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Project:	<b>Olympia Park - Cross Hills Farm, Selby</b>	Job No:	<b>60149197</b>
Subject:	<b>Swingbridge Junction Assessment</b>	Date:	<b>20 September 2010</b>

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**Introduction**

This note has been prepared following a meeting with Selby District Council and North Yorkshire County Council (NYCC) on Tuesday 14 September 2010.

At the meeting the improvements to the A63 "Swingbridge" junction were discussed (dwg 60149197-P-002) and NYCC considered that the widening to 3 lanes on Water Hill Lane, was not something that they could support, although they appreciated that it had been proposed in order to try and achieve "nil detriment" at the junction with the addition of the development traffic.

NYCC suggested that, in this instance and without prejudice, (given the specific circumstances regarding the junction and the location of two of the development sites adjacent to the Selby By-pass), they would be able to accept an improvement scheme that did not necessarily achieve "nil detriment". However, the impact of any traffic diverting away from this junction would have to be fully understood, investigated and assessed with further mitigation works proposed elsewhere to accommodate the relocated traffic if necessary.

It was therefore agreed with both Selby DC and NYCC that the analysis of the development traffic would be undertaken in two stages, with stage 1 agreeing the level of improvement that can be achieved at the junction and the extent to which the development trips could be accommodated, with a deadline of late October for agreement of the works. Further work would then be undertaken to establish the extent of any trips diverting away from the junction and the impact that this would have upon other junctions on the highway network, with this work being undertaken and agreed in late 2010 / early 2011.

This note will therefore set out the methodology adopted to determine the level of capacity that can be achieved at the junction and the number of development trips that can be accepted and the extent to which any diversion of trips away from the junction is required, and as part of this an improvement scheme will be produced which will enable Selby DC to report as part of the Core Strategy that a solution at the Swingbridge junction has been agreed with NYCC, and this approach and methodology has been agreed with NYCC.

**Traffic Data**

As part of the work undertaken for the preparation of the Swingbridge Junction Study Report dated July 2010 AECOM undertook new traffic counts at the Swingbridge junction in May 2010 and growthed these to the LDF design year of 2026. The TRICS database was then interrogated in order to determine the likely development traffic generation and census data was used to determine a likely trip distribution.

AECOM undertook these studies independently of the work included within the two Jacobs report as it was initially considered that the development mix and final numbers of dwellings may vary from that assumed by Jacobs and therefore an assessment independent of the work done by NYCC should be commissioned. However, following a more detailed review of the development mixes on the site, it was ultimately decided to assess the same level of development as given within the Jacobs report, with 1000 dwellings on Site A, 800 dwellings on Site D and the G1 development mix being assumed.

Direct Tel: 0113 391 6212  
T +44 (0)113 391 6800  
F +44 (0)113 391 6899  
E [stephen.moss@aecom.com](mailto:stephen.moss@aecom.com)  
[www.aecom.com](http://www.aecom.com)

5th Floor  
2 City Walk  
Leeds  
LS11 9AR  
United Kingdom

However, it is now proposed to use the base traffic flows and development trip distributions given within the Jacobs report. This approach has been agreed as NYCC consider that some development trips are likely to divert, and this may require a new analysis of the Selby VISUM model to determine the level of additional traffic at other points on the network. Therefore, in order to provide a consistent set of base and development traffic data the flows taken from the Selby VISUM model, as supplied by Jacobs and agreed with NYCC will be used within this Note.

Within the Jacobs report, the following assumptions have been made for each of the three sites under consideration within this Note.

Site	Land Use	GFA (m <sup>2</sup> )
Site A	Privately Owned Houses	1000 dwellings
Site D	Privately Owned Houses	800 dwellings
Site G1	Office	25,000 sq.m
	Industrial	75,000 sq.m
	Warehouse	75,000 sq.m
	Public House	1,278 sq.m
	Hotel	9,565 sq.m
	Leisure Centre	9,627 sq.m
	Car Showroom	4,530 sq.m

The assessments given within this Note will use the following traffic flows at the Swingbridge junction, as taken from the Selby VISUM model Report, and this approach has been agreed with NYCC.

