

ADDITIONAL JUNCTION ASSESSMENT

FOR

PROPOSED N4 PARK & RIDE

APRIL 2007

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JUNCTION ASSESSMENT FOR PROPOSED N4 PARK AND RIDE.

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1.0 INTRODUCTION

- 1.1 This report has been prepared as part of a Request for Further Information by An Bord Pleanála, leading on from comments received from the National Roads Authority (NRA). The following is the request with respect to the submission made by the NRA;

Details of a more comprehensive analysis of the impact the proposed development would have on the operation of the M4 Motorway / Celbridge Road Interchange. In particular, the analysis should look at the interchange as a whole and include consideration of the operation of the Celbridge Road / M4 on-ramp junction where the number of right turning vehicles would increase dramatically during the PM peak with a Park & Ride site in operation.

- 1.2 This traffic report responds to An Bord Pleanála's request for a more detailed analysis of the M4 Motorway / Celbridge Interchange (ref letter 20th March 2007). The initial traffic assessment as contained in the EIS submitted in December 2006 showed that the development of a Park and Ride facility at Lucan Demense can be facilitated by the local road network with some infrastructural modifications (signalisation of the R403 Celbridge Road / M4 off-ramp junction).
- 1.3 The attached report indicates that the development of a Park and Ride at Lucan Demense will not impact on the interchange as a whole or on the R403 Celbridge Road / M4 on ramp junction in particular during the PM peak if the junction of the R403 Celbridge Road / M4 off-ramp is signalised and both sets of signals are linked. Therefore the additional information supplied does not alter the impacts, proposed mitigation, residual impacts, monitoring or interactions section for traffic as set out in Sections 5.4, 5.5, 5.6, 5.7 and 5.8 of the N4 Park and Ride EIS as submitted in December 2006.
- 1.4 Consequently, we ask that the Bord does not invoke its powers under subsection 5(b)(i) of the Planning and Development Act (2000) and request the attached report to be published due to minimal impact on the EIS and the time delays associated with same.

- 1.5 It is noted that this report has been submitted and agreed with the National Roads Authority (NRA). And it is our understanding that they are satisfied with the Additional Information provided.

2.0 TRAFFIC IMPACT

2.1 The following report outlines the results abstracted during the analysis of the required junctions on the M4 Motorway / R403 Celbridge Road Interchange.

2.2 The junctions to be examined are those that are likely to be significantly affected by this development. It is considered sufficient to examine the following locations (as requested by An Bord Pleanála):

✚ Junction of M4 off-ramp / R403 Celbridge Road (Junction 1) - Priority; and,

✚ Junction of M4 on-ramp / R403 Celbridge Road (Junction 4) – Signalised.

2.3 DBFL Consulting Engineers revisited the proposed site in March 2007. The road geometry measurements and photographs of relevant infrastructure were taken.

M4 off-ramp / R403 Celbridge Road

2.4 This priority junction would be the first of the junctions to be impacted by the increase in traffic exiting the M4 to use the proposed Park and Ride facility at Leixlip. The M4 off-ramp is one-way only, entering the junction from the west and is the minor arm of the junction. At the belmouth, there is capacity for two lanes of traffic with a flare accommodating for two vehicles. The minor arm is 5.0 metres wide with a hard shoulder, changing to two exit lanes 4.0 metres wide at the intersection. Parking is restricted across the R403 Celbridge Road by means of box junction carriageway markings to allow vehicles to exit from the minor arm during times of congestion. Sightlines for traffic exiting the M4 off-ramp are 70.0 metres to the right and 60.0 metres to the left. There are two lanes entering the junction on the south approach (each 4.0 metres in width) and one from the north approach (5.0 wide);

M4 on-ramp / R403 Celbridge Road

2.5 This intersection is located approximately 60 metres south of the previous junction. It is a four-arm signal controlled junction where the R403 Celbridge Road is the main road and the N4 off-ramp and the M4 on-ramp are the minor roads. On site inspection of this intersection, there are adequate lane widths for traffic accessing the junction. There is a left filter for traffic coming off the

N4 and heading south along the R403 Celbridge Road. The M4 on-ramp is one way only. There is a pedestrian crossing across the N4 off-ramp belmouth. The speed limit is 60km/h in the vicinity of the junction. At present, the signals are operating on a 70 second cycle time, with the right turners from the R403 Celbridge Road north heading to the M4 called by means of a loop detector.

