

**EVALUATION OF MITIGATION REQUIREMENTS FOR LEEDS SITE ALLOCATIONS PLAN DEVELOPMENT
IN THE EAST LEEDS AND GARFORTH AREA**

EXCLUDES BROAD LOCATIONS

28 JUNE 2018

1. INTRODUCTION

- 1.1. The revised Submission draft Leeds Site Allocations Plan (SAP) contains proposals for the delivery of 66,000 dwellings between 2012 and 2028¹. Just over half this total (35,374) are included in Identified sites, 24,751 in Allocated sites and 6,454 in Broad Allocations.
- 1.2. The two largest allocated housing sites are located adjacent to Garforth:
 - MX2-39 Parlington Estate, Aberford – Outer NE HMCA – 792 dwellings and 5 Ha employment
 - HG2-124 Stourton Grange Farm South, Selby Road - Ridge Road, Garforth – Outer SE HMCA – 1,089 dwellings (referred to as the East of Garforth site throughout the rest of this report)
- 1.3. These two sites will generate significant volumes of traffic that is likely to add considerably to congestion on the local and strategic road network.
- 1.4. In addition, a number of smaller sites are also located within the communities of Garforth and Kippax as well as major developments at Thorpe Park and East Leeds Extension.
- 1.5. This report documents the results of a local transport modelling exercise that has been undertaken to evaluate the potential impacts of the SAP in the Garforth and east Leeds area. It includes a consideration of the impact of mitigation schemes at M1 junction 47 and on the A63 at Garforth.
- 1.6. This work has been undertaken using a local highway transport model funded jointly by Leeds City council, Highways England and the promoters of the Parlington and Stourton Grange Farm sites. The model tests have been undertaken by Leeds City Council.

2. GARFORTH AND EAST LEEDS MODEL

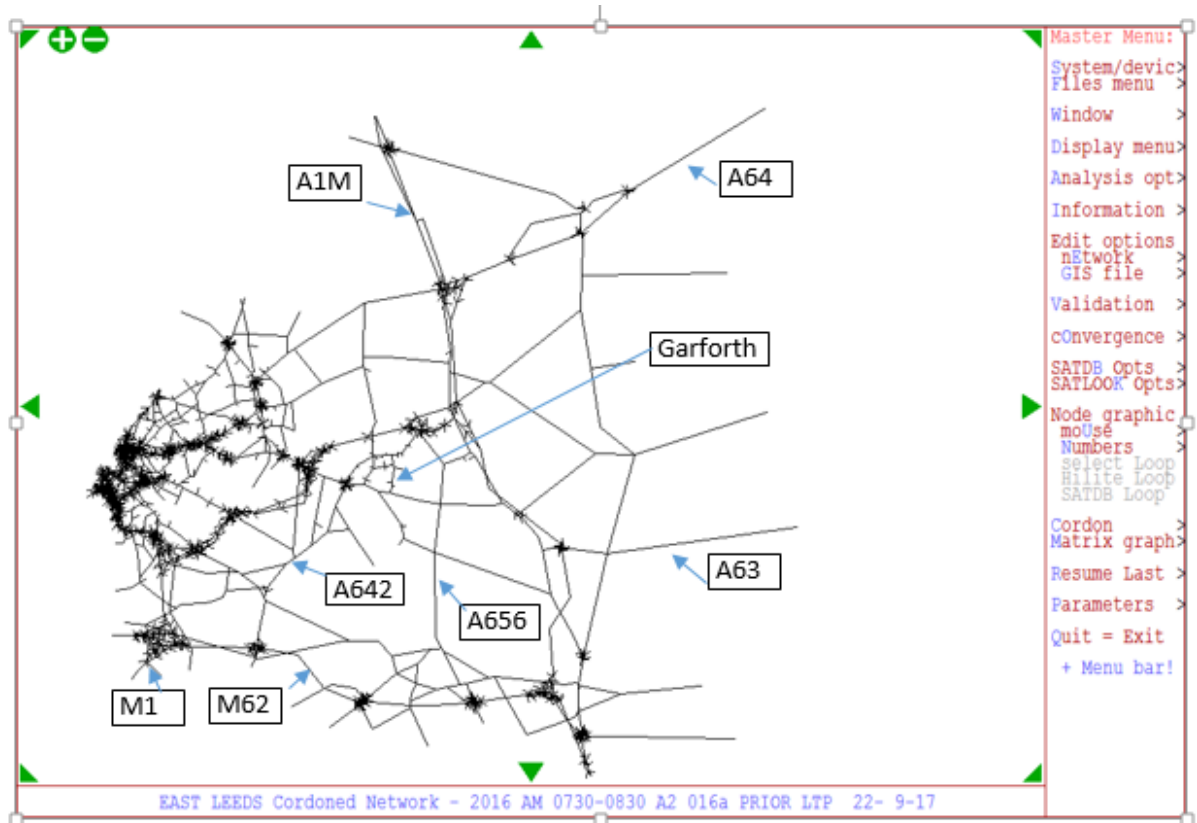
- 2.1. In order to assess the impacts of the SAP a local traffic model was developed to cover the area of interest. The coverage of the model is shown in Figure 1 below. The model was principally based on the existing Leeds Transport Model (LTM) supplemented by additional survey data and a refined zoning system.
- 2.2. Comprehensive traffic surveys were undertaken in the spring of 2017 covering all the key roads around Garforth. These comprised automatic traffic counts (ATC) and manual classified junction counts (MCC). The former were undertaken for a period of 2 weeks in late March to provide a robust measure of average traffic levels, while the MCC were carried out on a single weekday from 0700-1900. ANPR surveys were carried out on the A63 and A642 at Garforth to determine the levels of through traffic. See Figure 2.
- 2.3. All the data was collected at 15 minute intervals to allow an assessment of the peak periods and ensure that the resulting model reflected the local morning and evening peak hours. Following an assessment of the ATC data it was determined that these were 0730-0830 and 1645-1745.
- 2.4. In addition, these surveys were supplemented by other survey data collected principally in 2015 for the most recent update of the LTM, and the latest weekday journey time data