- 2008 Base
- 2026 Base, and
- 2026 Base plus Site A, Site D and Site G1

And these can be given as follows for ease of reference:

**2008 Base**

	A	B	C	D	Tot
A		524	80	76	680
B	302		52	170	524
C	27	46		85	158
D	51	173	52		276
Tot	380	743	184	331	1638

Where,

- A New Street
- B Barlby Road (Swingbridge)
- C Ousegate
- D Water Hill Lane

**2026 Base**

	A	B	C	D	Tot
A	0	598	90	83	771
B	319	0	164	233	716
C	1	76	0	102	179
D	42	203	68	0	313
Tot	362	877	322	418	1979

Where,

- A New Street
- B Barlby Road (Swingbridge)
- C Ousegate
- D Water Hill Lane

Direct Tel: 0113 391 6212  
 T +44 (0)113 391 6800  
 F +44 (0)113 391 6899  
 E stephen.moss@aecom.com  
 www.aecom.com

5th Floor  
 2 City Walk  
 Leeds  
 LS11 9AR  
 United Kingdom

**2026 Base plus Site A, Site D and Site G1**

	A	B	C	D	Tot
A	0	437	10	43	490
B	294	0	128	416	838
C	15	148	0	120	283
D	40	366	95	0	501
Tot	349	951	233	579	2112

Where,

A	New Street
B	Barlby Road (Swingbridge)
C	Ousegate
D	Water Hill Lane

Therefore, comparing the 2026 Base and 2026 Base plus Site A, Site D and Site G1, the changes in traffic at the junction as result of all the development trips can be given as follows:

**Changes in traffic flow with the addition of 100% of the Site A, D and G1 development traffic**

	A	B	C	D	Tot
A	0	-161	-80	-40	-281
B	-25	0	-36	183	122
C	14	72	0	18	104
D	-2	163	27	0	188
Tot	-13	74	-89	161	133

Where,

A	New Street
B	Barlby Road (Swingbridge)
C	Ousegate
D	Water Hill Lane

The above flows have then been used to establish what percentage of the change in traffic flows can be accommodated whilst still achieving a “nil detriment” compared to the 2026 Base.

Firstly, an assessment of the junction using the 2008 and 2026 Base traffic flows at the junction has been undertaken in order to establish the existing and predicted operation in the “Do Nothing” base scenario, and the results can be given as follows.

The junction has been modelled using LINSIG v3 and has been based upon traffic signal data provided by North Yorkshire County Council.

For the assessment of traffic signals an approach is considered to be operating within capacity where it has a degree of saturation below 90%, with a degree of saturation between 90 and 100% indicating that it is approaching capacity, and a degree of saturation above 100% indicating that the approach is operating above capacity. The cycle time is the measure of time required for all required movements to receive at least one period of green time. The Practical Reserve Capacity (PRC) is an indication of the percentage of additional traffic that the junction as a whole could accommodate whilst still operating within capacity, with a positive value indicating that the junction could accept more traffic with a negative value indicating that the junction already operates over capacity. The Total Delay being the total delay experienced by all vehicles using the junction during the modelled period.

**2008 Base – Existing Junction layout – LINSIG Assessment**

The results for the 2008 assessment are attached but can be summarised as follows.

Approach Link	2008 Base – Existing Junction layout	
	Degree of Saturation (%)	Mean Max Queue
A63 Barlby Road – Swing bridge	88.9%	19
Water Hill Lane Ahead and Left	63.6%	8
Water Hill Lane Right	18.0%	2
A63 New Street	65.8%	14
Ousegate	88.1%	8
Cycle time (seconds)	120s	
Overall Junction Practical Reserve Capacity (%)	+1.2%	
Total Delay (pcu/Hr)	18.86	

From the above table it can be seen that using the 2008 base traffic levels the existing junction is predicted to operate within capacity, assuming a two stage operation with no calling of the pedestrian stage, and this is consistent with the work undertaken by Jacobs.

**2026 Base – Existing Junction layout – LINSIG Assessment**

The results for the 2026 assessment are attached but can be summarised as follows, and this then provides the predicted junction operation in the “do nothing” scenario at the LDF design year of 2026.

