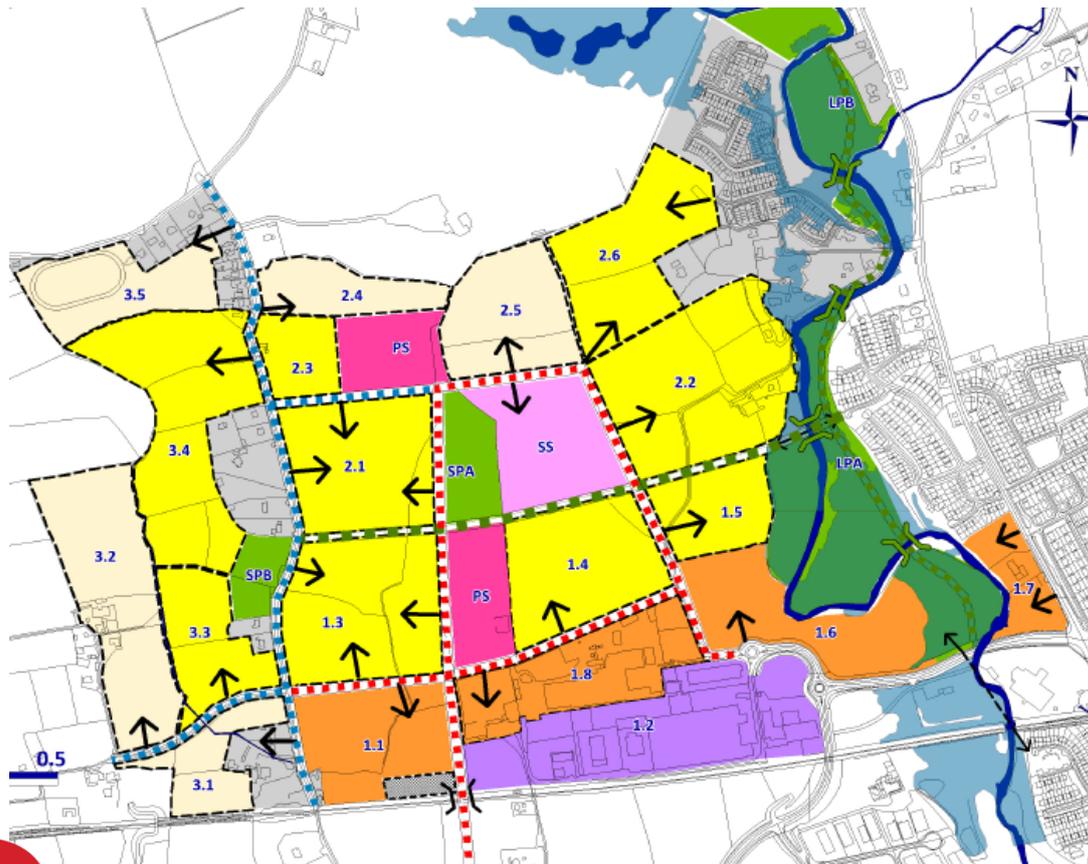


WATER ROCK STRATEGIC TRANSPORT ASSESSMENT – ADDENDUM REPORT



WATER ROCK STRATEGIC TRANSPORT ASSESSMENT

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1. INTRODUCTION

1.1 Background

1.1.1 Cork County Council (CCC) have published a series of draft Local Area Plans (LAPs) which set out a land use planning strategy for the development of the settlements of the county. The county has been divided into a total of 8 Municipal Districts with a LAP developed for each district. Contained within these district LAPs are 9 Urban Expansion Areas (UEAs) which will house much of the projected future population growth within the county, of which Water Rock in Midleton is one.

1.1.2 When fully developed the Water Rock UEA will accommodate a total of approximately 2,500 housing units, 10,000 m² of Offices, 2,000m² of Retail facilities, 500m² of Leisure facilities, 2 primary schools and 1 secondary school. Atkins and SYSTRA Ltd have been commissioned by Cork County Council to undertake a Transport Assessment of the Water Rock Urban Expansion Area in Midleton, which is scheduled to take place over four development phases (1A, 1, 2, & 3). The Water Rock Lands are located to the north-west of Midleton town centre.

1.2 Transport Assessment Report

1.2.1 The Water Rock Transport Assessment Report demonstrated that Phase 1A (525 residential units) and Phase 1 (1,054 residential units) could both be accommodated on the local traffic network, with the inclusion of some relatively minor infrastructure proposals. These infrastructure proposals are:

- Service Corridor Link Road from NRR to Water Rock Road (infrastructure proposal A);
- Upgrade of Cork Rd / NRR Signalised Junction to include an additional lane on the eastbound approach to the junction (infrastructure proposal B);
- Closure of Water Rock Rd / N25 Junction (infrastructure proposal C); and
- New Railway Stop on Cork - Midleton Line (infrastructure proposal D).

1.2.2 Assessment of phases 2 (approx. 2,000 units) and 3 (approx. 2,500 units) demonstrated that this level of development will need to be accompanied by more considerable infrastructure proposals including the upgrade of the N25/Cobh Cross interchange, a new N25 interchange east of Carrigtwohill and the completion of the NRR Phase 2 and 3.

1.2.3 Further details on the Water Rock Transport Assessment and recommendations can be found in the Main Report which should be read alongside this Addendum Report.

1.3 Addendum Report Overview

1.3.1 This is an Addendum to the **Water Rock Strategic Transport Assessment Report** (hereinafter referred to as the “Main Report”).

1.3.2 Cork County Council commissioned SYSTRA to undertake additional strategic modelling, following the publication of the Main Report, to further assess the impact of the Water Rock development and infrastructure proposals on traffic movements on the Water Rock Road and Carrigane Road. Specifically, these additional model tests were concerned with:

1. Assessing the potential for increased “rat-running”, between Midleton and Carrigtwohill, along the Water Rock Road as result of the construction of the Water Rock Rd. / Link Rd connection; and
2. The impacts of closing the proposed Water Rock Rd./ Link Rd for Phase 1A of the Water Rock development.

1.3.3 To fully assess these impacts, the following scenarios have been tested:

Table 1-1 Additional Phase 1a Scenarios Modelled

Scenario	Water Rock Rd/Link Rd Connection	Resi Units (Midleton)	Resi Units (Carrigtwohill)	Resi Units (Water Rock)
1	Open	0	357	0
2	Closed	0	357	525
3	Closed	425	357	525

- **Scenario 1** – The purpose of this test is to establish what level of ‘rat-running’ would occur with base year levels of development in place in Midleton and with the link road open.
- **Scenario 2** – The purpose of this test is to establish the network impacts of opening Phase 1A of Water Rock without the Water Rock Road/Link Road connection in place.
- **Scenario 3** – The purpose of this test is to examine the network impacts of additional development elsewhere on Midleton, during Phase 1A Water Rock, without the Water Rock Road/Link Road connection in place.

1.3.4 This Addendum Report details the outputs of the strategic modelling of these additional modelling tests and should be read in conjunction with the main report.

1.4 Report Structure

1.4.1 The remainder of this report will be structured as followed:

- **Chapter 2:** Assessment Methodology;
- **Chapter 3:** Scenario 1 Results;
- **Chapter 4:** Scenario 2 Results;
- **Chapter 5:** Scenario 3 Results; and
- **Chapter 6:** Summary and Conclusions

2. ASSESSMENT METHODOLOGY

2.1 Overview

2.1.1 The Water Rock Local Area Traffic Model has been used to assess the highway network impacts of the scenarios outlined in Section 1.3.