¹ Leeds SAP Table 1

collected by TrafficMaster and provided by the DfT to local authorities. This data covered the academic year 2015-16 excluding school and bank holidays.

2.5. In order to provide a consistent survey database for the development of the model all the traffic counts were factored to a common 2016 baseline. Throughout the report the base situation referred to is for 2016.

Figure 1 – Garforth and East Leeds Model Coverage



2.6. The resulting traffic model was calibrated and validated to ensure that it replicated the observed traffic levels and journey times. This is reported in the Local Model Validation Report.

2.7. In order to forecast the impacts of the SAP, future year trip matrices were created based on the sites contained in the site allocations plan and trip rates previously used by Leeds City Council in the consideration of the wider plan. These are shown in Table 1. External traffic movements were grown in line with the DfT NTEM 7.2 (Tempo) database.

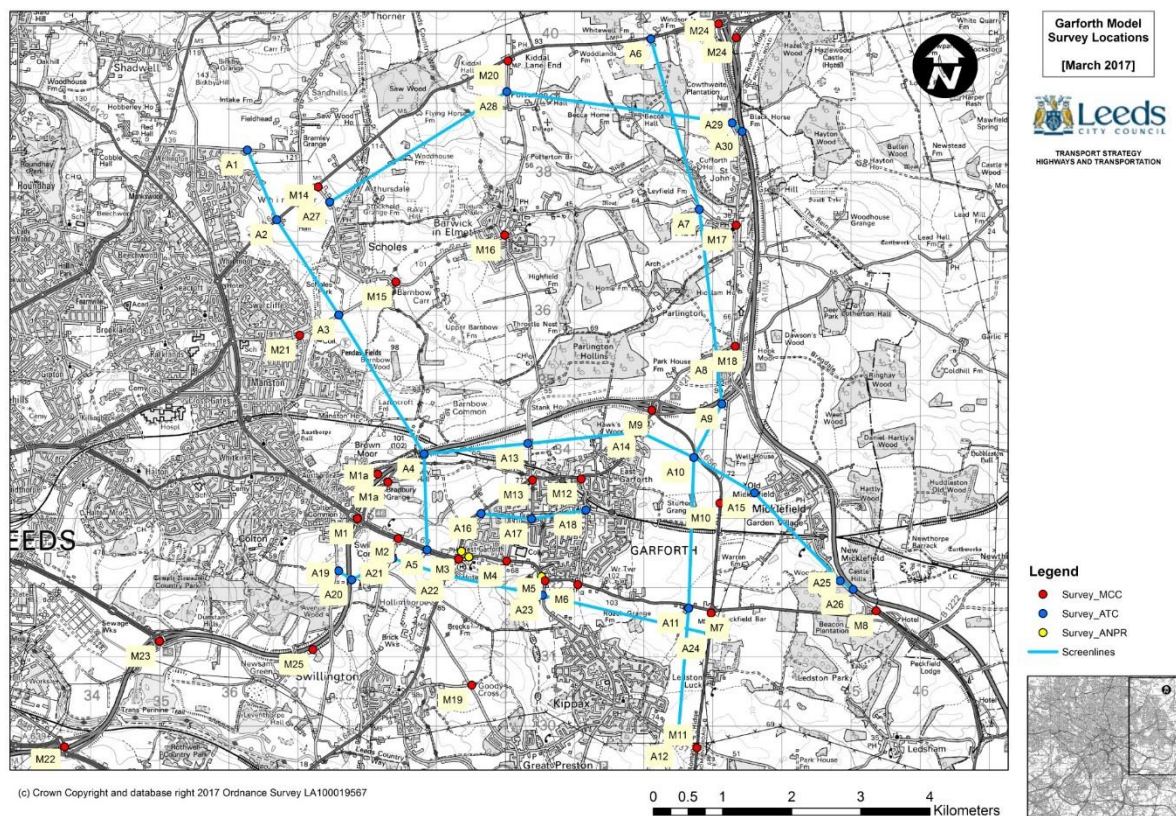
Table 1 – Development Trip Rates (vehs)