Approach Link	2026 Base – Existing Junction layout	
	Degree of Saturation (%)	Mean Max Queue
A63 Barlby Road – Swing bridge	129.5%	94
Water Hill Lane Ahead and Left	96.5%	10
Water Hill Lane Right	14.8%	1
A63 New Street	88.1%	12
Ousegate	111.9%	16
Cycle time (seconds)	45s	
Overall Junction Practical Reserve Capacity (%)	-43.9%	
Total Delay (pcu/Hr)	116.60	

As can be seen from the above table by 2026 the existing junction is predicted to operate over capacity with the A63 Barlby Road and Ousegate approaches having a degree of saturation of over 100% and Water Hill Lane, ahead and left operating at just over 90%.

The full development traffic associated with Sites A, D and G1 have then been added to the existing junction in order to provide an analysis of the junction with no mitigation works and all development traffic.

Direct Tel: 0113 391 6212  
 T +44 (0)113 391 6800  
 F +44 (0)113 391 6899  
 E stephen.moss@aecom.com  
 www.aecom.com

5th Floor  
 2 City Walk  
 Leeds  
 LS11 9AR  
 United Kingdom

### 2026 Base plus Site A, Site D and Site G1 – Existing Junction layout – LINSIG Assessment

The results for the 2026 assessment with all the development traffic associated with sites A, D and G1 added to the existing junction layout is attached but can be summarised as follows.

Approach Link	2026 Base plus Site A, Site D and Site G1 – Existing Junction layout	
	Degree of Saturation (%)	Mean Max Queue
A63 Barlby Road – Swing bridge	171.8%	192
Water Hill Lane Ahead and Left	162.1%	99
Water Hill Lane Right	13.8%	1
A63 New Street	54.4%	5
Ousegate	172.9%	67
Cycle time (seconds)	44s	
Overall Junction Practical Reserve Capacity (%)	-92.2%	
Total Delay (pcu/Hr)	350.57	

With reference to the above table, and as would be expected, with the addition of the development traffic the junction is predicted to operate further over capacity with A63 Barlby Road, Ousegate and Water Hill Lane, ahead and left all operating with a degree of saturation over 100% with queue lengths of 192 and 67 being predicted for the A63 Barlby Road and Ousegate.

### Proposed Mitigation

As would be expected, with all the development trips associated with Sites A, D and G1 the existing junction is predicted to operate over capacity and therefore a scheme of mitigation has been proposed, as shown on **drawing 60149197-P-002 Revision B**, which includes the following:

- A right turn pocket of 3m in width to allow 2 vehicles turning right from the A63 Barlby Road into Water Hill Lane to wait without blocking vehicles wishing to travel ahead or turn left.
- A right turn pocket of 3m in width to allow 1 vehicle turning right from the A63 New Street into Ousegate to wait without blocking vehicles wishing to travel ahead or turn left.
- An improved radius of 12m from Water Hill Lane onto the A63 Barlby Road
- The approach from Ousegate widened on the immediate approach to the stopline to allow room for 1 vehicle turning right into the A63 Barlby Road to wait without blocking traffic travelling ahead or turning left.
- Pedestrian crossing facilities across the A63 Barlby Road and Ousegate approaches, although a full 2m footway has not been shown on the frontage of the former PFS at the corner of Ousegate and the A63 Barlby Road due to land ownership constraints, however a 1m footway has been shown to match the existing provision, as shown on the photograph below.

Direct Tel: 0113 391 6212  
 T +44 (0)113 391 6800  
 F +44 (0)113 391 6899  
 E stephen.moss@aecom.com  
 www.aecom.com

5th Floor  
 2 City Walk  
 Leeds  
 LS11 9AR  
 United Kingdom

Photograph 1 – existing footway provision on PFS Frontage



### 2026 Base plus Site A, Site D and Site G1 – Proposed Junction layout – LINSIG Assessment

The results for the 2026 assessment with all the development traffic associated with sites A, D and G1 added to the proposed junction layout, as shown on **drawing 60149197-P-002 Revision B**, is attached but can be summarised as follows, with the 2026 Base, existing layout, results also provided for ease of comparison.