2.1.2 The assessment methodology adopted in this Transport Assessment includes the following steps:

- **Step 1:** Determine the **Demand for Travel** (The total **Person Trips** and **Total Vehicle Trips** generated by development assumptions for each scenario);
- **Step 2: Assess Strategic Impacts** of future transport demand on future transport networks using a set of key performance indicators;

2.2 Key Performance Indicators

2.2.1 The following Key Performance Indicators (KPIs) have been used to assess the impact each scenario has on the local transport network:

1. Link Flows (and routing) on Water Rock Road;
2. Volume over Capacity for key junctions; and
3. Journey times

3. SCENARIO 1 - RESULTS

3.1 Overview

3.1.1 Scenario 1 involves opening the link road that connects the Water Rock Development lands to Water Rock Road before any Water Rock residential units are in place. This will establish what level of 'rat-running' will take place, on the Link Road, between Midleton and Carrigtwohill in the absence of any Water Rock Development. The key assumptions for this scenario are:

- Service Corridor **Link Road from NRR to Water Rock Road** (infrastructure proposal A) is in place;
- **Upgrade of Cork Rd / NRR Signalised Junction** to include an additional lane on the eastbound approach to the junction (infrastructure proposal B);
- **Closure of Water Rock Rd / N25 Junction** (infrastructure proposal C);
- **New Railway Stop** on Cork - Midleton Line (infrastructure proposal D); and
- **No new development at Water Rock.**

3.2 Water Rock Road Demand Analysis

3.2.1 As mentioned in the previous chapter, the forecast traffic along Water Rock Road in Scenario 1 is being used as a KPI to assess the impact of infrastructure and land use proposals for Water Rock.

3.2.2 Figures 3.1 to 3.4 illustrate the quantity of vehicles traveling northbound and southbound on Water Rock Road during the AM and PM peak hours. These figures also illustrate the origin and destination of the forecast traffic on Water Rock Road.

Figure 3-1 AM Northbound Flow on Water Rock Rd (Scenario 1)

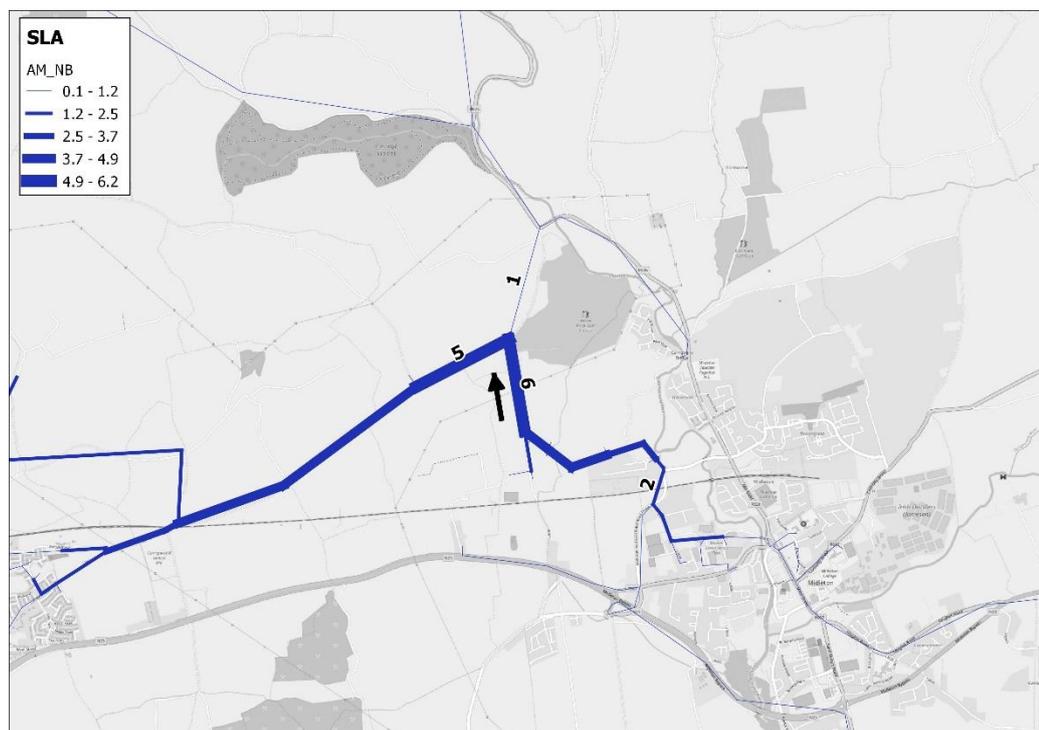


Figure 3-2 AM Southbound Flow on Water Rock Rd (Scenario 1)

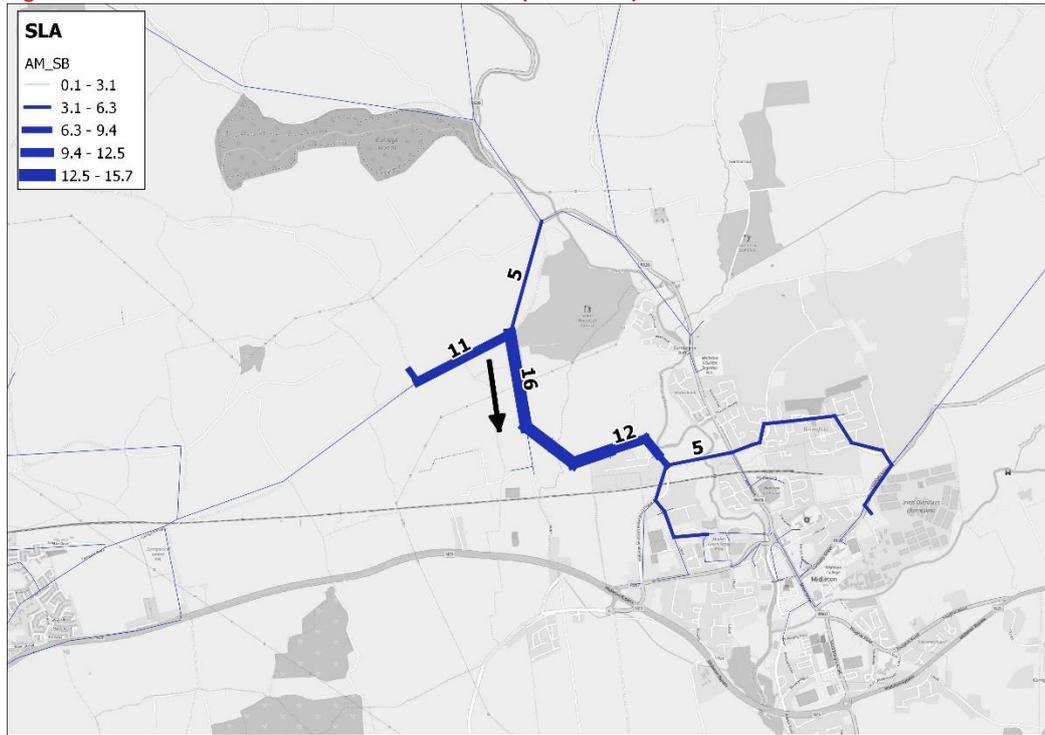


Figure 3-3 PM Northbound Flow on Water Rock Rd (Scenario 1)

