

Colindale

Area Action Plan

Supporting Documents

VISSIM Proposed Modelling
April 2009

**Local
Development
Framework**



Colindale Area Action Plan (AAP)

VISSIM Proposed Modelling

Project No: 133133
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1 Introduction

1.1 Background

1.1.1 A calibrated and validated SATURN highway model, base year 2007, has been developed on behalf of Transport for London by Hyder Consulting. The model analyses an AM and PM peak hour weekday. Colin Buchanan (CB) was commissioned by Transport for London and the London Borough of Barnet to develop Do Minimum and Do Something SATURN future year models relating to residential developments in the Colindale area.

1.1.2 An AM peak VISSIM model was also requested as part of this project in order to further investigate the impact of several highway schemes in relation to the proposed development schemes. Only the final year of the SATURN models - 2021, has been tested in VISSIM for all alternatives.

1.2 This report

1.2.1 The remainder of this report is structured as follows:

- Chapter 2 details the network changes for each option;
- Chapter 3 compares VISSIM and SATURN matrices;
- Chapter 4 details the VISSIM proposed assignment methodology;
- Chapter 5 summarises the VISSIM outputs; and
- Chapter 6 provides the conclusions and recommendations.

2 Proposed Options - Network Changes

2.1 General

2.1.1 This chapter summarises the network changes between the Base model and the Do-Minimum model. All the do-minimum changes have also been modelled in SATURN as part of the 'do-something' development scenarios.

Do Minimum Network Changes

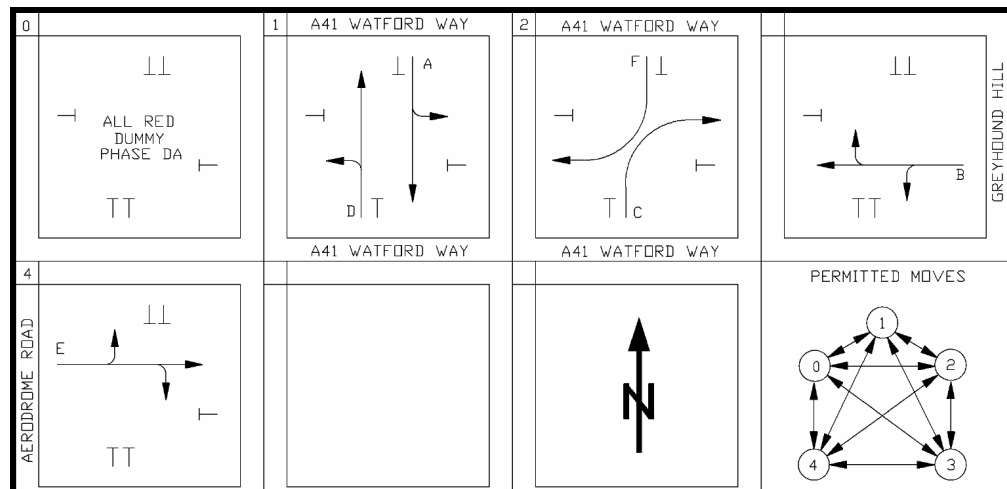
2.1.2 The following network changes were made to the base model to include the expected changes as coded in SATURN, and the signal timings were checked and updated.

Watford Way / Aerodrome Road Junction

2.1.3 The surveys, on which the base model was calibrated, took place in 2007 when Aerodrome Road had only one lane entering the junction. In early 2009 the junction was being reconstructed with a separate right turn lane. In order to have a consistent model, the junction was modelled as per 2007.

2.1.4 As presented on Figure 2.1, the existing staging diagram remained unchanged as well as the cycle time at 104 seconds.