Approach Link	2026 Base plus Site A, Site D and Site G1 – Proposed Junction layout		2026 Base – Existing Junction layout	
	Degree of Saturation (%)	Mean Max Queue	Degree of Saturation (%)	Mean Max Queue
A63 Barlby Road – Swing bridge	124.4%	118	129.5%	94
Water Hill Lane Ahead and Left	76.6%	15	96.5%	10
Water Hill Lane Right	8.9%	1	14.8%	1
A63 New Street	51.4%	11	88.1%	12
Ousegate	119.8%	38	111.9%	16
Cycle time (seconds)	119s		45s	
Overall Junction Practical Reserve Capacity (%)	-38.3%		-43.9%	
Total Delay (pcu/Hr)	144.15		116.60	

From the above table it can be seen that with the addition of all the Site A, D and G1 development traffic that the proposed junction is still proposed to operate over capacity with an overall Practical Reserve Capacity (PRC) of -38.3% at a cycletime of 119 seconds. In addition compared to the 2026 base scenario there is an increase in predicted queue length on both the A63 Barlby Road and Ousegate approaches, although the degrees of saturation on the Water Hill Lane and A63 New Street approaches has reduced.

Although the overall PRC has reduced with the improvement scheme compared to the 2026 base, existing layout, the queue length on Barlby Road has increased by 24 pcus and the overall delay at the junction is also predicted to increase. It should also be noted that as a result of the addition of the development traffic the optimum cycletime has increased from 45 seconds in the base scenario to 119 seconds in the base plus development scenario.

Direct Tel: 0113 391 6212  
 T +44 (0)113 391 6800  
 F +44 (0)113 391 6899  
 E stephen.moss@aecom.com  
 www.aecom.com

5th Floor  
 2 City Walk  
 Leeds  
 LS11 9AR  
 United Kingdom

It is therefore considered that the proposed mitigation scheme would not provide a “nil detriment” for 100% of the development compared to the 2026 base scenario and that a further analysis is required to ascertain the percentage of development trips that could be accommodated.

As mentioned above we have then undertaken an assessment of the junction at 2026 using a percentage of the change in traffic flows as a result of the addition of the Site A, Site D and Site G1 development traffic, and consider that 75% can be accommodated whilst still achieving a “nil detriment” compared to the 2026 “do nothing” base.

The development flows associated with 75% of the development can be given as follows.

**Changes in traffic flow with the addition of 75% of the Site A, D and G1 development traffic**

	A	B	C	D	Tot
A	0	-121	-60	-30	-211
B	-19	0	-27	137	92
C	11	54	0	14	78
D	-2	122	20	0	141
Tot	-10	56	-67	121	100

Where,

- A New Street
- B Barby Road (Swingbridge)
- C Ousegate
- D Water Hill Lane

**2026 Base plus 75% Site A, Site D and Site G1 – Proposed Junction layout - LINSIG Assessment**

The results for the 2026 assessment with 75% of the development traffic associated with sites A, D and G1 are attached but can be summarised as follows, with the 2026 Base, existing layout, results also provided for ease of comparison

Approach Link	2026 Base plus 75% Site A, Site D and Site G1 – Proposed Junction layout		2026 Base – Existing Junction layout	
	Degree of Saturation (%)	Mean Max Queue	Degree of Saturation (%)	Mean Max Queue
A63 Barby Road – Swing bridge	116.3%	91	129.5%	94
Water Hill Lane Ahead and Left	74.4%	14	96.5%	10
Water Hill Lane Right	10.1%	1	14.8%	1
A63 New Street	56.0%	13	88.1%	12
Ousegate	116.1%	32	111.9%	16
Cycle time (seconds)	120s		45s	
Overall Junction Practical Reserve Capacity (%)	-29.2%		-43.9%	
Total Delay (pcu/Hr)	109.77		116.60	

From the above table it can be seen that with the addition of 75% of the change in development traffic the predicted queues on the A63 Barby Road approach and the degree of saturation on the Ousegate approach are similar to the 2026 base scenario, with the Water Hill Lane and A63 New Street approaches all operating with improved degrees of saturation, albeit at a longer cycletime. In addition, the overall junction PRC is increased from -43.9% in the 2026 base, existing layout, to -29.2% with the improvement scheme, with the Total delay reduced from 116.60 to 109.77 (pcu/Hr). Also, as before the optimum cycletime is increased to 120 seconds in this scenario compared to 45 seconds in the base only assessment.