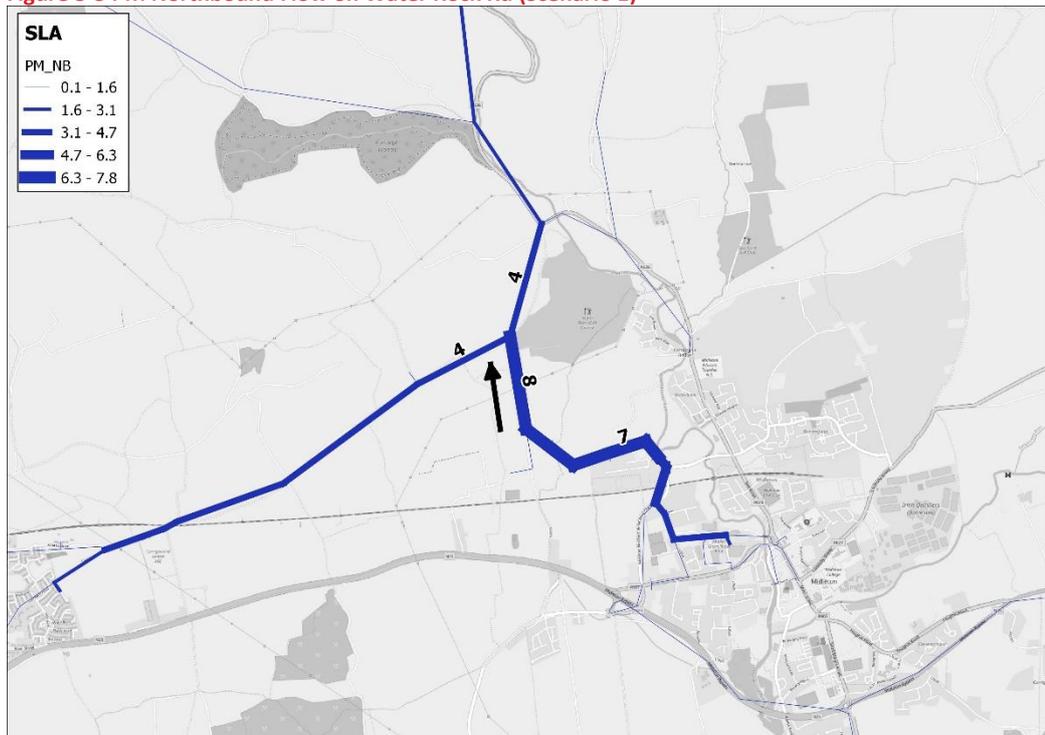
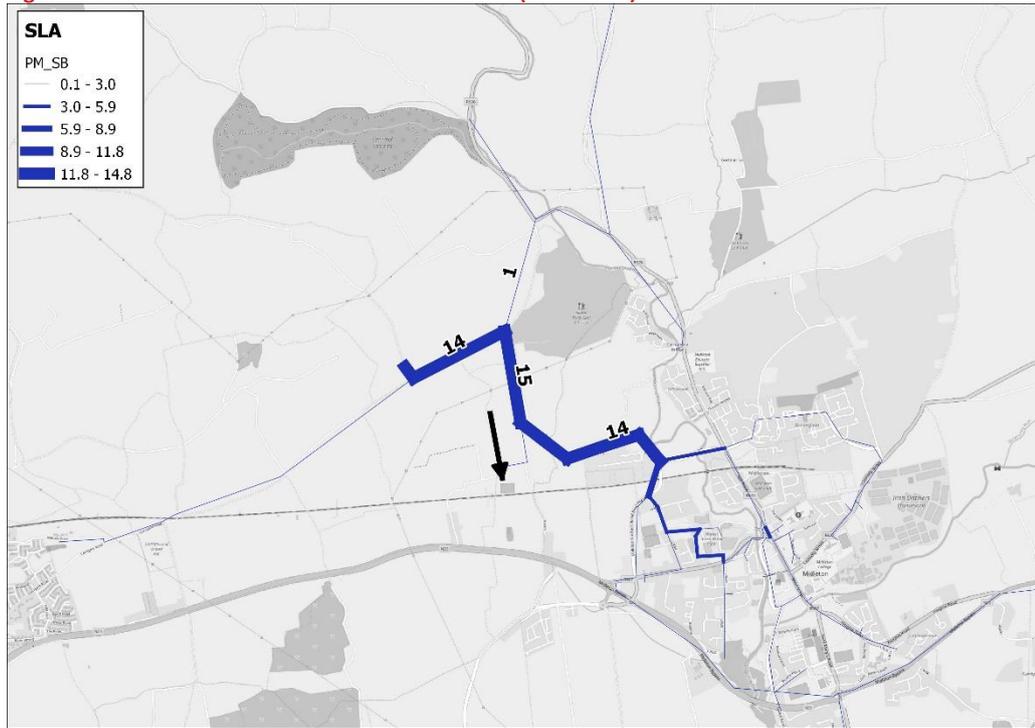


Figure 3-4 PM Southbound Flow on Water Rock Rd (Scenario 1)



3.2.3 The images above show that, the link road in the absence of any development in Water Rock, leads to minimal “rat running” along Water Rock Road. In the AM Peak hour, the total amount of two way traffic who use this route as a rat run is approximately 15 vehicles. The PM equivalent is 21 vehicles.

3.2.4 The tables below compare forecast traffic flows on Water Rock Road between Scenario 1 and Phase 1a, from the main report. With a combined two-way flow of 22 PCUs in the AM peak, and 23 PCUs in the PM peak, the figures below demonstrate that the level of traffic on the Water Rock road will be relatively low in this scenario.

Table 3-1 AM Water Rock Rd Flow Comparison

Scenario	Description	AM		
		Link Flows		2 - Way Water Rock Rd
		(OB) Water Rock Rd	(IB) Water Rock Rd	
1	<i>Link Rd Open & No Water Rock Development</i>	6	16	22
Phase 1a	<i>As per original spec</i>	71	27	98

Table 3-2 PM Water Rock Rd Flow Comparison

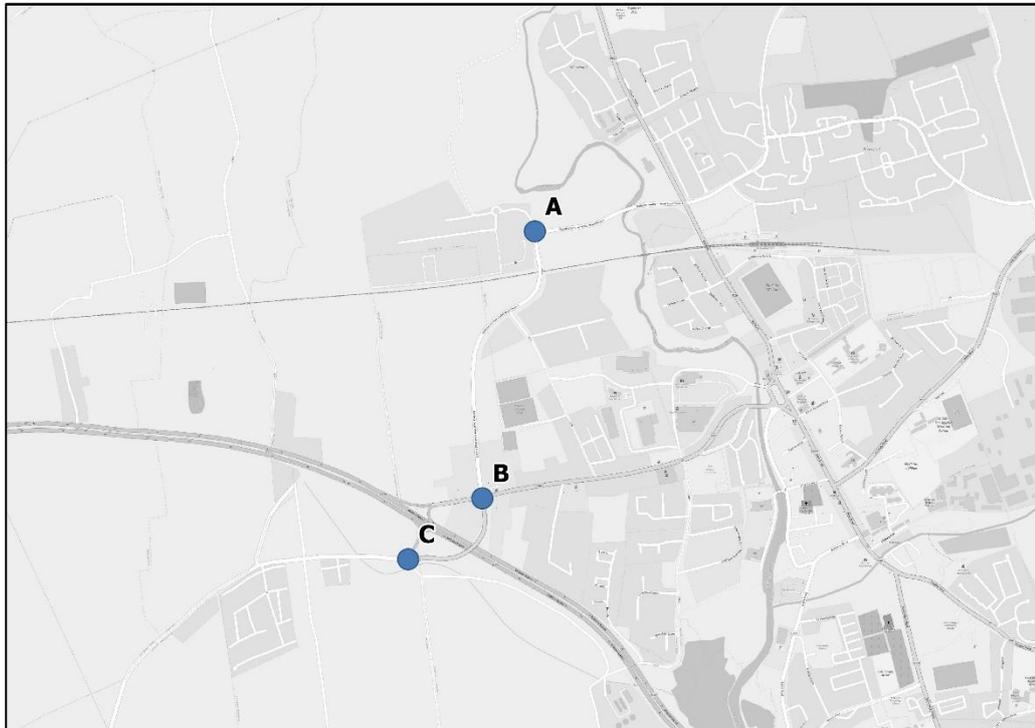
		PM		
		Link Flows		
Scenario	Description	(OB) Water Rock Rd	(IB) Water Rock Rd	2 - Way Water Rock Rd
1	<i>Link Rd Open & No Water Rock Development</i>	8	15	23
Phase 1a	<i>As per original spec</i>	9	77	86