2.6 During the site inspection, there appeared to be no heavy queuing occurring.

2.7 **Figure 2.1** below outlines the junction and the movements for each arm and labelling for analysis.

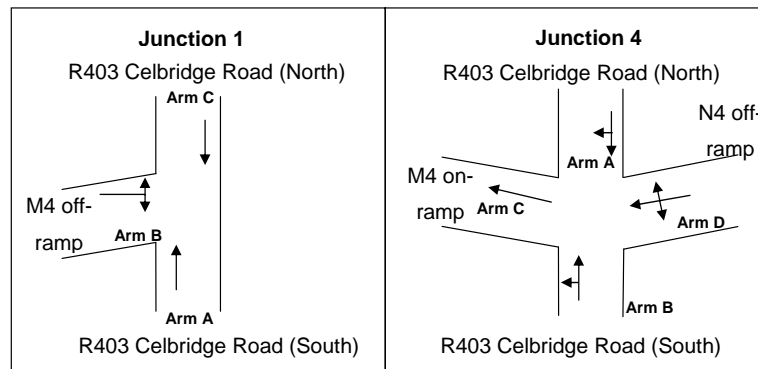


Figure 2.1 - Junctions Analysis

2.8 Capacity assessments for the 2008 “Do Something” have been undertaken using the Transport Research Laboratory (TRL) OSCADY (Optimised Signal Capacity and Delay) Version 5 and TRANSYT (TRAffic Network Study Tool) Version 12 programmes, for the morning and afternoon peak periods.

2.9 A signalised junction is said to be at capacity if the Flow to Capacity Ratio (RFC) or Degree of Saturation (DOS) is greater than 0.90 or 90%. Values above these thresholds are considered to be over capacity as operations above these values are poor and deteriorate quickly.

2.10 In all models, a 90-minute period was simulated, from 07:45 to 09:15 for the morning peak and 16:45 to 18:15 during the evening peak period. This allows for variations in flow during a typical peak hour. Traffic flows were entered using an Origin-Destination table for the peak hours (08:00 to 09:00 and 17:00 to 18:00). This method ensures that the model accounts for vehicles already on the network at the outset of the peak hour under consideration.

2.11 Only the “Do Something” scenario has been examined in detail for 2008 (proposed opening year of the Park and Ride facility).

2.12 The impact of the proposed facility has been assessed using a traffic excel model. This impact is illustrated in **Figure 2.2** to **Figure 2.6** in **Appendix A**. This section summarises the results of this assessment and also outlines the results of the junction modelling exercise which has been carried out.

Junctions 1 & 4 – R403 Celbridge Road with the M4 off-ramp and M4 on-ramp.

2.13 **Table 2.1** below shows that the junctions would be operating at capacity for 2008 with the junction of the M4 off-ramp and the R403 Celbridge Road signalised. The junctions are operating on stand alone.

Table 2.1 – Results of junction assessment (OSCADY) for Junctions 1 & 4

Scenario	Year	Peak	Movement	RFC	Queue (veh)	Delay (min/veh)
Junction 1 – M4 off-ramp / R403 Celbridge Road						
1	2008	AM	A	0.560	2.0	0.15
			B	0.631	2.6	0.17
			C	0.477	1.8	0.16
2		PM	A	0.239	1.4	0.03
			B	0.259	0.9	0.46
			C	0.291	1.9	0.04
Junction 4 – M4 on-ramp / R403 Celbridge Road						
3	2008	AM	A	0.669	5.3	0.28
			B	0.760	5.4	0.41
			C	0.587	4.0	0.31
			D	0.000	0.0	0.00
4		PM	A	0.953	16.4	1.20
			B	0.939	13.5	1.31
			C	0.974	23.8	0.92
			D	0.000	0.0	0.00

2.14 **Table 2.1** above shows that the junctions would be operating within capacity, since a Degree of Saturation (DoS) of 100% (1.000) would indicate that the junction is operating at its theoretical maximum capacity, however a value of approximately 90% (0.900) is considered to be the optimum operational value

for a stand-alone signal-controlled junction. It is noted that the junction will be operating in sequence with the adjacent junction, therefore the OSCDAY analysis is a worst case assessment and a more appropriate assessment is carried out below using TRANSYT for linked signals.

2.15 **Figure 2.7** outlines the labelling of the links for the analysis carried out using TRANSYT 12. **Table 2.2** below outlines the results for the scenario with both sets of signals linked.