Direct Tel: 0113 391 6212  
 T +44 (0)113 391 6800  
 F +44 (0)113 391 6899  
 E stephen.moss@aecom.com  
 www.aecom.com

5th Floor  
 2 City Walk  
 Leeds  
 LS11 9AR  
 United Kingdom

It is therefore considered that the proposed junction improvement scheme can accommodate 75% of the change in development traffic whilst still maintaining a similar level of operation to the 2026 base, do nothing, scenario.

### Redistribution of Development Trips

Therefore, as 75% of the development flows have been accommodated at the junction, the remaining 25% will need to be redistributed and this equates to the following number of trips through the junction.

#### Changes in traffic flow to be redistributed

	A	B	C	D	Tot
A	0	-40	-20	-10	-70
B	-6	0	-9	46	31
C	4	18	0	5	26
D	-1	41	7	0	47
Tot	-3	19	-22	40	33

Where,

A	New Street
B	Barlby Road (Swingbridge)
C	Ousegate
D	Water Hill Lane

As discussed at the meeting the above trips will need to be redistributed onto the wider highway network and this will require further discussion and agreement with NYCC as to the most appropriate methodology for achieving this.

### Summary

This note has been prepared to assess the Swingbridge junction within Selby based upon the existing layout of the junction and the layout with a proposed improvement scheme at the LDF design year of 2026.

The aim of the report being to allow Selby DC to report as part of the Core Strategy that an improvement scheme at the junction has been agreed with NYCC that will support the aspirations of the Local Development Framework.

The existing junction is predicted to operate with capacity problems at 2026 with only normal growth in background traffic levels, and as would be expected when the development traffic is added the junction is predicted to operate over capacity with increased queuing on the A63 Barlby Road, Water Hill Lane and Ousegate approaches.

An improvement scheme has therefore been proposed which will allow right turning vehicles from the A63 in both directions and from Ousegate to wait without blocking traffic wishing to travel ahead.

The development traffic has then been assessed using the improved junction, and compared to the 2026 base situation at the existing junction layout some additional capacity problems are predicted. It is therefore considered that the proposed mitigation, whilst still providing an improvement compared to the existing junction layout, does not provide a nil detriment compared to the 2026 "do nothing" base scenario.

From discussions with NYCC it has been accepted that any mitigation scheme may not fully mitigate for all development trips and that some redistribution of both base and development trips will occur. The note has therefore been prepared to establish what percentage of development trips can be mitigated and to then establish the extent of any trips that would potentially divert to other routes.

The proposed junction improvement has then been modelled with 75% of the development trips, and compared to the 2026 base "do nothing" scenario is considered to provide a "nil detriment" impact, with

Direct Tel: 0113 391 6212  
T +44 (0)113 391 6800  
F +44 (0)113 391 6899  
E [stephen.moss@aecom.com](mailto:stephen.moss@aecom.com)  
[www.aecom.com](http://www.aecom.com)

5th Floor  
2 City Walk  
Leeds  
LS11 9AR  
United Kingdom



similar or reduced degrees of saturation, an improved overall junction PRC and a reduced overall Total Delay for all vehicles.

It is therefore considered that the proposed mitigation scheme can accommodate 75% of the development trips associated with Site A, Site D and Site G1, with 25% of the trips assumed to divert onto other routes, as agreed in principle with NYCC.

The total change in vehicle trips at the junction with 100% of the development is 133 trips, and therefore as 75% can be accommodated this equates to a total change in vehicle flows of 100 being mitigated, with a total change of 33 needing to be redistributed.

It is therefore considered that Selby DC will be able to positively report, as part of the Core Strategy that a solution at the Swingbridge junction can be designed to accommodate 75% of the development traffic from Site A, Site D and Site G2.

The next step, following agreement of this note, is to establish the methodology for assessing the impact of any diverted trips and their impact upon the wider highway network, and as agreed this work can follow at a later date.

Direct Tel: 0113 391 6212  
T +44 (0)113 391 6800  
F +44 (0)113 391 6899  
E [stephen.moss@aecom.com](mailto:stephen.moss@aecom.com)  
[www.aecom.com](http://www.aecom.com)

5th Floor  
2 City Walk  
Leeds  
LS11 9AR  
United Kingdom