3.3 Volume Over Capacity Analysis

3.3.1 As mentioned in Chapter 2, Volume over Capacity has been used as a KPI to measure the performance of key junctions in the study area in each scenario. For reference, these V/C values will be compared against the original Phase 1A results from the main Water Rock TA. The junctions used in this analysis are shown in the Figure below and include:

- A – NRR Roundabout (Entrance to Nordic Enterprise Park)
- B – Knockgriffin Signalised Junction
- C – N25 Roundabout (Adjacent to Gaelscoil Mhainistir Na Corann)

Figure 3-5 Key Junctions used for V/C Comparison



3.3.2 The tables below show a comparison of the Max V/C per junction in Scenario 1 against the original Phase 1a scenario. The results show that all three junctions experience the same or lower V/Cs in this Scenario. This is in line with expectations as Phase 1A included 525 residential units in Water Rock, whereas, Scenario 1 includes no residential development.

Table 3-3 AM V/C Comparison

Scenario	Description	AM Max V/C		
		NRR Rdbt (A)	Knockgriffin (B)	N25 Rdbt (C)
1	<i>Link Rd Open & No Water Rock Development</i>	61%	95%	88%
Phase 1a	<i>As per original spec</i>	61%	97%	93%

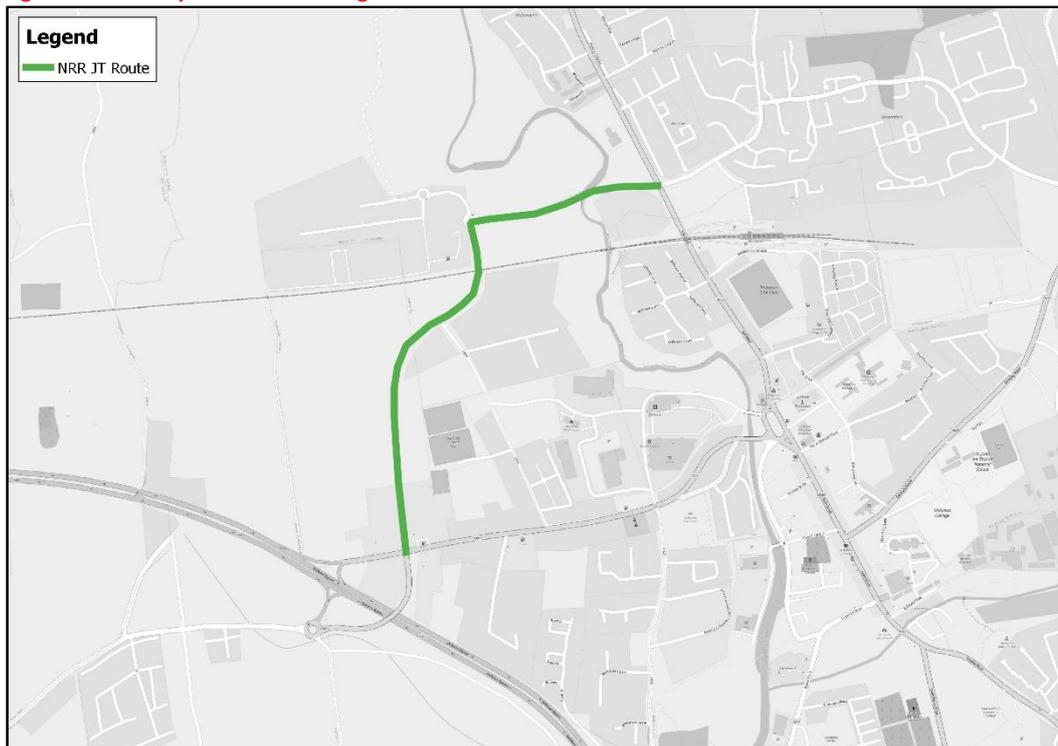
Table 3-4 PM V/C Comparison

Scenario	Description	PM Max V/C		
		NRR Rdbt (A)	Knockgriffin (B)	N25 Rdbt (C)
1	<i>Link Rd Open & No Water Rock Development</i>	56%	96%	68%
Phase 1a	<i>As per original spec</i>	73%	97%	69%

3.4 Journey Time Analysis

3.4.1 As mentioned in Chapter 2, Journey Times along the NRR have been used as a KPI to assess the performance of the local road network in each scenario. For reference, these Journey Time values will be compared against times from the original Phase 1A scenario. The 2-way route used in this analysis is shown in the Figure below.

Figure 3-6 Journey Time Route along the NRR



3.4.2 The table below show a comparison of the Journey times in Scenario 1 against the original Phase 1a scenario. The results show slight reductions in journey times along the route, especially the Southbound section (23 seconds in the AM and 13 seconds in the PM).

Table 3-5 Journey Time Comparison

Scenario	Journey Times (secs)			
	AM		PM	
	NB	SB	NB	SB
Phase 1a	163	200	174	181
1	162	177	171	168

4. SCENARIO 2 - RESULTS

4.1 Overview

4.1.1 Scenario 2 involves closing the link road that connects the Water Rock Development lands to Water Rock Road while assuming Phase 1a residential units (525) have been developed. This test will establish the impact on the local road network if this level of development occurs without the Link Road connection in place. The key assumptions for this scenario are:

- **Upgrade of Cork Rd / NRR Signalised Junction** to include an additional lane on the eastbound approach to the junction (infrastructure proposal B);
- **New Railway Stop on Cork - Midleton Line** (infrastructure proposal D);
- **Water Rock Rd / N25 Junction** remains open; and
- **525 residential units** are developed at Water Rock.

4.2 Water Rock Road Demand Analysis

4.2.1 The forecast traffic along Water Rock Road in Scenario 2 has been used as a KPI to assess the impact of infrastructure and land use proposals for Water Rock.

4.2.2 Figures 4.1 to 4.4, below, illustrate the quantity of vehicles traveling northbound and southbound on Water Rock Road during the AM and PM peak hours. These figures also illustrate the origin and destination of the forecast traffic on Water Rock Road.