Figure 2.1: Watford Way – Aerodrome Road junction staging diagram

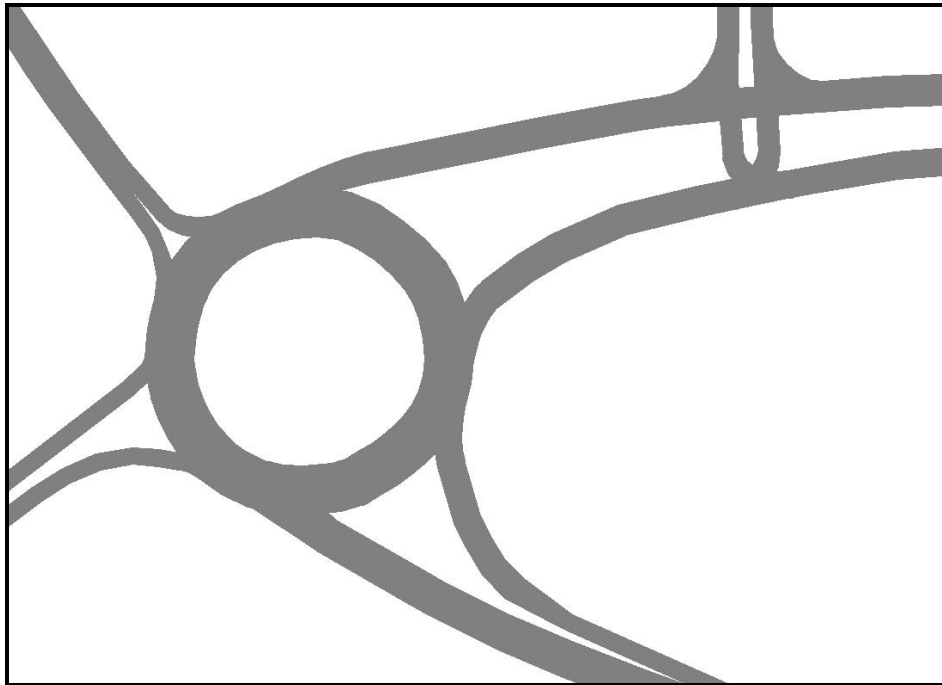


Aerodrome Road / Colindale Avenue Roundabout & Lanacre Avenue Shift

2.1.5 Currently the intersection between Aerodrome Road, Colindale Avenue, Ravens Close, Lanacre Avenue and Grahame Park Way consists of a two lane roundabout and give-way junction, as shown in Figure 2.2. The right turn from Grahame Park Way to Lanacre Avenue is allowed only for buses, other vehicles have to use the roundabout.

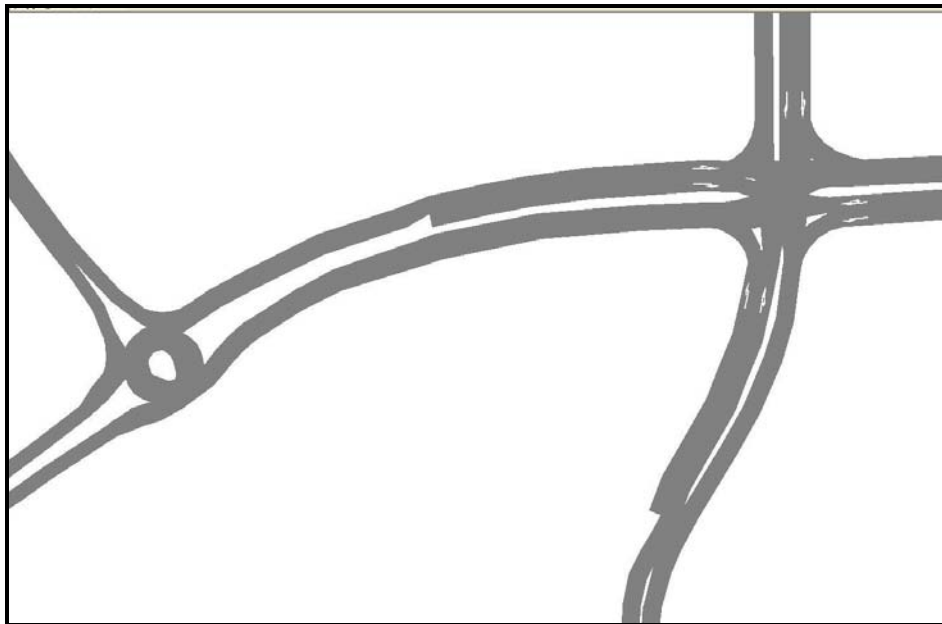
2.1.6 Lanacre Avenue was moved approximately 20 metres eastward. At its bend near Neat Acre a new street was connected to Field Mead at the location of Dunn Mead.

Figure 2.2: Colindale Avenue eastern end - Base



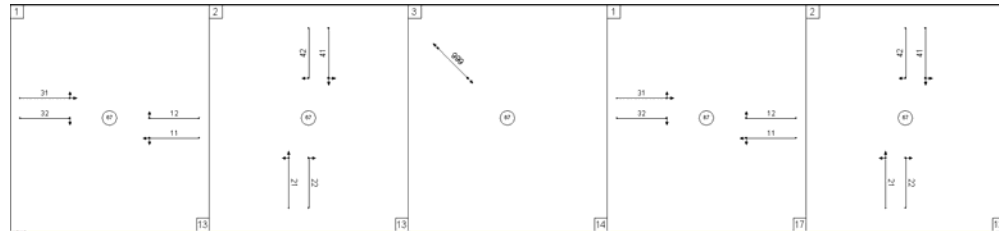
2.1.7 In the Do-Minimum scenario, the intersections were assumed changed from the Figure 2.2 configuration to a roundabout and a signalized crossroad, as shown in Figure 2.3.

Figure 2.3: Colindale Avenue eastern end – Do-Minimum



2.1.8 The Aerodrome Road / Colindale Avenue junction traffic signals stage diagram assumed is shown in Figure 2.4. The junction has a 96 seconds cycle time and a pedestrian crossing stage is called every other cycle.

Figure 2.4: Aerodrome Road / Colindale Avenue stage diagram



Grahame Park Way / Bunns Lane Junction

2.1.9 Currently the junction is a one-lane roundabout with an extra entry lane for the left turning movement from Grahame Park Way to the northern arm of Bunns Lane. The proposed layout assumes two lane on each entry, though only one lane on the exits.

Signal Timings Changes

2.1.10 There were minor changes to the signal timings to reflect the flexible signal design of Edgware Road and the fact that the traffic patterns might have changed between the 2007 model and current timings.

2.2 Do Something

2.2.1 The following network changes were made to the base model in order to be consistent with the SATURN model. The Do Something models include all the Do Minimum changes plus the following two changes, which were consistent in all the do-something tests.

