The Judd Street one-way scheme and Midland Road

Discussion paper by Camden Cycling Campaign, 9th April 2006

The proposal to make Judd Street one way was considered by Camden's executive environment committee on 21st March 2006. They recommended that this proposal should be deferred.

The main factors that appear to have led to this decision are:

1. The proposed scheme would be detrimental to the safety of cyclists on LCN Route 6 in Mabledon Place due to the following features of the scheme:
   - diversion of traffic via Bidborough Street into Mabledon Place;
   - introduction of a left turn from Mabledon Place into Euston Road.
2. It is unacceptable to the local residents and Kings Cross councillors due to:
   - the large increase in vehicular traffic entering the area south of the Town Hall via the north end of Judd Street from Midland Road.

These factors taken together suggest that the assumptions regarding the use of the MEJ (Midland Road/Euston Road/Judd Street) junction should be revisited. In particular, the assumption as to the vehicle flow in Midland Road should be challenged. A reduction in the projected flow could have two immediate benefits:

1. the junction capacity gained could allow Judd Street to remain two way, removing the need to divert traffic via Bidborough Street to a new left turn in Mabledon Place;
2. there will be less southbound vehicular flow in Judd Street.

This paper outlines the options offered by Buchanans' Report on Kings Cross Area Modelling and quotes its assumptions regarding traffic flow on Midland Road. It then argues that reducing the projected traffic flow in Midland Road will have a very beneficial effect on the MEJ junction, allowing Judd Street to remain two-way. Finally it concludes with a request to LB Camden to reconsider the use of Midland Road; and to TfL to have the modelling reworked with less demanding assumptions about the traffic flow in Midland Road.

The Appendix at the end of this paper contains an Excel spreadsheet showing an approximation of the effect on the MEJ junction of changing the assumptions regarding vehicular flow in Midland Road.

Kings Cross Area Modelling (Buchanans Report for TfL, July 2005)

Options

Buchanans' report models the combined use of the MEJ junction in its larger context, which includes the Pancras Road/Euston Road junction. It presents five different options for the MEJ junction. To summarise:

Option 1. Judd Street southbound only, with a staggered pedestrian crossing over Euston Road eastern arm;

Option 2. Judd Street two-way, with a staggered crossing over Euston Road eastern arm;

Option 3. Judd Street southbound only, with a straight-across crossing over Euston Road eastern arm;

Option 4. Judd Street two-way, with revised staging (i.e. 4 signal stages instead of 3) allowing Judd Street to run to its minimum of 7 seconds only, with additional green time given to Midland Road;

Option 4a. Similar to Option 4 but with the southbound lanes on Midland Road amended. (3 right turn lanes and 1 left turn+ahead lane);

Buchanans' conclusion: Option 1 is the only one that does not become over saturated at peak periods. This is the origin of the Judd Street one-way proposal.

Assumptions quoted from Buchanans' report

Buchanans Section 2.1

The KX CTRL works and KX LUL works have been in place since around 2001. The extent of the works has varied by phase, but the key effects on road capacity within the study area have been:

- *Reduction in the number of traffic lanes through the KX area in both directions along the A501;*
- *Closure of Midland Road and Pancras Road to general traffic.*

LB Camden and LB Islington reported that their borough roads have not in fact seen any significant rises in traffic flow during the works, suggesting that overall traffic flow through King's Cross has fallen substantially rather than diverting to local alternative routes. Decisions are either being taken at a long distance to avoid central London, or trips have shifted to other modes.

The measures resulting in reduced road capacity will be removed and a new highway network implemented before the CTRL station at St. Pancras opens in 2007.

Buchanans Section 3.3

As there has been a significant reduction in traffic flow through the area during the roadworks it is thought that a proportion of the modal changes/diverted routes will not return to the network once the works are complete.

LB Camden and LB Islington agreed that the traffic loss on the approach roads from the north could be substantial due to the above factor. However, due to a lack of clear data on where the trips have gone, a starting point should be a loss of 20% of traffic on these approaches, with these trips being diverted over a long distance or not now being made by car. TfL Street Management and the CCS Team agreed that this is still a conservative assumption given the lack of apparent local diversion. [i.e. they assume that 80% of the original traffic will return].

