10	20	90	10	52.5
08:15	70	90+	25	5	25	35	15	55
08:20	60	90	0	15	20	105+	0	40
08:25	30	40	5	35	5	100+	25	40
08:30	70	75	35	10	25	95+	10	37.5
08:35	70	70	0	20	10	95+	0	45
08:40	40	90	20	25	0	60	20	40
08:45	65	90	0	5	40	65	10	50+
08:50	85	70	10	20	25	65	10	40
08:55	70	70	5	20	15	55	15	50+
09:00	100	90+	5	25	30	80	20	50+

Fig 7.2: Junction1 Forge Hill/N27 – Observed/Recorded Queue Lengths in meters (08:00-09:00)

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Junction 1	-	-	-		-	-	-	-	-	-	86.0%	0	0	0	31.9	-	-
Forge Hill / Airport Road N27	-	-	-		-	-	-	-	-		86.0%	0	0	0	31.9	-	-
1/1	N27 To Cork Left Ahead	U	A		1	44	-	676	1921	786	86.0%	-	-	-	8.5	45.2	21.7
1/2	N27 To Cork Right	U	B		1	7	-	58	1870	136	42.6%	-	-	-	1.2	71.7	2.1
2/1	Forge Hill Right Left Ahead	U	C		1	18	-	280	1891	327	85.7%	-	-	-	6.1	78.8	10.9
3/1	N27 To Airport Ahead Left	U	D		1	44	-	554	1932	790	70.1%	-	-	-	5.3	34.5	15.2
3/2+3/3	N27 To Airport Ahead Right	U	D E		1	44:7	-	585	1940:1893	754+55	72.3 : 72.3%	-	-	-	5.9	36.3	15.7
4/1+4/2	R851 Bull McCabes Left Ahead Right	U	F		1	8	-	222	1824:1883	149+127	80.4 : 80.4%	-	-	-	5.0	80.4	5.5
Ped Link: P1	Unnamed Ped Link	-	G		1	10	-	0	-	0	0.0%	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): 4.6 Total Delay for Signalled Lanes (pcuHr): 31.93 Cycle Time (s): 110
PRC Over All Lanes (%): 4.6 Total Delay Over All Lanes(pcuHr): 31.93

Fig 7.3: Junction 1 Forge Hill/N27 – 2018: 08:00-09:00 Results

The results of the future year models for 2020, 2025 and 2035 are presented if the following tables. **It should be noted that as the expected peak hour traffic generation from the expanded facility is negligible the 'With/Without' scenario results are the same**.

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Junction 1	-	-	-		-	-	-	-	-	-	87.9%	0	0	0	33.9	-	-
Forge Hill / Airport Road N27	-	-	-		-	-	-	-	-	-	87.9%	0	0	0	33.9	-	-
1/1	N27 To Cork Left Ahead	U	A		1	44	-	691	1921	786	87.9%	-	-	-	9.2	47.7	22.8
1/2	N27 To Cork Right	U	B		1	7	-	59	1870	136	43.4%	-	-	-	1.2	72.0	2.1
2/1	Forge Hill Right Left Ahead	U	C		1	18	-	287	1891	327	87.9%	-	-	-	6.7	83.6	11.7
3/1	N27 To Airport Ahead Left	U	D		1	44	-	570	1932	790	72.1%	-	-	-	5.6	35.3	15.8
3/2+3/3	N27 To Airport Ahead Right	U	D E		1	44:7	-	594	1940:1893	754+56	73.4 : 73.4%	-	-	-	6.1	36.8	16.2
4/1+4/2	R851 Bull McCabes Left Ahead Right	U	F		1	8	-	227	1824:1883	149+126	82.4 : 82.4%	-	-	-	5.3	83.6	5.8
Ped Link: P1	Unnamed Ped Link	-	G		1	10	-	0	-	0	0.0%	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): 2.4 Total Delay for Signalled Lanes (pcuHr): 33.93 Cycle Time (s): 110
PRC Over All Lanes (%): 2.4 Total Delay Over All Lanes(pcuHr): 33.93