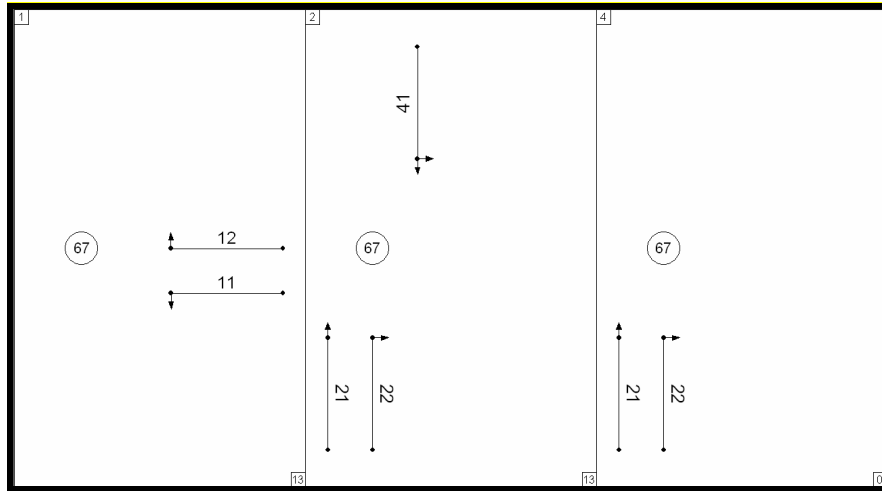
2.2.2 Each one of the three do-something scenarios included one other major scheme, either the North Montrose link, the Colindale Avenue/ Edgware Road junction enhancement or the Peel Link.

Montrose Avenue / Edgware Road Signalisation

2.2.3 The Montrose Avenue / Edgware Road junction has been signalised for all the Do Something options. The purpose of this signalisation is to provide a stable exit and entrance capacity to Montrose Avenue.

2.2.4 Figure 2.5 shows the junction staging diagram. The chosen cycle time was 104 seconds with no formal pedestrian crossing stage assumed.

Figure 2.5: Montrose Avenue / Edgware Road stage diagram



Aerodrome Road / A41 Eastbound Right Turn

2.2.5

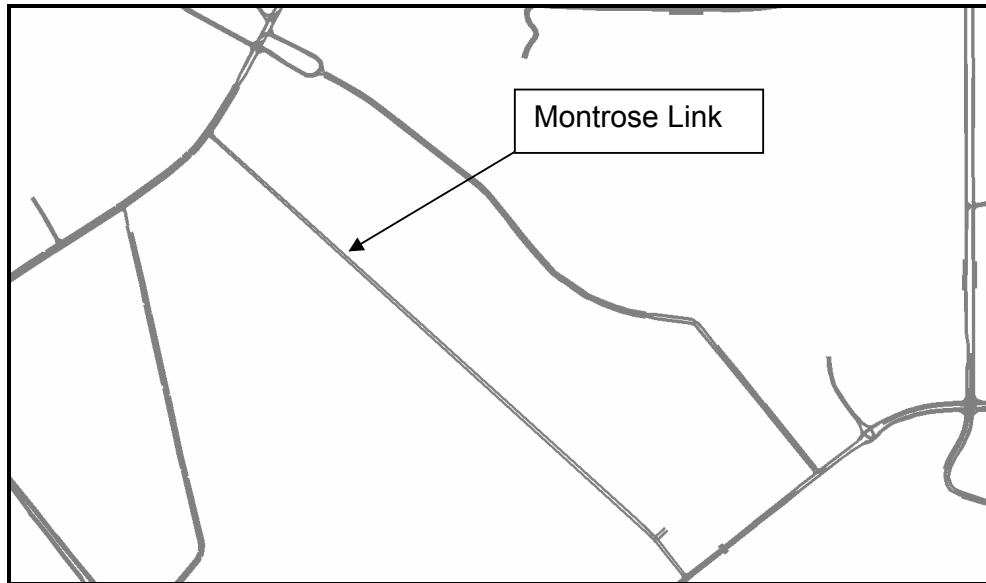
The Aerodrome Road Eastbound approach at the junction with the A41 had the two offside lanes converted to right turn. The nearside lane remained available for ahead and left turn traffic.

2.3 Do Something - North Montrose network changes

North Montrose Access Link

- 2.3.2 The North Montrose link was included in this Do Something option, the location of which is shown below in Figure 2.3. Both ends of the new Montrose Link were assumed to be give-way junctions.