Figure 4-1 AM NB Flow on Water Rock Rd (Scenario 2)

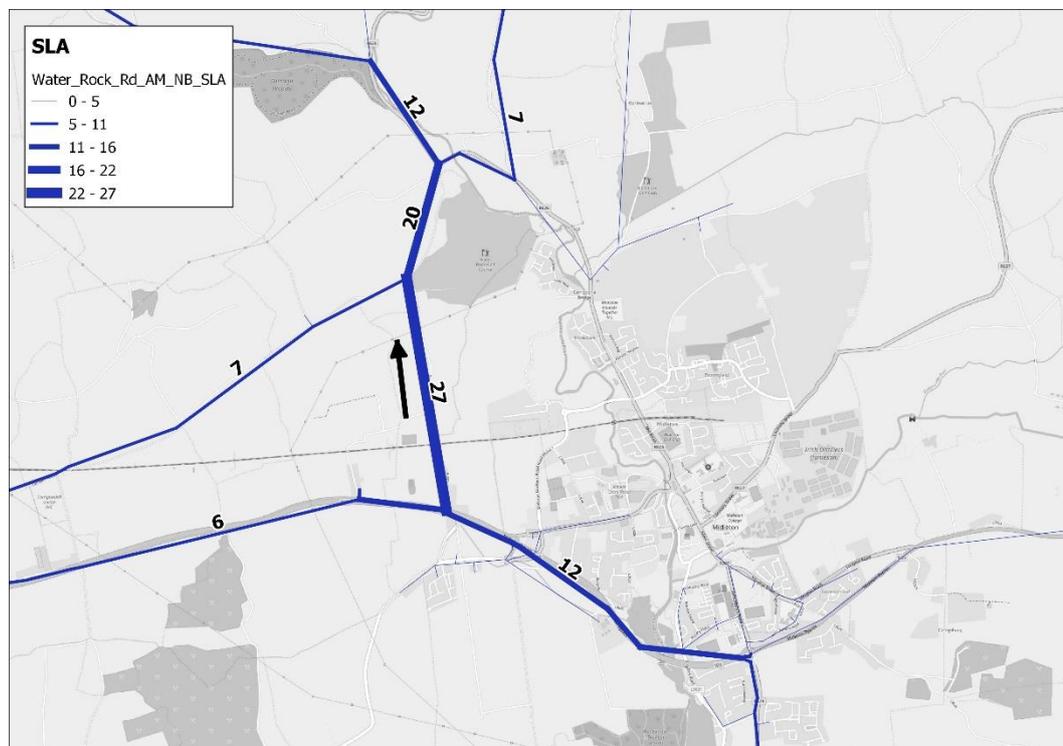


Figure 4-2 AM SB Flow on Water Rock Rd (Scenario 2)

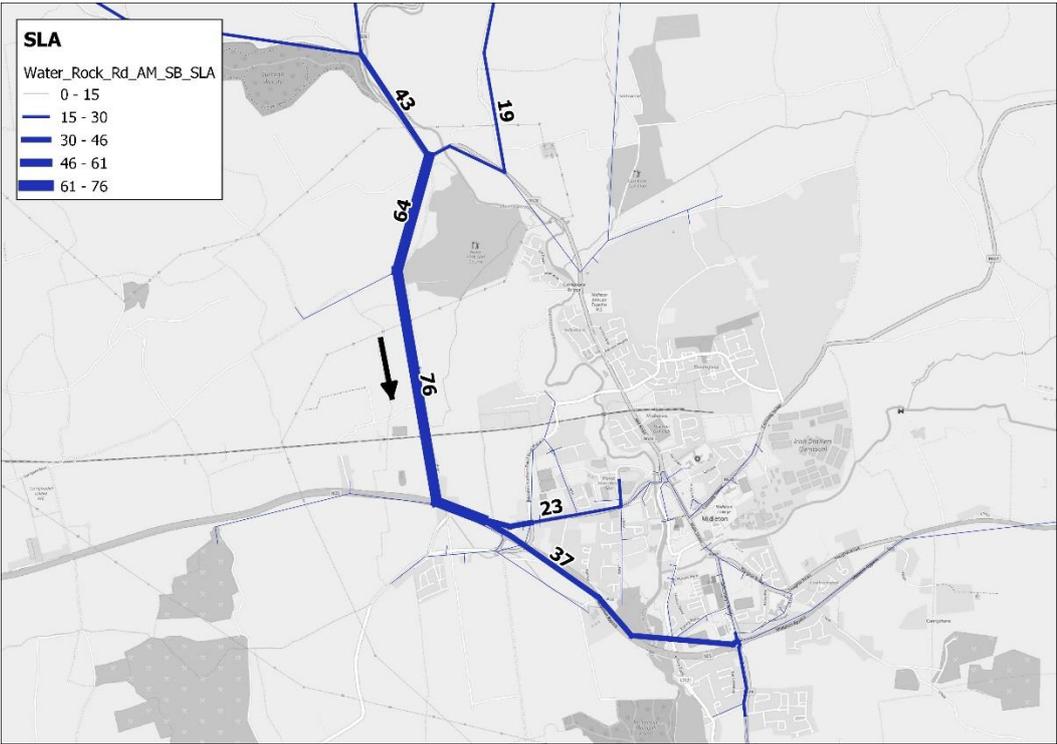


Figure 4-3 PM NB Flow on Water Rock Rd (Scenario 2)

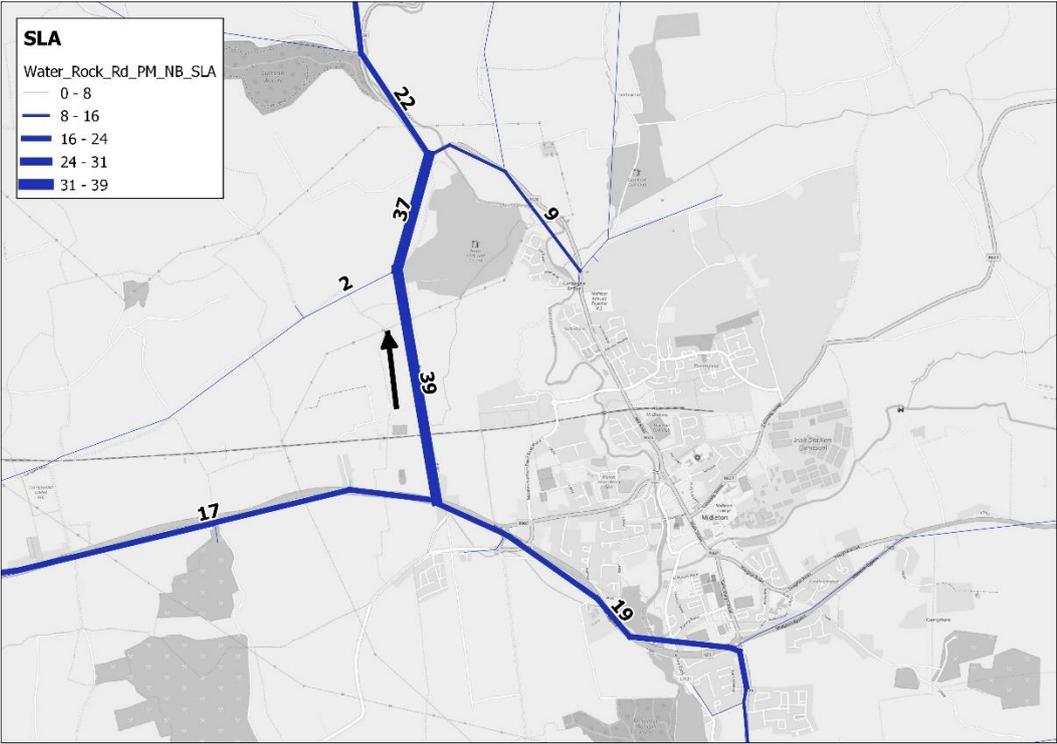
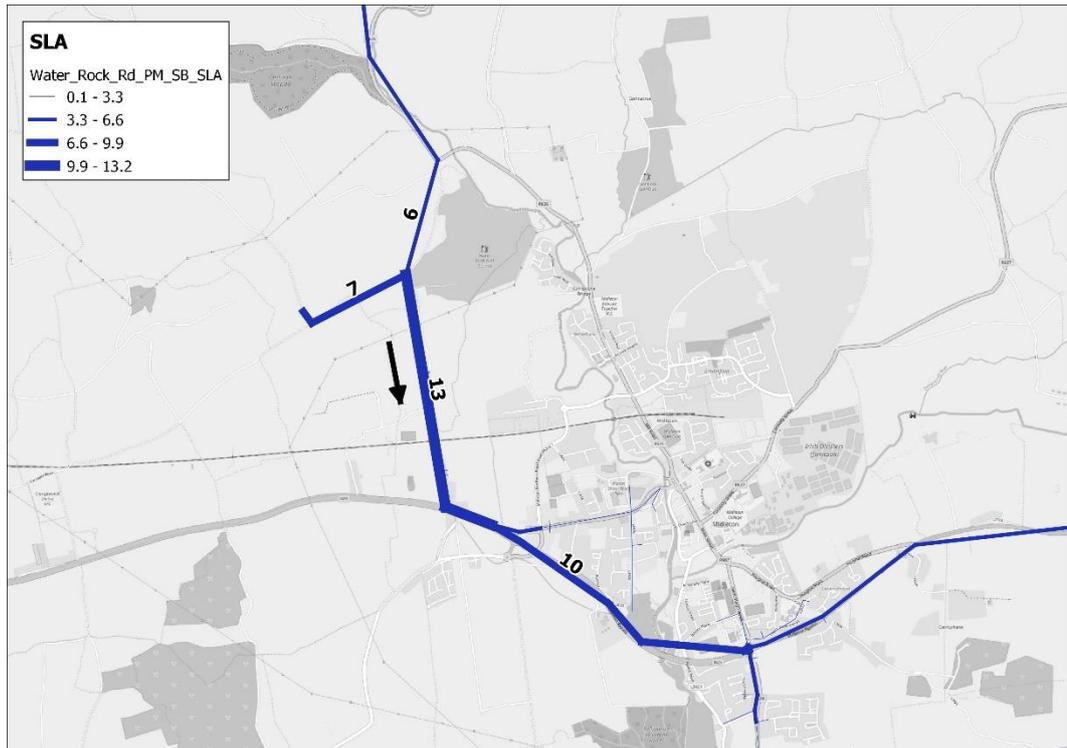


