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1.0 Introduction

M.H.L. & Associates Ltd. Consulting Engineers have been engaged by McCutcheon Halley Planning Consultants on behalf of Greenore Port Ltd. to prepare a Traffic Report for the refurbishment of Berth No. 2 quay wall and deck which will span the gap between the existing Berth No.1, with an overall length of 139m as indicated in the planning drawings. The Berth No. 2 quay wall will act as a continuation of Berth No. 1, and will therefore be in line with the existing berthing face.

The purpose of this report is to assess the impact of construction traffic from the proposed development on the existing road network. Furthermore, the report makes recommendations as to the most effective junction type to best accommodate the expected traffic volumes generated by the proposed development.
The purpose of this application for permission is solely to rehabilitate the existing berth and quay deck to provide for safer operational conditions. This proposed rehabilitation will not result in the intensification of vessel movements, which are restricted due to channel depth, width, and towage power within Carlingford Lough. Therefore, an operational traffic assessment is not included within this report.

As part of a previous planning application in 2015 MHL & Associates prepared a detailed Traffic and Transport Assessment. As part of the TTA report traffic counts were undertaken at the following junctions

- R175 / Euston Street (J01)
- R175 / R176 (J02)

This previous planning application on which the Traffic and Transport Assessment was based was to provide a storage yard for excess cargo.

The works are considered as emergency works by DSG. The berthing wall at the existing BerthNo.2 has experienced undermining and subsequent outward rotation. Temporary remedia lworks have been carried out in 2016 with the objective of eliminating this rotation. The deck at Berth No.2 has become damaged. It is likely that this has been caused by the undermining and rotation.

This TTA report undertaken in 2015 was prepared in accordance with the "TII's 2014 publication "Traffic and Transport Assessment Guidelines". 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.

The base year is the year of expected completion for the development and was taken to be 2016. In accordance with the NRA TTA Guidelines, a traffic analysis was required to be undertaken for the **Current Year – 2015** as well as the following design years.

- Opening Year (With Development) 2016
- Opening Year (Without Development) 2016
- Opening Year + 5 Year Forecast (With Development) 2021.
- Opening Year + 5 Year Forecast (Without Development) 2021.
- Opening Year + 15 Year Forecast (With Development) 2031.
- Opening Year + 15 Year Forecast (Without Development) 2031.

In order to assess the capacity of the existing junction a traffic analysis was produced using traffic modelling software PICADY for uncontrolled junctions. The output results sheets from PICADY traffic analysis consist of tables of demand flow, capacities, queues and delays for each 15-minute time segment of the peak hour analysis.

The TII Traffic and Transport Assessment Guidelines states that a Traffic and Transport Assessment is required when traffic volumes to and from the proposed new development exceeds 5% of the traffic flows on the adjoining road where congestion exists or the location is sensitive. The overall impact of this development is well below the 5% threshold contained in the TII's 2014 publication "Traffic and Transport Assessment Guidelines", and therefore a TTA is not required for this proposal.

2.0 Existing Conditions

Greenore is a small village with a deep-water port on Carlingford Lough in County Louth. It is located on the southern shores of Carlingford Lough 3km south east of Carlingford village. It is approximately 19km from both Dundalk and Newry. The village itself consists of a small number of houses, a golf course, and the port. It is accessed by the R175, which is a regional road with a speed limit of 100km/hr before it enters the outskirts of Greenore village where it drops down to a 50km/hr speed limit.

The port is located at the back of the village and can be entered either by Euston Street or Shore Road. Trucks accessing and egressing the port do not use the main street of the village, which is Euston Street, but instead travel along Shore Rd around the back of the village.

There has been no new development within the port since the 2015 analysis and therefore saturation levels are expected to be similar.

A recently approved application for 2No grain silos which has received a Grant of Permission would generate very low level traffic estimated at 10 HGV's entering and leaving daily. It should be noted that the cumulative effect of this current application and the grain silo application will not give rise to a significant traffic impact.