Figure 2.6: Proposed layout for North Montrose link

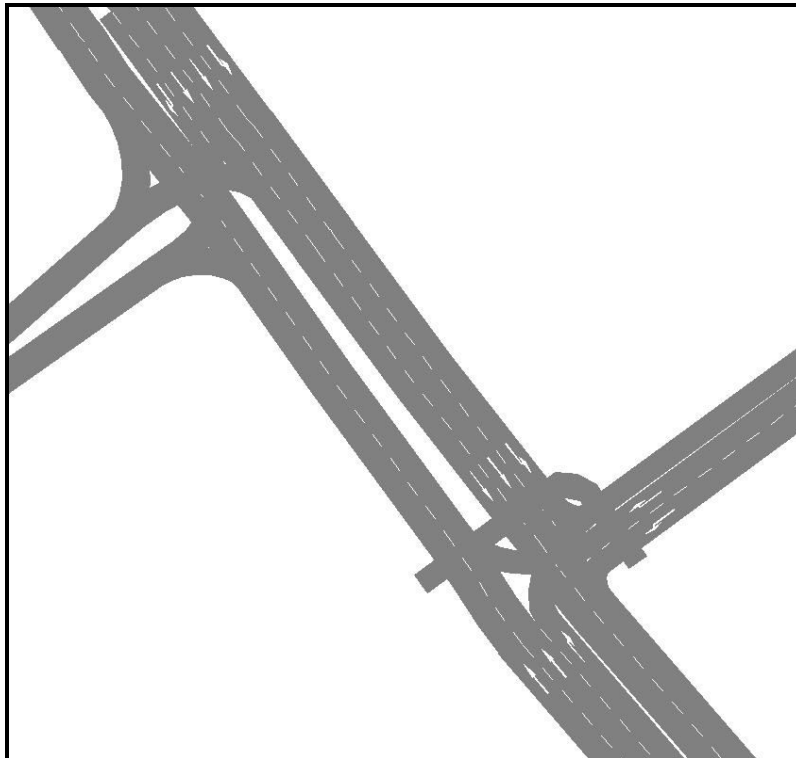


2.4 Do Something - Colindale Avenue network changes

Edgware Road / Colindale Avenue Junction Upgrade

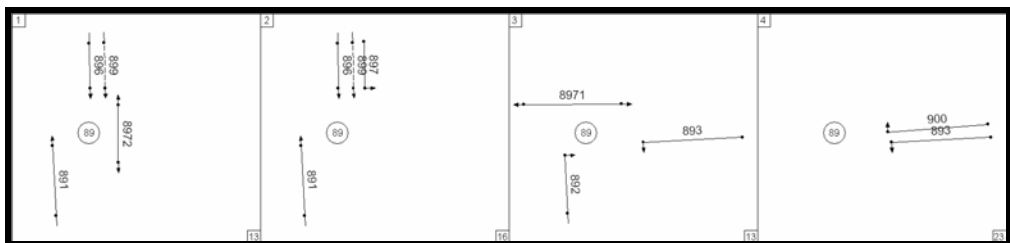
2.4.2 A major junction upgrade was assumed for the junction of Edgware Road and Colindale Avenue. The number of lanes on all arms was increased by one and the previously banned right turn from Colindale Avenue was permitted. No changes were made to Annesley Avenue movements. This also required a new signal plan. Figure 2.7 shows the new layout.

Figure 2.7: Proposed layout for Edgware Road/ Colindale Avenue junction



2.4.3 Figure 2.8 shows the staging diagram of Edgware Road / Colindale Avenue junction. The junction was assumed to have an 88 seconds cycle time and the pedestrian phases ran with the traffic phases.

Figure 2.8: Edgware Road / Colindale Avenue staging diagram

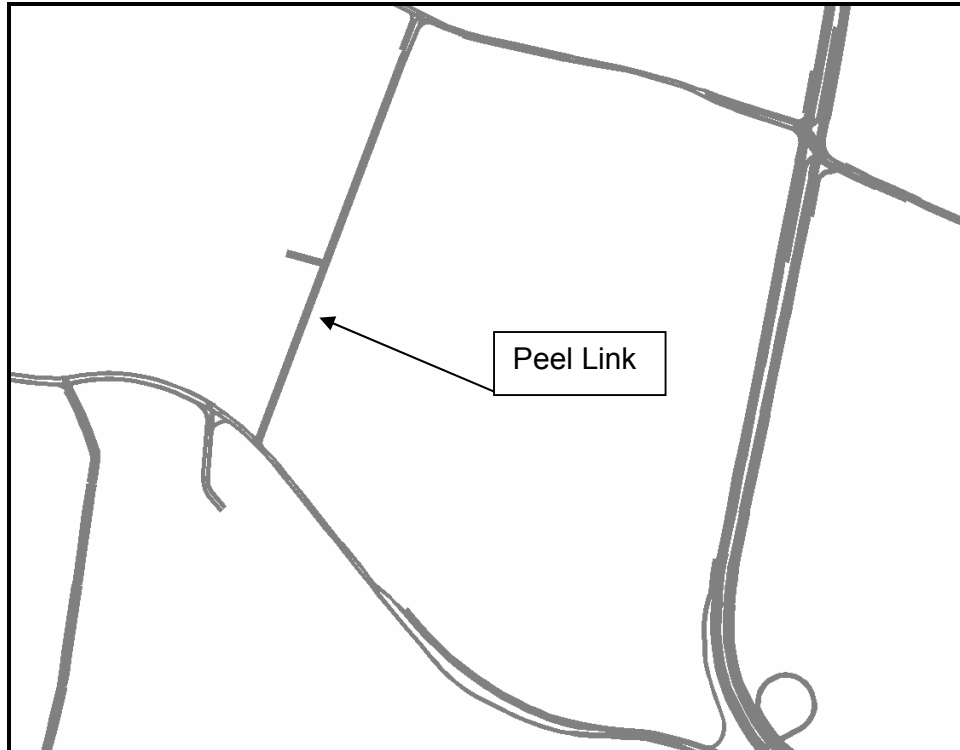


2.5 Do Something - Peel Access Link network changes

Peel Access Link

- 2.5.2 The Peel link was included in this Do Something option, the location of which is shown Figure 2.5. Either end of the Peel link was assumed as give-way junctions, with a flare on the northbound approach to Aerodrome Road.

Figure 2.9: Proposed layout for Peel link



3 Proposed 2021 Matrices

3.1 Methodology

- 3.1.1 The proposed 2021 matrices were produced by adding the absolute SATURN matrix changes to the VISSIM validated base matrix.
- 3.1.2 For some cells in the matrix, the absolute changes in SATURN were negative, probably resulting from the fact that SATURN reassigned some traffic outside of the VISSIM cordon.
- 3.1.3 The trip volumes were also subject to minor changes due to the rounding of flows as SATURN operates with flows with multiple decimal places while VISSIM uses only integer volumes.