Figure 4-4 PM SB Flow on Water Rock Rd (Scenario 2)



4.2.3 The above images demonstrate that, as the N25/ Water Rock Rd junction remains open in this scenario, there will be a certain amount of through traffic on the Water Rock Rd in both the AM and PM peak Periods.

4.2.4 The tables below compare the Phase 1a flows and scenario 2 flows on Water Rock Road. With a combined two-way flow of 103 PCUs (Sc 2) versus 98 PCUs (Phase 1a) in the AM and 52 PCUs (Sc 2) versus 86 PCUs (Phase 1a) in the PM, the figures below demonstrate that closing the link road connection (in combination with keeping the N25/Water Rock Road junction open) will have a relatively small impact on the levels of traffic experienced on Water Rock Rd in the AM and PM peak periods.

Table 4-1 AM Water Rock Rd Flow Comparison

		AM		
		Link Flows		
Scenario	Description	(OB) Water Rock Rd	(IB) Water Rock Rd	2 - Way Water Rock Rd
2	Link Rd Closed and Water Rock Development	27	76	103
Phase 1a	As per original spec	71	27	98

Table 4-2 PM Water Rock Rd Flow Comparison

		PM		
		Link Flows		
Scenario	Description	(OB) Water Rock Rd	(IB) Water Rock Rd	2 - Way Water Rock Rd
2	Link Rd Closed and Water Rock Development	39	13	52
Phase 1a	As per original spec	9	77	86

4.3 Volume Over Capacity Analysis

4.3.1 Volume over Capacity has been used as a KPI to measure the performance of key junctions in the study area in each scenario. For reference, these V/C values are compared against the original Phase 1A results from the main Water Rock TA. The junctions used in this analysis are shown in Figure 3.5 and include:

- A – NRR Roundabout (Entrance to Nordic Enterprise Park)
- B – Knockgriffin Signalised Junction
- C – N25 Roundabout (Adjacent to Gaelscoil Mhainistir Na Corann)

4.3.2 The tables below compare the Max V/C for each junction in Scenario 2 against the original Phase 1a scenario. The results show that all three junctions experience similar V/Cs with (phase 1A) and without (Scenario 2) the Link Road in place. The NRR roundabout below experiences a reduction in V/C in scenario 2 due to the infrastructure differences between the two scenarios (slight re-routing of traffic in scenario 2 with level crossing on Water Rock Rd and the N25 junction still open).

Table 4-3 AM V/C Comparison

Scenario	Description	AM Max V/C		
		NRR Rdbt (A)	Knockgriffin (B)	N25 Rdbt (C)
2	<i>Link Rd Closed and Water Rock Development</i>	53%	98%	96%
Phase 1a	<i>As per original spec</i>	61%	97%	93%

Table 4-4 PM V/C Comparison

Scenario	Description	PM Max V/C		
		NRR Rdbt (A)	Knockgriffin (B)	N25 Rdbt (C)
2	<i>Link Rd Closed and Water Rock Development</i>	74%	98%	69%
Phase 1a	<i>As per original spec</i>	73%	97%	69%

4.4 Journey Time Analysis

4.4.1 Journey times along the NRR have been compared against times from the Phase 1A scenario to help determine the network impacts in this scenario. The 2-way route used in this analysis is shown in Figure 3.6.

4.4.2 The results of this analysis, detailed in the Table below, show comparable journey times between Sc2 and Phase1A with only the Southbound direction in the PM showing a real increase (6 seconds). The re-routing mentioned above in the V/C analysis also has an effect on the journey times in this scenario, however, the results suggest the performance of the NRR won't be significantly impacted with the Water Rock link road closed and 525 residential units completed at Water Rock.

Table 4-5 Journey Time Comparison

Scenario	Journey Times (secs)			
	AM		PM	
	NB	SB	NB	SB
Phase 1a	163	200	174	181
2	164	198	173	187

5. SCENARIO 3 - RESULTS

5.1 Overview

5.1.1 Scenario 3 involves closing the link road that connects the Water Rock Development lands to Water Rock Road while assuming the full Phase 1a residential units (525) are built at Water Rock and an additional 425 units (Phase 1 allocation) are built in Midleton. This scenario will establish if the network can cope with these levels of development without the Link Road connection in place. The key assumptions for this scenario are:

- **Upgrade of Cork Rd / NRR Signalised Junction** to include an additional lane on the eastbound approach to the junction (infrastructure proposal B);
- **New Railway Stop on Cork - Midleton Line** (infrastructure proposal D);
- **Water Rock Rd / N25 Junction** remains open;
- **525 residential units at Water Rock;** and
- **425 residential units in Midleton.**

5.2 Water Rock Road Demand Analysis

5.2.1 The forecast traffic along Water Rock Road in Scenario 3 has been used as a KPI to assess the impact of infrastructure and land use proposals for Water Rock in this scenario.

5.2.2 Figures 5.1 to 5.4, below, illustrate the quantity of vehicles traveling northbound and southbound on Water Rock Road during the AM and PM peak hours. These figures also illustrate the origin and destination of the forecast traffic on Water Rock Road.