Fig 7.4: Junction 1 Forge Hill/N27 – 2020: 08:00-09:00 Results

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Junction 1	-	-	-		-	-	-	-	-	-	**92.8%**	**0**	**0**	**0**	**40.3**	-	-
Forge Hill / Airport Road N27	-	-	-		-	-	-	-	-	-	**92.8%**	**0**	**0**	**0**	**40.3**	-	-
1/1	N27 To Cork Left Ahead	U	A		1	44	-	729	1921	786	92.8%	-	-	-	11.7	57.6	26.4
1/2	N27 To Cork Right	U	B		1	7	-	63	1870	136	46.3%	-	-	-	1.3	73.3	2.3
2/1	Forge Hill Right Left Ahead	U	C		1	18	-	302	1891	327	92.5%	-	-	-	8.3	98.4	13.6
3/1	N27 To Airport Ahead Left	U	D		1	44	-	603	1932	790	76.3%	-	-	-	6.3	37.4	17.3
3/2+3/3	N27 To Airport Ahead Right	U	D E		1	44:7	-	626	1940:1893	754+56	77.3 : 77.3%	-	-	-	6.7	38.8	17.7
4/1+4/2	R851 Bull McCabes Left Ahead Right	U	F		1	8	-	239	1824:1883	149+127	86.4 : 86.4%	-	-	-	6.1	91.4	6.6
Ped Link: P1	Unnamed Ped Link	-	G		1	10	-	0	-	0	0.0%	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): -3.1 Total Delay for Signalled Lanes (pcuHr): 40.26 Cycle Time (s): 110
PRC Over All Lanes (%): -3.1 Total Delay Over All Lanes(pcuHr): 40.26

Fig 7.5: Junction 1 Forge Hill/N27 – 2025: 08:00-09:00 Results

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Junction 1	-	-	-		-	-	-	-	-	-	**99.0%**	**0**	**0**	**0**	**55.1**	-	-
Forge Hill / Airport Road N27	-	-	-		-	-	-	-	-	-	**99.0%**	**0**	**0**	**0**	**55.1**	-	-
1/1	N27 To Cork Left Ahead	U	A		1	44	-	778	1921	786	99.0%	-	-	-	19.1	88.4	35.7
1/2	N27 To Cork Right	U	B		1	7	-	67	1870	136	49.3%	-	-	-	1.4	74.8	2.4
2/1	Forge Hill Right Left Ahead	U	C		1	18	-	321	1891	327	98.3%	-	-	-	11.7	131.3	17.4
3/1	N27 To Airport Ahead Left	U	D		1	44	-	645	1932	790	81.6%	-	-	-	7.3	40.9	19.5
3/2+3/3	N27 To Airport Ahead Right	U	D E		1	44:7	-	665	1940:1893	754+56	82.1 : 82.1%	-	-	-	7.8	42.0	19.8
4/1+4/2	R851 Bull McCabes Left Ahead Right	U	F		1	8	-	255	1824:1883	149+127	92.4 : 92.4%	-	-	-	7.8	110.8	8.5
Ped Link: P1	Unnamed Ped Link	-	G		1	10	-	0	-	0	0.0%	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): -10.0 Total Delay for Signalled Lanes (pcuHr): 55.12 Cycle Time (s): 110
PRC Over All Lanes (%): -10.0 Total Delay Over All Lanes(pcuHr): 55.12

Fig 7.6: Junction 1 Forge Hill/N27 – 2035: 08:00-09:00 Results

7.2 ROAD IMPACT CONCLUSIONS

The traffic modelling results presented above show that Junction 1 can operate within capacity for the morning peak period up to 2020 but exceeds capacity prior to 2025. These results are the same both with and without the proposed development in place. The traffic modelling conclusion is that the proposed development has negligible impact on the surrounding roads network.

With the flexibility that the operators of the FHR Plant will have, in terms of when they receive waste if the proposed development is put in place, the potential for a positive impact on the surrounding junctions is possible. As previously outlined given the low volumes of trip generation to/from the site any such impact will be minor.

8. CUMULATIVE IMPACTS

As outlined in Section 6.0 of this report, industry standard growth rates have been applied to background traffic for future year assessments. These growth rates make allowance for modal shift targets as set by national policy but do not take account of site specific measures that may be implemented to mitigate against traffic generation from a particular enterprise. In this instance and based on the recorded traffic generation to the existing facility the level of trips generated is minimal with little scope for improvement given the nature of the business.