Traffic counts were undertaken by Abacus Transportation Surveys Ltd. on Thursday 05th November 2015 at the existing priority T- junctions of R175 / Euston Street (J-01) and R175 / R176 (J-02) for the morning hours of 07:30-09:30 & evening hours of 16:30-18:30. As well as this an ATC (Automatic Traffic Counter) was placed along the R175 between Greenore village & the R175 / R176 junction for the period of a week commencing Saturday 31st October. The locations of the junctions as well as the location of the ATC are shown in Fig 2.1 below.

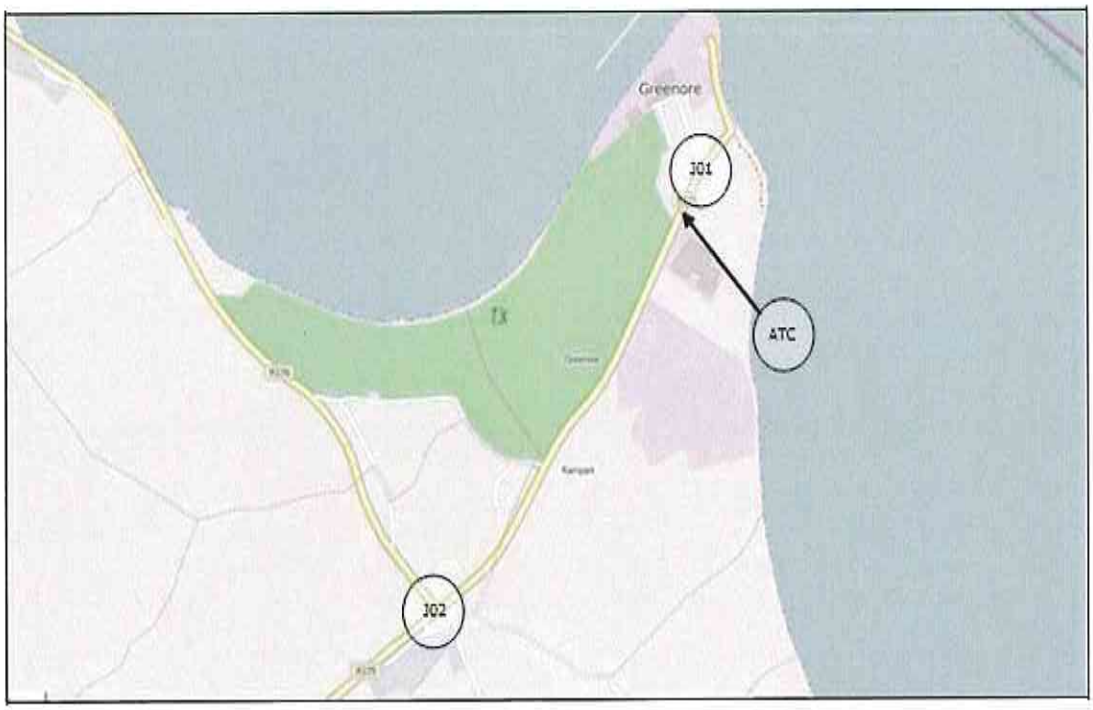

***Fig. 2.1** – Traffic Count Locations*

Graphical representations of the traffic counts for the two junctions can be seen below. These represent the recorded vehicle turning movements at each junction over the morning peak hour of 08:00-09:00 & also the evening peak hour of 17:00-18:00.

2.1 PICADY Analysis Current Year

PICADY analysis for the priority T- junctions was carried out for the Current Year 2015. PICADY (Priority Intersection Capacity and Delay) is a computer software program dealing with capacities, queue lengths and delays at non-signalised major/minor priority junctions.

R.F.C. (ratio of flow to capacity) provides the basis for judging the acceptability of junction design and the capacity of existing junctions. It is considered good practice to maintain degrees of saturation of 85% and lower when designing junctions and traffic networks. A junction with an R.F.C. value of 0.85 signifies that it is operating at 85% of its saturation level and therefore has a practical reserve capacity of 15%. This reserve capacity of 15% is considered by traffic engineers to be the level of reserve capacity at a junction required to cater for periods of unusually high traffic flows, such as bank holiday weekends etc.

As can be seen from Table 2.1 below, both priority T- junctions are currently operating well within the desired degree of saturation of 85% for both morning and evening peak hours.