Arguments about traffic reduction in Midland Road

Our argument is that Midland Road should be accessible only to taxis, buses, cycles, service vehicles and vehicles picking up train passengers. We have decided to make this argument more concrete by performing some estimate of the effect of such a limitation on the MEJ junction. David Braine of TfL Streets has very kindly provided us with the following information by email on 7 April 2006.

Having gone through Arup's report from April 2004, which was used as a basis for traffic assignment in Buchanan's modelling work on the A501, it indicates that in 2007 there will be 441 taxis using Midland Road to pick up passengers in the AM peak hour and 321 in the PM peak. hour There may be more coming along Midland Road that do not pick up, but these have not been defined.

Buchanans report gives 1260+747 pcu for the AM peak hour and 883+991pcu in the PM peak hour. Thus, the above figures for taxis comprise approximately 22% of the AM peak hour figure and 17% of the PM peak hour figure.

To allow for use by the taxis that do not pick up, buses, delivery vehicles and cycles, we decided to base our estimates on a very generous assumption that the flows in Midland Road should be only 60% of those used by Buchanans.

We have made some rough calculations using an Excel spreadsheet to illustrate the effect of the 60% proportion of flows. Our calculations are intended to give some idea as to what might be done, for example to retains two-way working in Judd Street. We are not, of course, claiming to have reworked the model.

We selected Buchanans' Option 4a to study, because it seems to offer the most scope. First, it uses the minimum possible time for the Judd Street left turn (which should discourage its over-use in comparison with Option 2). Secondly, it uses only one lane in Midland Road for the left turn+straight ahead, with three lanes for the right turn out of Midland Road. We suspected that one of these three might, possibly, be redundant where there is less flow.

In carrying out our calculations, we make the following assumptions:

- that the flows in Euston Road must not be modified and its saturation figures kept below 90% ;
- that taxi flow must be supported, hence we should calculate at 50% or 60% of Buchanans' original flow;
- that the capacity of a signal stage is proportional to its duration (at least for our small variations in Ttl green times).

Results from our study of Option 4a

See 'CCC version of table 4.9 showing effects of reduced flow on signal stages' and 'CCC version of table 4.10 showing effects of reduced flow on signal stages' in our Appendix on page 5, where we used 60% flows. The saturation figures are shown enclosed in boxes for emphasis.

Briefly, we can save 9 seconds in the Midland Road stages of the signal cycle and give the time gained to the Euston Road stage. The resulting saturation figures are comparable to those produced by Option 1. For Euston Road the maximum saturation is 83% in the AM peak hour and 86% in the PM peak hour. For Midland Road the maximum saturation is for the left turn at 82% in the AM peak hour and 90% in the PM peak hour.

We took our calculations one step further: we estimated the saturation figure that would result from the case where only two lanes are provided for the right turn out of Midland Road. The result was good – with 77% saturation in the AM peak hour and 47% in the PM peak hour for the right turn phase.

Note that reduction of the number of lanes in Midland Road should allow space for cycle facilities, for example, a contraflow cycle lane as mentioned in the Mayor's reply to Jenny Jones' question regarding Cycling in Midland Road[†].

Results from study of Option 2

We performed a similar analysis based on Buchanans' Option 2, which also allows Judd Street to remain two-way. Our calculations are shown in 'CCC version of table 4.3 showing effects of reduced flow on signal stages' and in 'CCC version of table 4.4 showing effects of reduced flow on signal stages' in our Appendix on page 6. Once again, the saturation figures are comparable to those produced by Option 1.

Less radical reductions

We have also re-worked the exercise for Option 4a to show the effect of retaining 70% of Buchanans flows in Midland Road. In this case, we were able to give the same amount of extra time to Euston Road. But the saturation levels for the Midland Road left+ahead were higher (at 95% AM and 105% PM).