3.2 Saturn - VISSIM matrix comparison

- 3.2.1 Table 3.1 shows the total trip volumes for the Do-Minimum AM scenario. The total matrix in PCU's in VISSIM differed only by 0.4%, which is regarded as acceptable.

Table 3.1: Do-Minimum total trip volumes

	SATURN [PCU]	VISSIM [vehs]	VISSIM [PCU]
Cars	11,984	12,222	12,222
LGV	1,719	1,066	1,599
HGV	532	205	472
Total	14,235	13,493	14,293

- 3.2.2 Table 3.2 shows the total trip volumes for the Do Something North Montrose AM scenario. The total matrix in PCU's in VISSIM differed only by 0.9%, once again regarded as acceptable.

Table 3.2: Do Something North Montrose total trip volumes

	SATURN [PCU]	VISSIM [vehs]	VISSIM [PCU]
Cars	13,040	13,291	13,291
LGV	1,672	1,079	1,619
HGV	525	205	467
Total	15,238	14,573	15,376

- 3.2.3 Table 3.3 shows the total trip volumes for the Do Something Colindale Avenue AM scenario. The total matrix in PCU's in VISSIM differed by only 0.8%, which was regarded as acceptable.

Table 3.3: Do Something Colindale Avenue total trip volumes

	SATURN [PCU]	VISSIM [vehs]	VISSIM [PCU]
Cars	13,104	13,340	13,340
LGV	1,680	1,086	1,629
HGV	524	202	465
Total	15,308	14,628	15,434

3.2.4 Table 3.4 shows the total trip volumes for the Do Something Peel Link AM scenario. The total matrix in PCU's in VISSIM differed only by 0.8%, once again regarded as acceptable.

Table 3.4: Do Something Peel Link total trip volumes

	SATURN [PCU]	VISSIM [vehs]	VISSIM [PCU]
Cars	13,078	13,303	13,303
LGV	1,655	1,063	1,655
HGV	507	200	460
Total	15,240	14,566	15,378

4 Proposed VISSIM Assignment Method

4.1 Methodology

- 4.1.1 The proposed development scenario included a significant increase in traffic volume on the network, and because of this it was felt necessary to run the proposed model as dynamic to permit reassignment. The models were run until convergence was achieved on the assignment.
- 4.1.2 Due to the VISSIM network being relatively small with few re-routing options, and because the matrices were consistent with SATURN, the produced outputs were regarded as consistent with SATURN outputs.

5 AM Peak Results

5.1 Non-assigned vehicles

5.1.1 For some scenarios, a small number of vehicles remained non-assigned in VISSIM at the end of the model period. This non-assignment was mainly due to minor roads having a give-way access to a major road – in some of these cases an increase in traffic from the major road can lead to difficulties in exiting from the minor road, especially for right turners. Table 5.1 shows the average number of non assigned vehicles in VISSIM at the end of the simulation.

Table 5.1: AM Peak non assigned vehicles

	Base Model	Do Minimum - Do Minimum flow	North Montrose - Do Something flow	Colindale Avenue - Do Something flow	Peel Link - Do Something flow
Average number of non assigned vehicles at the end of the simulation	0	198	914	231	141

5.1.2 Table 5.2 shows that all the vehicles in the base model are assigned at the end of the simulation. For the Do Minimum and the Do Something scenarios however some vehicles remain non-assigned and therefore do not enter the network and are not included in the network statistics. The North Montrose access link was particularly affected with approximately 900 vehicles non-assigned while the Peel Access Link performed best with 141 vehicles non-assigned. This volume is a very small proportion of overall assigned volumes per peak hour of some 15,000 (excluding the half-hour preload).

5.2 Test results statistics

5.2.1 Table 5.2 shows the AM peak VISSIM model general statistics for the base and all the tested options. It should be noted that the trip matrices used for the base contain fewer trips than the do-minimum (committed development) which in turn contained fewer trips than the 3 do-something scenarios. The key comparison is between the do-minimum and do-something network performance.

Table 5.2: AM Peak VISSIM General Statistics

	Base Model	Do Minimum - Do Minimum flow	North Montrose - Do Something flow	Colindale Avenue - Do Something flow	Peel Link - Do Something flow
Average delay per vehicle [s], All Vehicle Types	65.35	143.38	189.27	120.80	115.99
Average delay per vehicle [s], Vehicle Class Car	64.29	145.37	193.79	122.23	116.93
Average delay per vehicle [s], Vehicle Class DD Bus	188.73	286.59	397.23	246.98	245.26
Average delay per vehicle [s], Vehicle Class SD Bus	145.19	231.50	342.23	173.70	168.82
Average speed [mph], All Vehicle Types	13.89	11.35	10.10	12.29	12.83
Average speed [mph], Vehicle Class Car	19.33	14.17	11.72	14.94	15.89
Average speed [mph], Vehicle Class DD Bus	9.32	7.84	6.29	8.30	8.36
Average speed [mph], Vehicle Class SD Bus	10.57	7.70	6.01	8.68	8.81