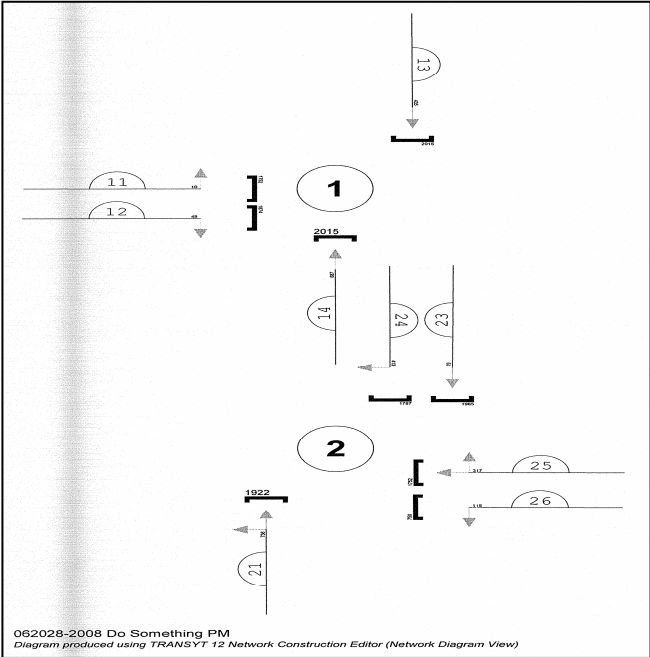


Figure 2.2 – TRANSYT Labelling for Junctions 1 & 4

Table 2.2 – Results of junction assessment (TRANSYT) for Junctions 1 & 4

Scenario	Year	Status	Link	Degree of Saturation	Queue (veh)	Delay (sec/veh)
5	2008	AM	11	58.0	11	33.9
			12	48.0	9	31.1
			13	28.0	6	18.7
			14	63.0	17	25.3
			21	5.0	1	18.5
			23	57.0	14	19.1
			24	8.0	0	69.7
			25	64.0	11	42.0
26		12.0	0	3.8		
6		PM	11	9.0	0	70.1
			12	39.0	2	77.8
			13	25.0	3	3.2
			14	39.0	5	3.8
			21	90.0	27	53.8
			23	6.0	1	6.6
			24	87.0	16	69.5
	25		87.0	13	81.6	
26	16.0	0	3.4			

2.16 The above table indicates that with the junction of the M4 off-ramp and the R403 Celbridge Road signalised, and both signals linked, both junctions will be operating within capacity for the AM and PM peaks for the 2008 “Do Something” scenarios.

2.17 It is therefore anticipated that the junction of the M4 on-ramp and the R403 Celbridge Road can accommodate the increased number of right turning vehicles inn the PM Peak. The model outputs from OSCADY and TRANSYT can be found in **Appendix B** and **Appendix C** respectively.

3.0 INFRASTRUCTURAL REQUIREMENTS

- 3.1 Analysis has indicated that the junction of the M4 on-ramp and the R403 Celbridge Road will operate close to capacity without any enhancements to the layout of the signals. If the junction to the north (the M4 off-ramp / R403 Celbridge Road) is signalised and both sets of signals are linked, then analysis has indicated that both junctions will operate within capacity limits.

4.0 CONCLUSION

4.1 DBFL Consulting Engineers have carried out a comprehensive assessment of the transportation impacts of the proposed N4 Park and Ride facility. The main conclusion that can be drawn from this assessment is as follows:

✚ The junction of the M4 on-ramp and the R403 Celbridge Road will operate within capacity for both peaks in the 2008 “Do Something” scenario, if the signals are put in place at the M4 off-ramp / R403 Celbridge Road and both signals are linked.

4.2 As a result of this assessment it can be concluded that the transport impact of the proposed Park and Ride facility can be accommodated by modifying the existing transport infrastructure.

4.3 It is also noted that providing a 1,000 space car-park at this location will have a significantly positive traffic impact further towards the City as 1,000 vehicles will be removed and their passengers transferred to a bus.

4.4 For this reason we suggest that this development should be permitted in order to provide an improved transport network in accordance with ‘Transport 21’.

DBFL Consulting Engineers

P062028/EPF

April 2007.

APPENDIX A

Figures

APPENDIX B

OSCADY Analysis

APPENDIX C

TRANSYT Analysis