Vehicle flow into Judd Street from Midland Road

The reduction of the projected vehicle flow in Midland Road should produce a proportionate reduction of the flow into Judd Street from Midland Road. Buchanans' report does not show explicitly the figures from Midland Road into Judd Street, but their appendices state the percentage that they expect to go ahead/turn left. In our spreadsheets on pages 5 and 6, we have added a line to the 'Link name' column showing the Midland-Judd figure and the percentage stated by Buchanans.

As we mentioned above, our assumption of 60% was very generous. We have shown that with that assumption, Judd Street can become two-way. However, a less generous assumption such as 40% would appear to cover the taxi and other essential vehicle flows and would be very beneficial to Judd Street.

Conclusions

Our purpose in making these calculations is to make concrete our suggestions regarding the reduction of flows in Midland Road.

To solve the problem at the southern end of Midland Road one must not let too many vehicles in at the northern end. The fact that the road has been closed for 2 years with no effect proves that the road is not required for general London circulation. Therefore with the opening of the Eurostar station it is reasonable to make provision for taxis, buses, cycles, delivery vehicles and drop offs, but not for anything else.

We therefore ask LB Camden to re-consider the options for the use of Midland Road and we ask Transport for London to commission a corresponding reworking of the model for the MEJ junction with a view to avoiding the problems arising from Buchanans' model of July 2005.

Camden Cycling Campaign Committee, contact: Jean Dollimore, jean@dollimore.net,
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[†]Cycle Access to St Pancras

Question No: 636 / 2006

Jenny Jones

Are you concerned that once the new Eurostar terminal is completed there will be no direct access for cyclists to the Thameslink and Midland Mainline terminal at St Pancras from Midland Road?

Agreements have been reached to ensure that cyclists have access to St. Pancras station for Eurostar, Midland Mainline and Thameslink services from Pancras Road.

Further discussions are underway to:

- Resolve the remaining access and traffic arrangements on Pancras Road
- Provide for cyclists travelling north/south across Euston Road (on LCN+)
- Consider provision for two-way cycle movement along the whole length of Midland Road.

APPENDIX[†]

An explanation of our calculations

Applied to Option 4a - Buchanans' Tables 4.9 and 4.10.

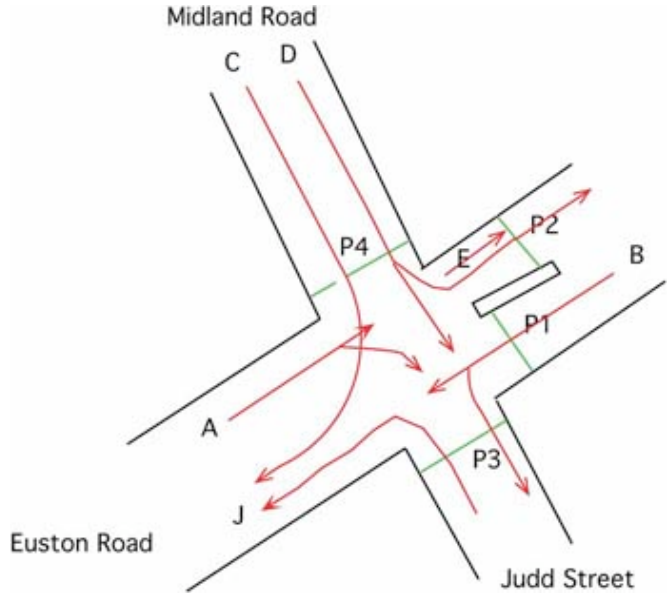
For this option, Buchanans propose 4 stages for the signals with minimum time of 7 seconds for Judd Street. Midland Road has 3 right turn lanes and one left+ahead lane.

Stage 1: Euston road (phases A, B, E and P4)

Stage 2: Midland Road right turn (phases C, P1, P2, P3)

Stage 3: Midland Road left turn plus Midland Road right turn (phases C, D, E and P1)

Stage 4: Midland Road straight ahead + left turn plus Judd Street left turn (phases D, E, J and P1).