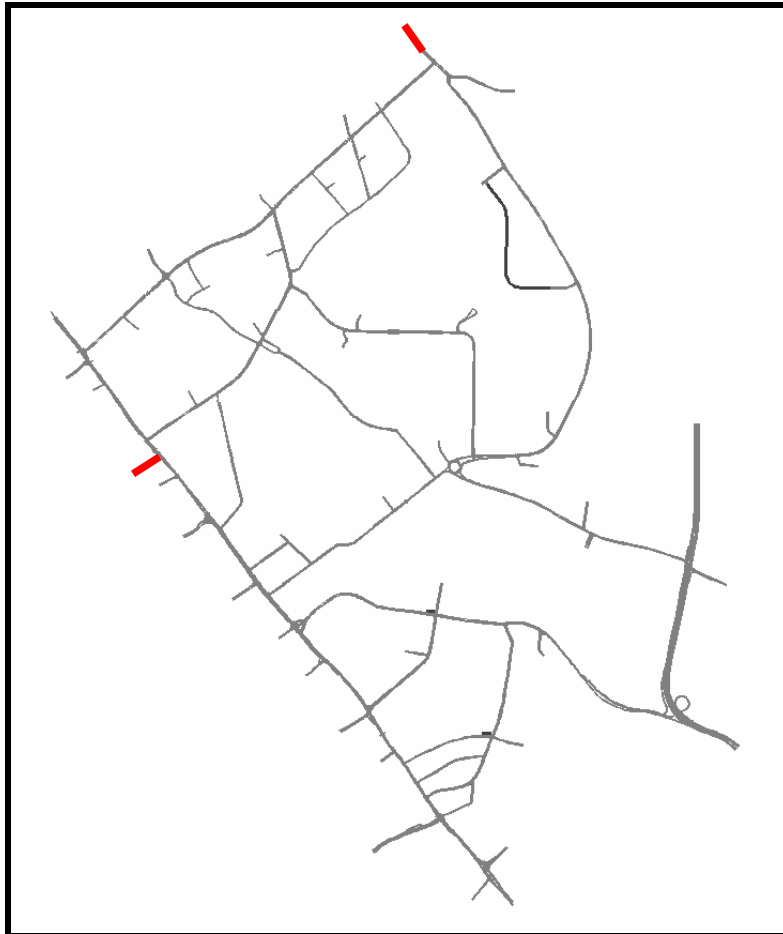
- 5.2.2 Table 5.2 shows that the average speed on the network for the Base model is 13.89mph. This average drops to 11.35mph for the Do-Minimum, and although queues do form at certain locations (See 5.3) no major traffic congestion was observed in the model.
- 5.2.3 For the three Do Something models, the Peel Access Link performs best, followed closely by the Colindale Avenue / Edgware Road junction upgrade. North Montrose Link however is the worst performing option in the AM peak. Both the Peel Access link and the Colindale Avenue/A5 improvement scenario result in network speeds above the do-minimum (committed development) scenario – this is regarded as acceptable in the light of the significant development planned here.

5.3 Congestion Points

Base model

- 5.3.2 Figure 5.1 shows in red the congestion points in the network in the base model.

Figure 5.1: Base model congestion points

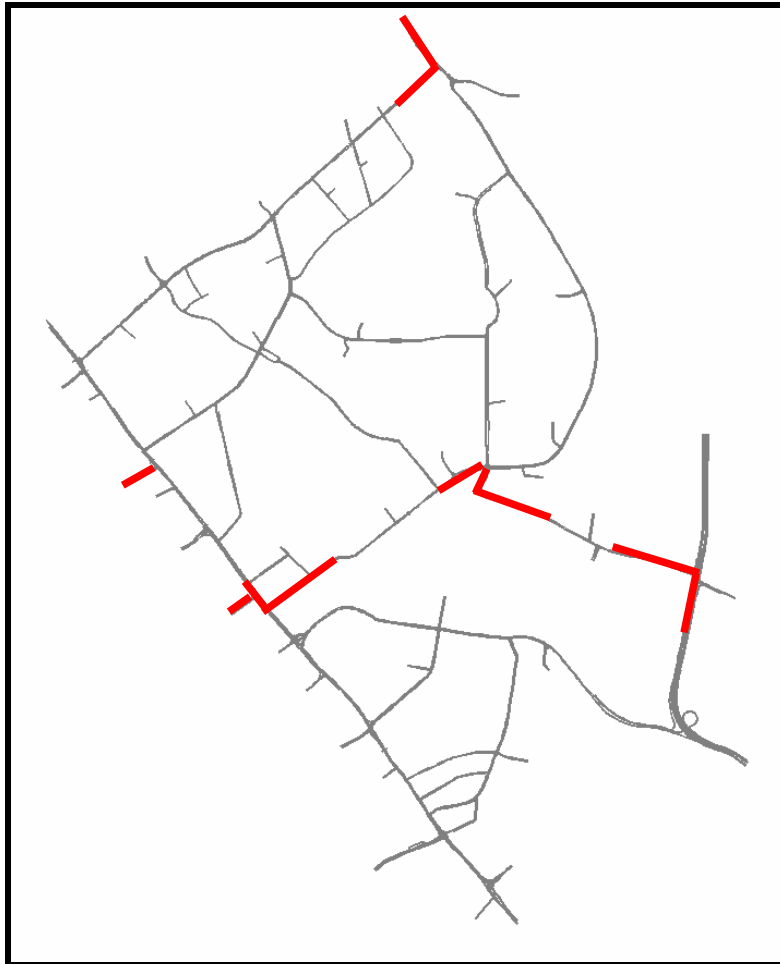


5.3.3 Figure 5.1 shows that the Colindale area in the AM peak is relatively free from congestion. The access to Mill Hill station roundabout and a right turn movement into Edgware Road are the only two real congestion points.