In terms of other impacts, the Junction of Forge Hill and Pouladuff Road is currently being designed to planning stage to convert this priority junction to a signal-controlled junction. The following figure presents this proposed upgrade which will be subject to the Part 8 Planning process. There is no clear timeline for the delivery of these improvements. The proposed development will have little or no impact on Junction 2.

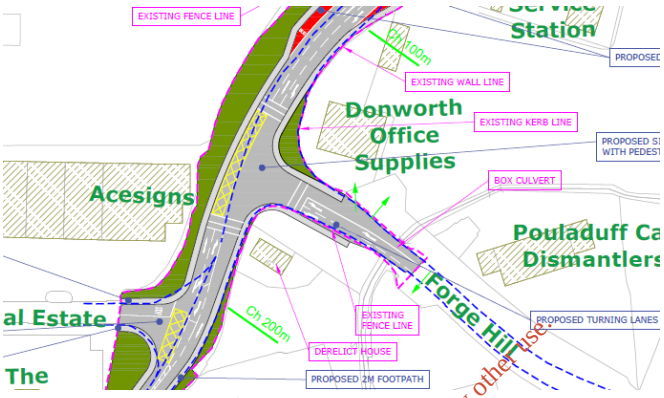


Fig 8.1: Junction 2: Forge Hill/Pouladuff Road proposed signalisation

TII as part of their mandate are currently undertaking the N40 Demand Management Strategy which seeks to improve the capacity of the National Roads Network through the implementation of junction improvements, speed limit modifications and other such measures. The N27 Airport Road is within this study area as is Junction 1. Currently there are no specific proposals for this junction but any future measures proposed would certainly seek to improve its capacity.

9. ROAD SAFETY

9.1 Road Collision Database

From accessing Ireland's road collisions database produced from the RSA it can be seen that there is a significant number of accidents at Junction 1 with some minor road accidents on Forge Hill. A number of these accidents are minor rear end shunt type accidents normally associated with busy signalised junctions.

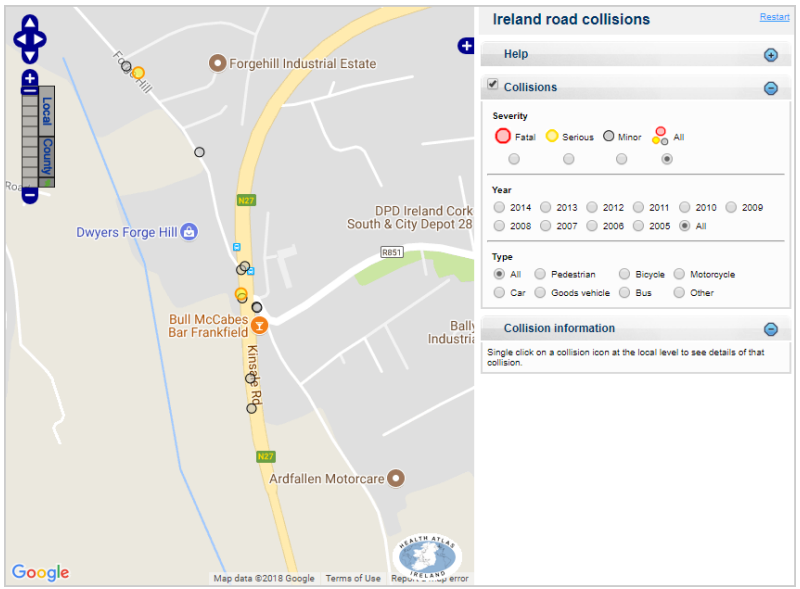


Fig 9.1: RSA Road Collisions database

10. ENVIRONMENTAL IMPACT

The environmental impact of the proposed extension is the subject of a separate report.

11. INTERNAL LAYOUT & PARKING PROVISIONS

The following drawing presents the turning movements of vehicles entering and exiting the facility.