Using our reduced proportion of the flows in Midland Road (60%), we can reduce the time allowed for Stages 2 and 3. The time gained is added to Stage 1. See page 5, Option 4a, under the heading 'CCC version of table 4.9 showing effects of reduced flow on signal stages' and 'CCC version of table 4.10 showing effects of reduced flow on signal stages'. We use colour to illustrate how we carried out the calculation.

i. Red shows the proportion of the original flow in Midland Road (0.6) and the resulting new flows in phases C and D; (the extra line in italics is explained below)

ii. Blue shows the proportion of the original time allowed in Stages 2 (0.8) and 3 (0.85), the changes to the durations of Stages 2 and 3 and for phases C and D in column Ttl green;

iii. Green shows the time gained in seconds (9) and the new times allowed for Stage 1 (and thus for phases A and B in column 'Ttl green');

iv. The flows for phases A and B are unchanged. The capacity for each phase is recalculated to take into account the new Ttl times;

v. The degree of saturation is calculated from the capacity.

The results show that it is possible to keep the saturation figures for Euston Road well below 90%, with a maximum saturation of 90.4% for the Midland Road left turn in the PM peak hour.

Note that we don't understand why the flows for Euston Road W Ahead are 1395+652 for Option 1 (AM) and 1458+500 for Options 2 and 4a (AM).

We have taken our calculations one step further - we have reduced the capacity of the right turn in Midland Road to 2 lanes and calculated the resulting degree of saturation, using the capacity figures from Option 2. This is shown in italic the row entitled 'M Rd right 2 lanes'. The resulting saturation figures are 77.4% AM and 46.8% PM.

Applied to Option 2 - Buchanans Tables 4.3 and 4.4

Option 2 allows Judd Street to be 2-way, with a staggered pedestrian crossing. The signals have three stages:

Stage 1 for Euston Road, comprising phases A, B, E, P4;

Stage 2 for Midland Road right turn, phases C, P1, P2, P3

Stage 3 for Midland Road left turn plus Judd Street left turn: phases D, J, E, P1.

We have applied calculations similar to the above. These are shown under the headings 'CCC version of table 4.3 showing effects of reduced flow on signal stages' and 'CCC version of table 4.4 showing effects of reduced flow on signal stages' on page 6. The above colour scheme is used to show the stages of the calculation, which is a little simpler for this option because each phase corresponds to a single stage in the signals.

[†]The file containing our spreadsheet is available on request from Jean Dollimore

Calculations based on the tables in Section 4 of Buchanans report

4.6 Option 4a see Buchanans Appendix 1f

4.6.1 **Judd 2-way, (7 secs) extra time Midland Rd, staggered crossing, Mid Rd lanes changed**, gives Midland Road **3** right turn lanes

See Figure 4.2. Midland Road Option 4a Staging Diagram

	vehicles	*pedestrians*	AM duration		PM duration	
Stage 1	A+B+ E	Midland Rd	29	38	33	42
Stage 2	C	P1+P2 + Judd	23	18	23	18
Stage 3	C+ D+E	P1	24	20	25	21
Stage 4	D+E+J	P1 J- Judd St (left)	7	7	7	7

staggered ped crossing over Euston Road: P1 southern half, P2 northern half

J- Judd Street (southbound) E- queue behind P2

TABLE 4.9 : Midland Road option 4a AM LINSIG result table (including KXC flows) 8-9am

Link Name	Phase	Ttl Green (Sec)	Flow (pcus)	Max Flow (pcuh)	Capacity (pcu)	Deg Sat (%)	Ttl Dly (pcu/s)	Ttl Dly (pcu/h)	Queue (pcu)
Euston RoadE Ahead Lef	B	29	458	1824	622	73.7	34.1	4.3	8.1
Euston Road E Ahead	B	29	1053	4110	1401	75.2	30.1	8.8	17.4
Euston Road W Right	A	27	101	1879	100	100.5	210.7	5.9	6.8
Euston Road W Ahead	A	27	1458	4110	1308	111.5	148.1	60	72.4
Euston Road W Ahead	A	27	500	1915	609	82.1	41.2	5.7	10
Midland Road Right	C	29	1260	5589	1905	66.1	27.1	9.5	20.6
Stage 3	C,D	26							
Midland Road Left	D	33	747	1733	670	111.6	157	32.6	38.3
Midland - Judd(30%)			**224**						