R175 / Euston Street Junction			
Priority Junction 08:00-09:00	Arm A To Dundalk	Arm B Euston Street	Arm C To Port
Scenario	Movement LS DOS / MCQL	Movement LR DOS / MCQL	Movement SR DOS / MCQL
Current Year 2015.	0% / 0.0	2.3% / 0.1	0.3% / 0.0
Priority Junction 17:00-18:00	Arm A To Dundalk	Arm B Euston Street	Arm C To Port
Scenario	Movement LS DOS / MCQL	Movement LR DOS / MCQL	Movement SR DOS / MCQL
Current Year 2015.	0% / 0.0	4.2% / 0.0	0.3% / 0.0
R175 / R176 Junction			
Priority Junction 08:00-09:00	Arm A To Dundalk	Arm B R176	Arm C To Port
Scenario	Movement LS DOS / MCQL	Movement LR DOS / MCQL	Movement SR DOS / MCQL
Current Year 2015.	0% / 0.0	17.3% / 0.2	1.7% / 0.0
Priority Junction 17:00-18:00	Arm A To Dundalk	Arm B R176	Arm C To Port
Scenario	Movement LS DOS / MCQL	Movement LR DOS / MCQL	Movement SR DOS / MCQL
Current Year 2015.	0% / 0.0	13.4% / 0.2	4.9% / 0.1

Note: DOS indicates degee of saturation
MCQL indicates maxiunm car queue lengths

***Table. 2.1** – PICADY results current year 2015*

R175 / Euston Street Priority T-Junction J01

The maximum degree of saturation for the junction is 4.2 % and a mean maximum queue length of 0.0 vehicles for the year 2015.
The existing priority junction is operating well within capacity for the year 2015.

R175 / R176 Priority T-Junction J02

The maximum degree of saturation for the junction is 17.3 % and a mean maximum queue length of 0.2 vehicles for the year 2015.
The existing priority junction is operating well within capacity for the year 2015.

3.0 Proposed Development

The proposed development will consist of the refurbished Berth No. 2 quay wall which will span the gap between the existing Berth No.1, with an overall length of c,139m as indicated in the planning drawings. The Berth No. 2 quay wall will act as a continuation of Berth No. 1, and will therefore be in line with the existing berthing face.

For the purposes of this planning application, the following works are proposed:

- Dredging of the existing sea bed;
- Disposal of dredged material at land;
- Reuse of suitable dredge material;
- Construction of combi sheet pile wall;
- Construction of anchor beam and tie rods to retain the combi sheet pile wall;
- Construction of capping beam and new concrete deck/apron;
- Installation of pier furniture and services.

4.0 Construction Traffic

Dredging Operation

The following volumes of dredge materials are estimated during the construction phase:

Material to Be Dredged	Volume (m^3)	Mass (tonnes)
Gravel	10,894	14,162*
Silt	2,880	3,744*
Sand	2,984	3,879*
Limestone Rock	1,260	2,520**

Table 4.1 Dredge Volumes

* Assume bulk density is 1,300kg/m^3
** Assume bulk density is 2,000kg/m^3

Subject to the quality of material dredged, it is estimated that 1,260m^3 of rock, and 3,410m^3 of gravel will be placed behind the new quay wall to fill the void created. The remaining 13,348m^3 (17,352tonnes) of gravel, silt and sand will require disposal at a suitably licenced site.

It is anticipated that overburden (gravel, silt and sand) will have a maximum dredging rate of 500m^3 per 24 hours. The bedrock will be excavated at a slower speed (approximately 40m^3 per 24 hours).

It is estimated that the haulage contractor would dispose of overburden material over 12 hoursper day. It is therefore estimated that 32 No. 20 tonne tipper trucks will be required per 12-hour day, over a period of approximately 27 days.