Figure 5-1 AM NB Flow on Water Rock Rd (Scenario 3)

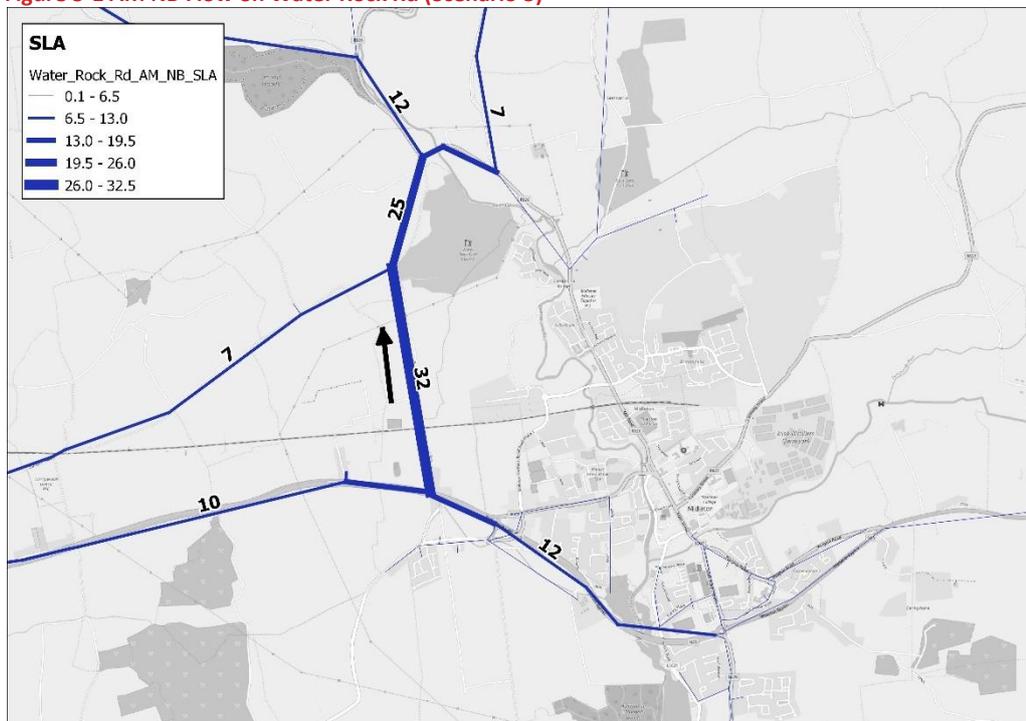


Figure 5-2 AM SB Flow on Water Rock Rd (Scenario 3)



Figure 5-3 PM NB Flow on Water Rock Rd (Scenario 3)

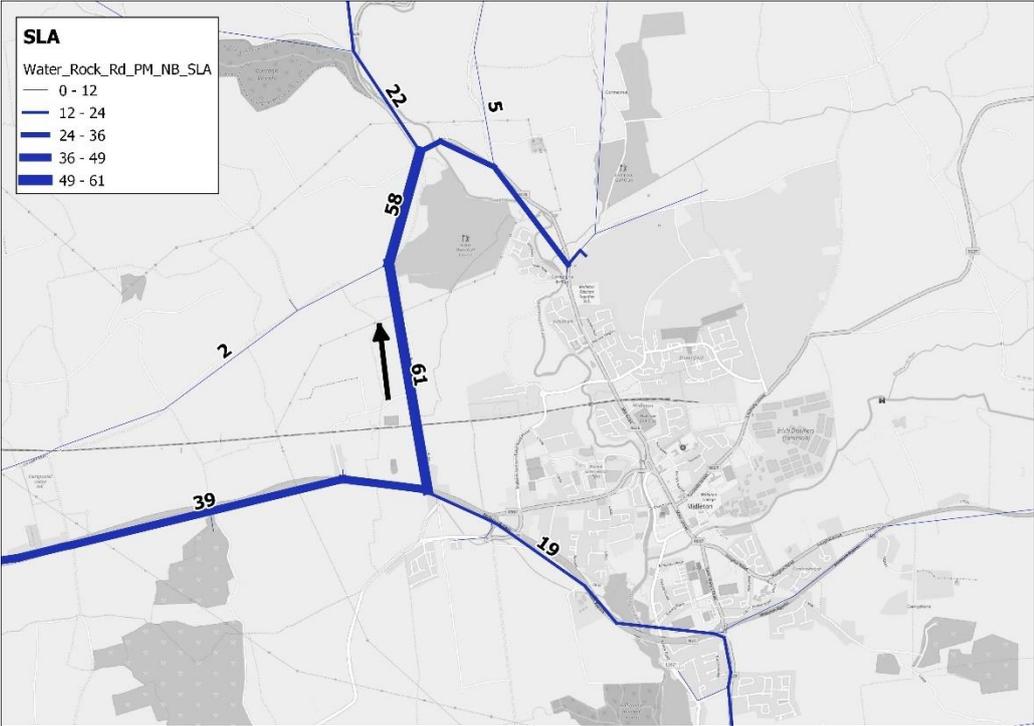
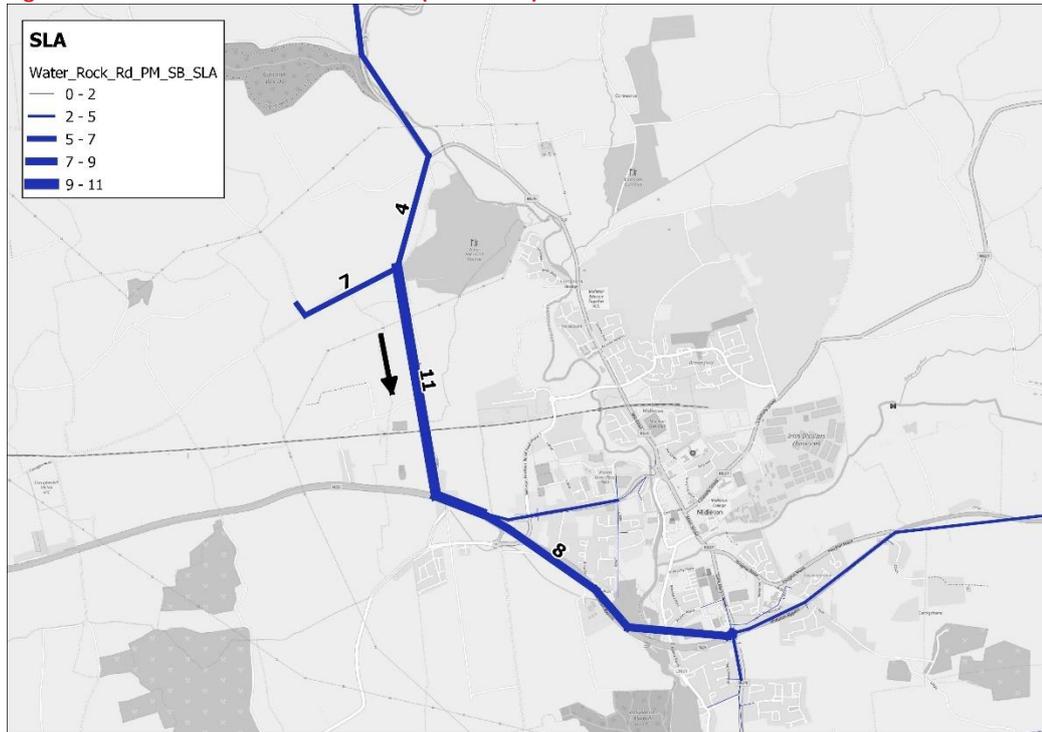


Figure 5-4 PM SB Flow on Water Rock Rd (Scenario 3)



5.2.3 As with scenario 2, the above figures show that, as the N25/ Water Rock Rd junction remains open in this scenario, there will be a certain amount of through traffic on the Water Rock Rd in both the AM and PM peak Periods.