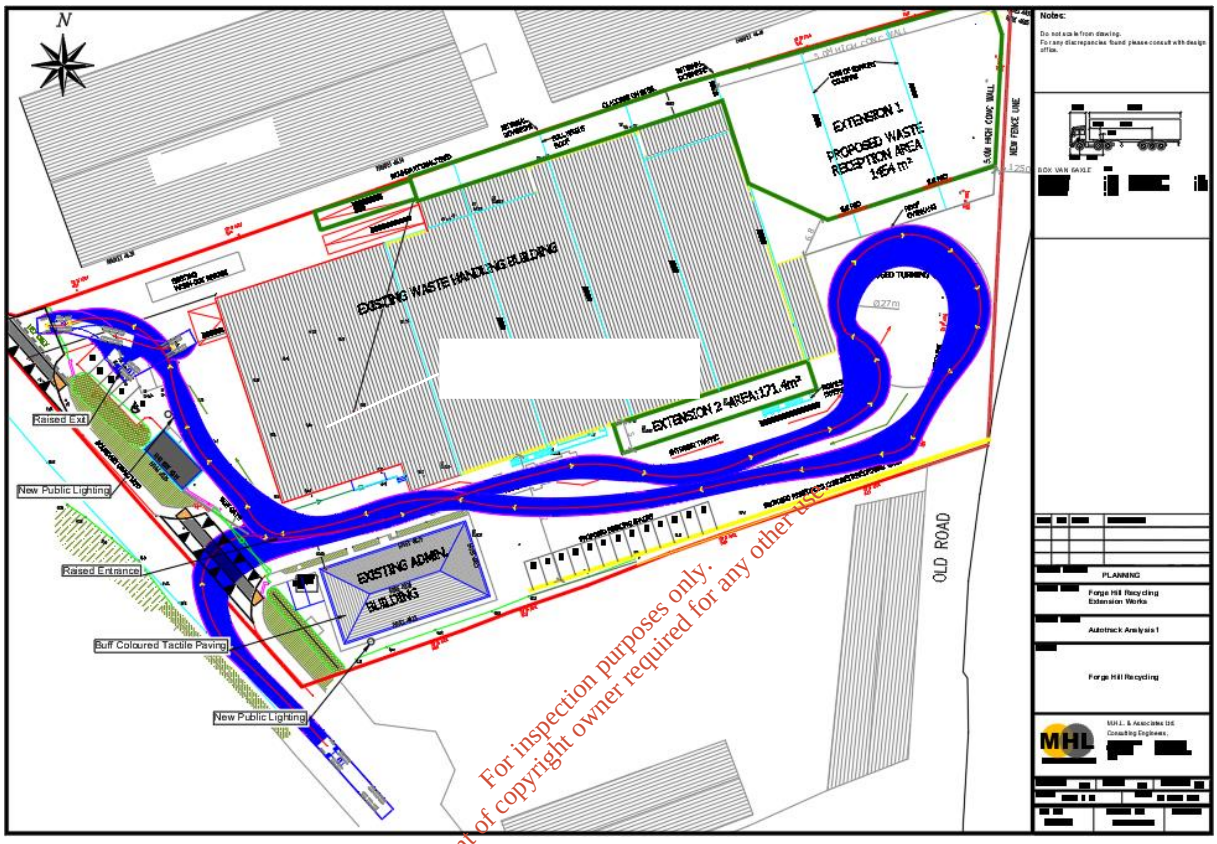


Figure 11.1: Proposed Site Layout – AutoTrack Analysis

12. PEDESTRIANS / CYCLISTS / PEOPLE WITH DISABILITIES

Not Applicable.

13. PUBLIC TRANSPORT

Not Applicable.

14. REFERENCES

National Roads Authority (May 2014) Traffic and Transport Assessment Guidelines NRA, Dublin

Institution of Highways & Transportation (1994) Guidelines for Traffic Impact Assessment IHT, London

National Roads Authority (2000) Road Geometry Handbook NRA, Dublin

National Roads Authority (revised 2003) Design Manual For Roads and Bridges NRA, Dublin

National Roads Authority (November 2004) Draft Traffic and Transport Assessment Guidelines NRA, Dublin

RSA Ireland Road Collisions

http://www.rsa.ie/RSA/Road-Safety/Our-Research/Ireland-Road-Collisions/

APPENDICES

APPENDIX A – TRAFFIC MODEL OUTPUTS

(available on request from MHL Consulting Engineers)

APPENDIX B– TRAFFIC SURVEYS

(available on request from MHL Consulting Engineers)