Do Minimum

5.3.4 Figure 5.2 shows in red the congestion points in the network in the Do Minimum model.

Figure 5.2: Do Minimum model congestion points

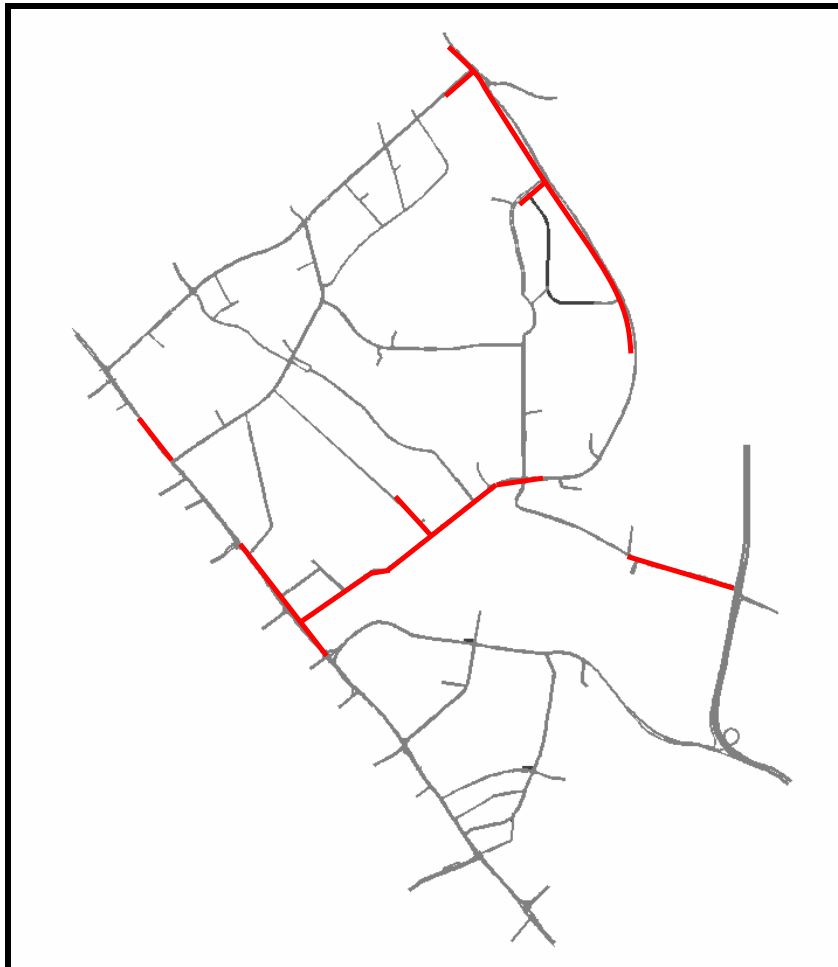


5.3.5 Figure 5.2 shows that the already committed new developments generate an increase in congestion on Colindale Avenue and Aerodrome Road. These two roads are the Colindale area exit points towards Central London.