5.2.4 The tables below compare Scenario 3 demand on Water Rock Road to the Phase 1a flows. With a combined two-way flow of 121 PCUs versus 98 PCUs in the AM peak and 72 PCUs versus 86 PCUs in the PM, the tables below demonstrate that the Scenario 3 assumptions don't result in a significant increase in traffic on the Water Rock Rd when the link road is closed.

Table 5-1 AM Water Rock Rd Flow Comparison

		AM		
		Link Flows		
Scenario	Description	(OB) Water Rock Rd	(IB) Water Rock Rd	2 - Way Water Rock Rd
3	Link Rd Closed and Water Rock & Middleton	33	88	121
Phase 1a	As per original spec	71	27	98

Table 5-2 PM Water Rock Rd Flow Comparison

		PM		
		Link Flows		
Scenario	Description	(OB) Water Rock Rd	(IB) Water Rock Rd	2 - Way Water Rock Rd
3	Link Rd Closed and Water Rock & Middleton	61	11	72
Phase 1a	As per original spec	9	77	86

5.3 Volume Over Capacity Analysis

5.3.1 Volume over Capacity has been used as a KPI to measure the performance of key junctions in the study area in each scenario. For reference, these V/C values are compared against

the original Phase 1A results from the main Water Rock TA. The junctions used in this analysis are shown in the Figure 3.5 and include:

- A – NRR Roundabout (Entrance to Nordic Enterprise Park)
- B – Knockgriffin Signalised Junction
- C – N25 Roundabout (Adjacent to Gaelscoil Mhainistir Na Corann)

5.3.2 The tables below compare the Max V/C per junction in Scenario 3 against the Phase 1a scenario. The results show an increase in the Max V/C for the junctions below in this scenario. In the AM peak hour, the max V/C at the Knockgriffin junction increases from 97% to 99% while the N25 Roundabout increases from 93% to 97%. In the PM, the NRR Roundabout increases from 73% to 77% and the N25 Roundabout increases from 69% to 72%.

5.3.3 While the Knockgriffin junction appears to be at capacity in this scenario, the modelling previously completed for Phase 1 also showed a maximum V/C of 99% in the am peak hour and 97% in the pm peak hour at Knockgriffin junction. This level of traffic was tested in the VISSIM microsimulation model and the junction was found to operate satisfactorily. Therefore, based on micro-simulation analysis carried out previously for Phase 1, which had a similar level of congestion at Knockgriffin to Scenario 3, it is anticipated that in scenario 3, the Knockgriffin junction should still perform satisfactorily.

Table 5-3 AM V/C Comparison

Scenario	Description	AM Max V/C		
		NRR Rdbt (A)	Knockgriffin (B)	N25 Rdbt (C)
3	<i>Link Rd Closed and Water Rock & Midleton Development</i>	54%	99%	97%
Phase 1a	<i>As per original spec</i>	61%	97%	93%

Table 5-4 PM V/C Comparison

Scenario	Description	PM Max V/C		
		NRR Rdbt (A)	Knockgriffin (B)	N25 Rdbt (C)
3	<i>Link Rd Closed and Water Rock & Midleton Development</i>	77%	97%	72%
Phase 1a	<i>As per original spec</i>	73%	97%	69%

5.4 Journey Time Analysis

5.4.1 Journey Times along the NRR in Scenario 3 have been compared against times from the original Phase 1A scenario to help determine the network impacts in this scenario. The 2-way route used in this analysis is shown in Figure 3.6.

5.4.2 The results of this analysis, detailed in the Table below, show comparable journey times between Sc3 and Phase1A in both time periods. The largest increase in journey times was observed on the Southbound direction in the AM peak hour, which increased by 33 seconds when compared to Phase 1A. .

Table 5-5 Journey Time Comparison

Scenario	Journey Times (secs)			
	AM		PM	
	NB	SB	NB	SB
Phase 1a	163	200	174	181
3	165	233	176	178

6. SUMMARY AND CONCLUSIONS

6.1 Summary

6.1.1 This Addendum Report summarises the outcomes of a strategic modelling assessment to determine the impacts of closing the proposed Water Rock Link Road and also its potential to increase “rat-running”, between Midleton and Carrigtwohill, along the Water Rock Road.

6.1.2 To fully assess these impacts, the following scenarios have been tested:

Table 6-1 Additional Phase 1a Scenarios Modelled

Scenario	Water Rock Rd/Link Rd Connection	Resi Units (Midleton)	Resi Units (Carrigtwohill)	Resi Units (Water Rock)
1	Open	0	357	0
2	Closed	0	357	525
3	Closed	425	357	525

6.1.3 In summary, the modelling assessment has found that:

- **Scenario 1:** Opening the Link Road and closing the N25/Water Rock Road Junction, in advance of Water Rock development, will result in minimal rat running using the link road. Furthermore, the total level of traffic on Water Rock road will reduce slightly because of decreased through traffic from the N25 and the journey times on the NRR also experience a slight reduction due to the removal of Water Rock development;
- **Scenario 2:** Closure of the link road with Phase 1A development in place will result in a slight increase in the maximum V/C experienced at some critical junctions when compared to original Phase 1A results. However, it is anticipated that the effect on queuing and overall journey times will be minimal, as demonstrated by the comparable journey times between Scenario 2 and Phase 1A;
- **Scenario 3:** This sensitivity test assessed the impact of the development of a further 425 units, elsewhere in Midleton, when Phase 1A has been completed. Modelling results for this scenario indicated that the increased level of development would lead to a deterioration of performance of key junctions, with the Knockgriffin Junction in-particular operating very close to capacity. This in turn has a knock-on effect to journey times along the NRR which also experience a deterioration particularly in the Southbound direction, as demonstrated in Chapter 4.

6.2 Conclusions

6.2.1 Transport Modelling carried out as part of the preparation of the Water Rock TA and to inform this Addendum Report, indicates that the Water Rock Link Road does not provide an attractive “rat-run” for traffic travelling between Midleton and Carrigtwohill. Model tests suggests that, with this connection in place, only a small number of vehicles (less than 25 in AM and PM peak hour) will use this route as a rat-run.

- 6.2.2 The modelling carried out to date indicates that most traffic generated by the Water Rock development (Phase 1A) will use the NRR access to the development. Therefore, the closure of the link road will result in only a marginal increase in traffic flows on the NRR and will not significantly impact the performance of key junctions along this route.
- 6.2.3 In scenario 3, the maximum V/C at Knockgriffin junction is 99% in the am peak hour and 97% in the pm peak hour. However, the longest queuing is on the northern arm of the junction (NRR) and therefore does not directly affect the N25 off slip. For comparison purposes, the modelling previously completed for Phase 1 also showed a maximum V/C of 99% in the am peak hour and 97% in the pm peak hour at Knockgriffin junction. This level of traffic was tested in the VISSIM microsimulation model and the junction was found to operate satisfactorily. Therefore, based on micro-simulation analysis carried out previously for Phase 1, which had a similar level of congestion at Knockgriffin to Scenario 3, it is anticipated that in scenario 3, the Knockgriffin junction should still perform satisfactorily.

SYSTRA provides advice on transport, to central, regional and local government, agencies, developers, operators and financiers.

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The SYSTRA logo is displayed in a bold, red, sans-serif font. The letters are thick and closely spaced, with a slight shadow effect behind them, giving it a three-dimensional appearance. The 'S' and 'Y' are particularly prominent due to their size and the way they connect to the other letters.