CCC version of table 4.9 showing effects of reduced flow on signal stages

Prop'n of Buchanans' projected flow in Midland Road 0.6 can insert other figures

Prop'n of Buchanans' time allowed to C in Stages 2, 3 0.8 0.85 AM

Prop'n of Buchanans' time allowed to C in Stages 2, 3 0.8 0.85 PM

Spare time gained is added to stage 1 (A and B) 9 seconds (derived)

Assumptions: capacity is proportional to time provided in Ttl Green

saturation = flow/capacity as percentage

Link Name	Phase	Ttl Green (Sec)	Flow (pcus)	Max Flow (pcuh)	Capacity (pcu)	Deg Sat (%)	Ttl Dly (pcu/s)	Ttl Dly (pcu/h)	Queue (pcu)
Euston RoadE Ahead Lef	B	38	458		815	56.2			
Euston Road E Ahead	B	38	1053		1836	57.4			
Euston Road W Right	A	36	101		133	75.8			
Euston Road W Ahead	A	36	1458		1744	83.6			
Euston Road W Ahead	A	36	500		812	61.6			
Midland Road Right	C	22	756		1445	52.3			
M Rd right 2 lanes		*22*	*756*	*same*	*976*	*77.4*	*capacity calc from Option 2*		
Midland Road Left	D	27	448		548	81.8			
Midland - Judd(30%)			**134**						

TABLE 4.10 : Midland Road option 4a PM LINSIG result table (including KXC flows) 5-6 pm

Link Name	Phase	Ttl Green (Sec)	Flow (pcus)	Max Flow (pcuh)	Capacity (pcu)	Deg Sat (%)	Ttl Dly (pcu/s)	Ttl Dly (pcu/h)	Queue (pcu)
Euston RoadE Ahead Lef	B	33	360	1824	646	55.7	29.1	2.9	6.3
Euston Road E Ahead	B	33	848	4110	1456	58.3	27.6	6.5	14.8
Euston Road W Right	A	31	55	1879	142	38.7	33.1	0.5	1
Euston Road W Ahead	A	31	1444	4110	1370	105.4	103	41.3	54.4
Euston Road W Ahead	A	31	707	1915	638	110.8	156.7	30.8	37.2
Midland Road Right	C	30	883	5589	1805	48.9	27.7	6.8	16.2
Midland Road Left	D	37	782	1733	686	114	178.1	38.7	45.1
Midland - Judd(30%)			**235**						

Spare time gained is added to stage 1 (A and B) 9 derived

CCC version of table 4.10 showing effects of reduced flow on signal stages

Link Name	Phase	Ttl Green (Sec)	Flow (pcus)	Max Flow (pcuh)	Capacity (pcu)	Deg Sat (%)	Ttl Dly (pcu/s)	Ttl Dly (pcu/h)	Queue (pcu)
Euston RoadE Ahead Lef	B	42	360		822	43.8			
Euston Road E Ahead	B	42	848		1853	45.8			
Euston Road W Right	A	40	55		183	30.0			
Euston Road W Ahead	A	40	1444		1768	81.7			
Euston Road W Ahead	A	40	707		823	85.9			
Midland Road Right	C	22	424		1324	32.0			
M Rd right 2 lanes		*22*	*424*	*same*	*905*	*46.9*	*capacity calc from Option 2*		
Midland Road Left	D	28	469		519	90.4			
Midland - Judd(30%)			**141**						

4.3.1 **Judd Street two-way, with a staggered crossing over Euston Road (eastern arm)**

FIGURE 4.2 :MIDLAND ROAD OPTION 2 STAGING DIAGRAM

Stage 1	A+B+ E	E - queue behind P2	Midland Rd
Stage 2	C		P1+P2 + Judd
Stage 3	D+J+E	J- Judd Street (left)	P1
	staggered ped crossing over Euston Road: P1 southern half, P2 northern half		