Do Something – North Montrose

5.3.6 Figure 5.3 shows in red the congestion points in the network in Do Something - North Montrose model.

Figure 5.3: Do Something (North Montrose) model congestion points

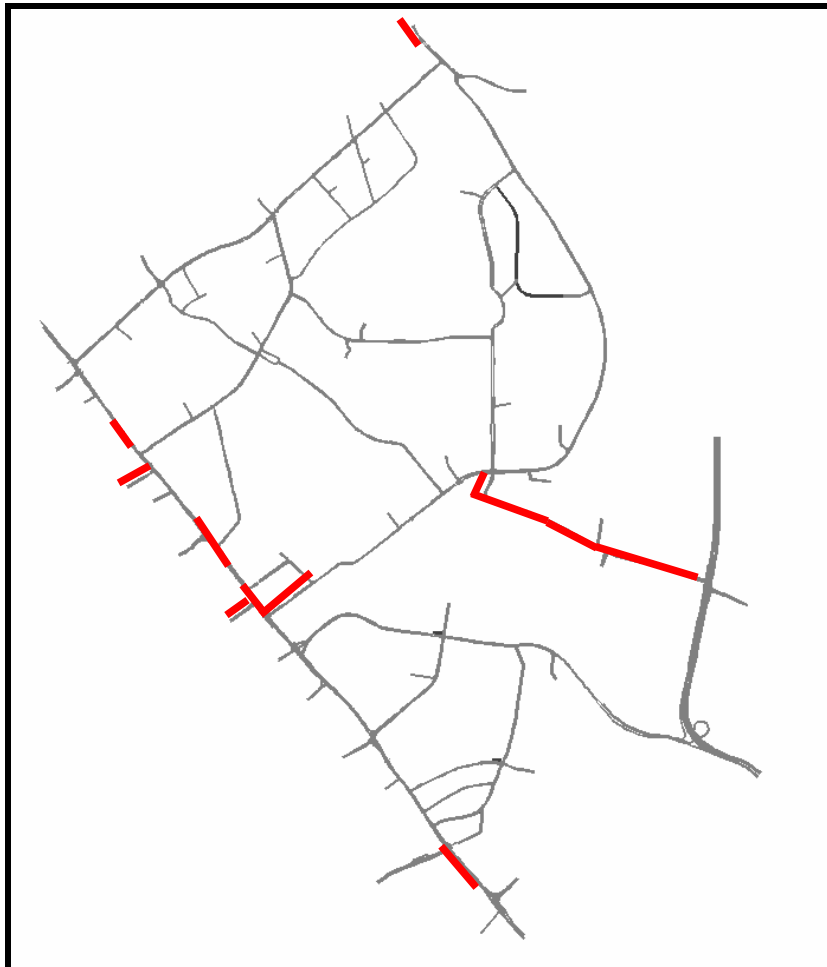


5.3.7 Figure 5.3 shows the effect of the North Montrose scenario test. The capacity of exits from the Colindale area has not been increased resulting in the key exit points to be oversaturated and for more queues to develop.

Do Something – Colindale Avenue

5.3.8 Figure 5.4 shows in red the congestion points in the network in the Do Something – Colindale Avenue model.

Figure 5.4: Do Something (Colindale Avenue) model congestion points

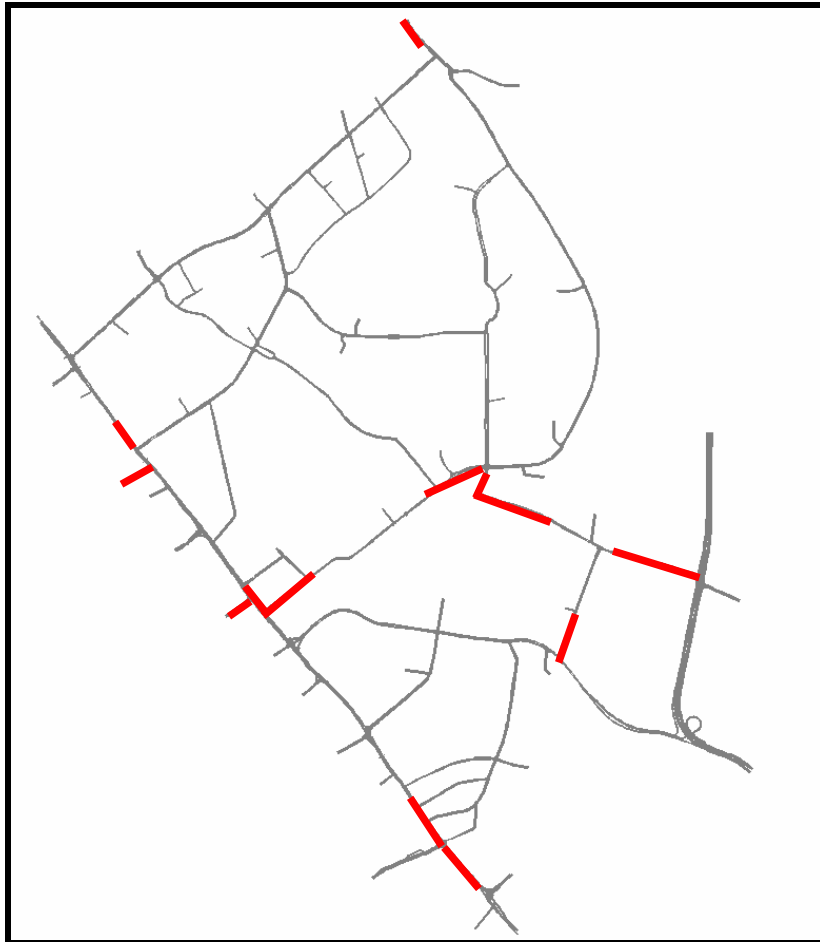


5.3.9 Figure 5.4 shows this scenario leads to an increase in congestion on Aerodrome Road and Edgware Road compared to the Do minimum model.

Do Something – Peel Link

5.3.10 Figure 5.5 shows in red the congestion points in the network in the Do Something Peel link model.

Figure 5.5: Do Something (Peel Link) model congestion points



- 5.3.11 The Peel link scenario results in some of the congestion from Aerodrome Road being relocated to the Peel Link southbound and the congestion on Edgware Road appearing more towards the Kingsbury Avenue junction, on the southern part of the study area.

6 Conclusions and Recommendation

6.1 General

- 6.1.1 Colin Buchanan (CB) was commissioned by the London Borough of Barnet to develop an AM peak VISSIM model in order to further investigate the impact of several highway schemes in relation to the proposed Colindale AAP.
- 6.1.2 The VISSIM model has been calibrated as far as possible following DTO standards and validated following a methodology ensuring consistency with the SATURN model.
- 6.1.3 The Base model is less congested than the Do-Minimum (committed development) scenario, but no major traffic congestion is observed although some queues are present on the exit approaches to the Colindale area.
- 6.1.4 For the three Do Something models, the Peel Access Link performs best, followed closely by the Colindale Avenue / Edgware Road junction upgrade. North Montrose Link however is the worst performing option in the AM peak. Both the Peel Access link and the Colindale Avenue/A5 improvement scenario result in network speeds above the do-minimum (committed development) scenario – this is regarded as acceptable in the light of the significant development planned here.
- 6.1.5 Further work would be needed to ‘fine-tune’ the network proposals to mitigate any congestion points, and it would be beneficial to develop a PM peak VISSIM of the Colindale area as well.



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