This equates to 3.0 truck movements in and out during the morning peak hour 08:00-09:00 and 17:00 – 18:00

Construction Operation

It is expected that the construction phase will take approx. 6 months as follows:

Construction Programme (Preliminary)
Mobilisation (1 week)
Marine piling Combi Wall (5/6 weeks)

Wall infilling/landside piling/concrete apron (7/8 weeks)
Dredging (5/6 weeks)
Ancillary infrastructure (3/4 weeks)

Removal of material:

Material	Quantity	Deliveries
Concrete Deck	2,572m^3	310 x 20t trucks

Importation of materials:

Material	Quantity	Deliveries
New Concrete Deck	2,572m^3	370 x 7m^3 concrete trucks
Other Concrete	TBC	30 x 7m^3 concrete trucks
Tubular Steel Piles	TBC	40 lorry deliveries
Sheet Piles	TBC	30 lorry deliveries
Reinforcement steel	TBC	20 lorry deliveries

Construction Activity	Timescale	Construction Traffic per day each way	Construction Traffic Peak hour each way
Remove Old Concrete Deck	30 days 310 trucks	10	1.3
New Concrete Deck	30 days 370 trucks	12	1.5
Marine piling Combi Wall	5 Weeks 70 trucks	14	1.75
Wall infilling/landside piling/concrete apron	7 weeks 50 trucks	7	1
Total		43	6

Table 4.2 Estimated truck movement each way both daily and during the peak hour.

When both the dredging activity and construction activity are combined the total each way movement of construction traffic will be as follows,

9.0 truck movements in and out during the morning peak hour 08:00-09:00 and 17:00 – 18:00

5.0 Highway Impact

As part of a previous planning application in 2015 MHL & Associates prepared a detailed Traffic and Transport Assessment. Traffic models were produced for the two junctions for each of the scenarios outlined in Section 1.0. up to the design year 2031. These models were produced using PICADY traffic analysis software.

5.1 PICADY Results

Table 6.1 shows a summary of the results from the PICADY analysis for the priority T-junction R175 / Euston Street.

R175 / Euston Street Junction

Priority Junction 08:00-09:00	Arm A To Dundalk	Arm B Euston Street	Arm C To Port
Scenario	Movement LS DOS / MCQL	Movement LR DOS / MCQL	Movement SR DOS / MCQL
Current Year 2015.	0% / 0.0	2.3% / 0.0	0.3% / 0.0
Opening Year (Without Development) 2016	0% / 0.0	2.3% / 0.0	0.3% / 0.0
Opening Year (With Development) 2016	0% / 0.0	2.3% / 0.0	0.3% / 0.0
Opening Year + 5 Year Forecast (Without Development) 2021	0% / 0.0	2.5% / 0.0	0.4% / 0.0
Opening Year + 5 Year Forecast (With Development) 2021	0% / 0.0	2.5% / 0.0	0.4% / 0.0
Opening Year + 15 Year Forecast (Without Development) 2031	0% / 0.0	2.7% / 0.0	0.4% / 0.0
Opening Year + 15 Year Forecast (With Development) 2031	0% / 0.0	2.8% / 0.0	0.5% / 0.0

Priority Junction 17:00-18:00	Arm A To Dundalk	Arm B Euston Street	Arm C To Port
Scenario	Movement LS DOS / MCQL	Movement LR DOS / MCQL	Movement SR DOS / MCQL
Current Year 2015.	0% / 0.0	4.2% / 0.0	0.3% / 0.0
Opening Year (Without Development) 2016	0% / 0.0	4.2% / 0.0	0.3% / 0.0
Opening Year (With Development) 2016	0% / 0.0	4.2% / 0.0	0.3% / 0.0
Opening Year + 5 Year Forecast (Without Development) 2021	0% / 0.0	4.5% / 0.0	0.4% / 0.0
Opening Year + 5 Year Forecast (With Development) 2021	0% / 0.0	4.5% / 0.0	0.4% / 0.0
Opening Year + 15 Year Forecast (Without Development) 2031	0% / 0.0	5.1% / 0.1	0.4% / 0.0
Opening Year + 15 Year Forecast (With Development) 2031	0% / 0.0	5.1% / 0.1	0.5% / 0.0

Note: DOS indicates degee of saturation

MCQL indicates maxiunm car queue lengths

Table 6.1 *- PICADY results for priority junction of R175 / Euston Street.*

As can be seen from the table above, the maximum degree of saturation for the junction is 5.1%, which occurs on the Euston St. arm of the junction during the 2031 scenario with and without the development in place. It can be seen that the development does not add any degree of saturation to the junction as both scenarios have the same degree of saturation as well as the same maximum car queue length. This is as a result of the volumes at the junction being so low.