Link Name	Phase	Ttl Green (Sec)	Flow (pcus)	Max Flow (pcuh)	Capacity (pcu)	Deg Sat (%)	Ttl Dly (pcu/s)	Ttl Dly (pcu/h)	Queue (pcu)
Euston RoadE Ahead Lef	B	29	458	1839	627	73.1	33.7	4.3	8
Euston Road E Ahead	B	29	1053	4110	1401	75.2	30.1	8.8	17.4
Euston Road W Right	A	27	101	1879	100	100.5	210.7	5.9	6.8
Euston Road W Ahead	A	27	1458	4110	1308	111.5	148.1	60	72.4
Euston Road W Ahead	A	27	500	1915	609	82.1	41.2	5.7	10
Midland Road Right	C	26	1260	3762	1154	109.2	131.6	46	56.9
Midland Road Left Aheac	D	15	747	3658	665	112.3	170.7	35.4	43
Midland - Judd (25%)			**187**						

CCC version of table 4.3 showing effects of reduced flow on signal stages

Proportion of original flow in Midland Road 0.6 can insert other figure
Proportion of time allowed in Stages 2,3 0.75 0.95 can insert other figures
Spare time gained is added to Stage 1 (A and B) 7 seconds (derived)
Assumptions: capacity is proportional to time provided in Ttl Green
saturation = flow/capacity as percentage

Link Name	Phase	Ttl Green (Sec)	Flow (pcus)	Max Flow (pcuh)	Capacity (pcu)	Deg Sat (%)	Ttl Dly (pcu/s)	Ttl Dly (pcu/h)	Queue (pcu)
Euston RoadE Ahead Lef	B	36	458		778	58.8			
Euston Road E Ahead	B	36	1053		1739	60.5			
Euston Road W Right	A	34	101		126	80.2			
Euston Road W Ahead	A	34	1458		1647	88.5			
Euston Road W Ahead	A	34	500		767	65.2			
Midland Road Right	C	20	756		888	85.2			
Midland Road Left Aheac	D	14	560		621	90.3			
Midland - Judd(25%)			**140**						

TABLE 4.4 : Midland Road option 2 PM LINSIG result table (including KXC flows)

Link Name	Phase	Ttl Green (Sec)	Flow (pcus)	Max Flow (pcuh)	Capacity (pcu)	Deg Sat (%)	Ttl Dly (pcu/s)	Ttl Dly (pcu/h)	Queue (pcu)
Euston RoadE Ahead Lef	B	34	360	1839	670	53.7	27.8	2.8	6.2
Euston Road E Ahead	B	34	848	4110	1498	56.6	26.6	6.3	14.6
Euston Road W Right	A	32	55	1879	148	37.2	31.5	0.5	1
Euston Road W Ahead	A	32	1444	4110	1413	102.2	84.7	34	46.8
Euston Road W Ahead	A	32	707	1915	658	107.4	131.8	25.9	32.2
Midland Road Right	C	20	883	3762	823	107.3	131.2	32.2	41.5
Midland Road Left Aheac	D	24	991	3658	953	104	106.2	29.2	39.1
Midland - Judd(25%)			**248**						

CCC version of table 4.4 showing effects of reduced flow on signal stages

Proportion of time in Stage 2 0.8 Stage 3 0.8
Spare time gained is added to Stage 1 (A and B) 9 seconds (derived)

Link Name	Phase	Ttl Green (Sec)	Flow (pcus)	Max Flow (pcuh)	Capacity (pcu)	Deg Sat (%)	Ttl Dly (pcu/s)	Ttl Dly (pcu/h)	Queue (pcu)
Euston RoadE Ahead Lef	B	43	360		847	42.5			
Euston Road E Ahead	B	43	848		1895	44.8			
Euston Road W Right	A	41	55		190	29.0			
Euston Road W Ahead	A	41	1444		1810	79.8			
Euston Road W Ahead	A	41	707		843	83.9			
Midland Road Right	C	16	530		658	80.5			
Midland Road Left Aheac	D	19	595		754	78.8			
Midland - Judd(25%)			**149**						