Table 6.2 shows a summary of the results from the PICADY analysis for the priority T-junction R175 / R176.

R175 / R176 Junction

Priority Junction 08:00-09:00	Arm A To Dundalk	Arm B R176	Arm C To Port
Scenario	Movement LS DOS / MCQL	Movement LR DOS / MCQL	Movement SR DOS / MCQL
Current Year 2015.	0% / 0.0	17.3% / 0.2	1.7% / 0.0
Opening Year (Without Development) 2016	0% / 0.0	17.5% / 0.2	1.8% / 0.0
Opening Year (With Development) 2016	0% / 0.0	17.6% / 0.2	1.8% / 0.0
Opening Year + 5 Year Forecast (Without Development) 2021	0% / 0.0	18.8% / 0.2	1.9% / 0.0
Opening Year + 5 Year Forecast (With Development) 2021	0% / 0.0	18.9% / 0.2	1.9% / 0.0
Opening Year + 15 Year Forecast (Without Development) 2031	0% / 0.0	21.2% / 0.3	2.1% / 0.0
Opening Year + 15 Year Forecast (With Development) 2031	0% / 0.0	21.4% / 0.3	2.1% / 0.0

Priority Junction 17:00-18:00	Arm A To Dundalk	Arm B R176	Arm C To Port
Scenario	Movement LS DOS / MCQL	Movement LR DOS / MCQL	Movement SR DOS / MCQL
Current Year 2015.	0% / 0.0	13.4% / 0.2	4.9% / 0.1
Opening Year (Without Development) 2016	0% / 0.0	13.6% / 0.2	5.0% / 0.1
Opening Year (With Development) 2016	0% / 0.0	13.6% / 0.2	5.0% / 0.1
Opening Year + 5 Year Forecast (Without Development) 2021	0% / 0.0	14.5% / 0.2	5.3% / 0.1
Opening Year + 5 Year Forecast (With Development) 2021	0% / 0.0	14.6% / 0.2	5.4% / 0.1
Opening Year + 15 Year Forecast (Without Development) 2031	0% / 0.0	16.5% / 0.2	6.1% / 0.1
Opening Year + 15 Year Forecast (With Development) 2031	0% / 0.0	16.5% / 0.2	6.1% / 0.1

Note: DOS indicates degee of saturation

MCQL indicates maxiunm car queue lengths

Table 6.2 - PICADY results for priority junction of R175 / R176.

As can be seen from the table above, the maximum degree of saturation for the junction is 16.5% which occurs on the R176 arm of the junction during the 2031 scenario with and without the development in place. It can be seen that the development does not add any level of saturation to the junction as both scenarios have the same degree of saturation as well as the same maximum car queue length. This is as a result of the volumes at the junction being so low.

5.2 Conclusions

It is estimated that during the Construction Phase that the haulage contractor would dispose of overburden material over 12 hours per day. It is therefore estimated that 32No. 20 tonne tipper trucks will be required per 12-hour day, over a period of approximately 27 days.

When both the dredging activity and construction activity are combined the total each way movement of traffic will be as follows,

9.0 truck movements in and out during the morning peak hour 08:00-09:00 and 17:00 – 18:00

The previous traffic analysis undertaken in December 2015 shows the following,

R175 / Euston Street Priority T-Junction J01

The maximum degree of saturation for the junction is 5.1% and a mean maximum queue length of 0.1 vehicles for the design year 2031.
The existing priority junction is operating well within capacity for the future design years. No modifications are required to this junction.

R175 / R176 Priority T-Junction J02

The maximum degree of saturation for the junction is 21.5% and a mean maximum queue length of 0.3 vehicles for the design year 2031.
The existing priority junction is operating well within capacity for the future design years. No modifications are required to this junction.

It is clear from the above design year levels of saturated flows that the impact on the existing junctions from construction traffic will be very low. The volumes generated by this development during construction at 2.7 HGV in and out during the morning and evening peak hours would have little or no impact on these saturation levels.

6.0 References

National Roads Authority (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

National Roads Authority (January 2011) Project Appraisal Guidelines - Unit 5.5 Link-Based Traffic Growth Forecasting NRA, Dublin