Use Type	Location	AM (08:00 to 09:00)			PM (17:00 to 18:00)		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Housing & flats	Not city centre	0.138	0.413	0.551	0.378	0.214	0.592
Housing (flats)	City centre	0.054	0.165	0.219	0.125	0.070	0.195
B1 office	Not city centre	1.716	0.305	2.021	0.209	1.420	1.629
	City centre	1.513	0.248	1.761	0.237	1.336	1.573
General employment*	All	0.208	0.097	0.305	0.059	0.185	0.244

Note: Rate per dwelling for residential, rate per 100sqm GFA for employment

2.8. To ensure that the local peak hours were reflected in the forecasts, the trip rates were applied without any adjustment.

Figure 2 – Data collection March 2017



2.9. For the majority of development sites in the model the existing trip distribution from the relevant model zones was assumed to apply to future development. However, given that the Parlington and Stourton Grange Farm sites are in green field locations an alternative approach was adopted that utilised trip distributions from a number of adjacent communities.

2.10. In the case of Parlington, this was based on model zones covering Barwick in Elmet, Aberford, Micklefield and Garforth. For Stourton Grange Farm the source zones were Micklefield, Garforth and Kippax.

2.11. Due to the reduced amount of houses proposed in the revised Site Allocations Plan only one horizon year was modelled and that was for 2028, when it was assumed all the proposed houses at the two sites would have been completed. Full details of the forecasts are contained in the Model Forecasting Report.

3. MODELLED TRAFFIC IMPACTS

3.1. All the model tests runs described below are for 2028.

3.2. The future year model forecasts included an assumption that a number of transport schemes will have been completed (current status listed in brackets):

- M1 Junction 45 improvement (under construction)
- East Leeds Orbital Road/Manston Lane Link Road/M1 Junction 46 (ELOR scheme under development, MLLR under construction)
- Temple Green Park and Ride (completed, open July 2017)
- A63 Selby Rd/B6137 Leeds Rd junction improvement (scheme associated with housing development in Kippax)
- A642 Lidl development and associated junctions, Garforth (completed March 2018)

3.3. The ELOR scheme was included on the grounds that it facilitates much of the development in East Leeds Extension. Limited improvements to the southern roundabout junction between the A63 / A6120 and Motorway slip roads at M1 junction 46 associated with the ELOR scheme have also been included. The Leeds Rd junction improvement is associated with the Sandgate Dr, Kippax housing development (HG3-19). No other interventions were included.

3.4. These tests are referred to thereafter as Do Minimum (DM) tests. Appendix 1 includes scheme plans where available for the Do Minimum and Do Something schemes.

Do Minimum impacts

3.5. The DM model tests for 2028 indicate that without mitigation traffic growth in absolute terms will be focused on M1 junction 47 and the M1 between J46 and 47 in both directions. Traffic also grows on the A63 through Garforth and the minor road network around Barwick-in-Elmet and Scholes is also forecast to experience large percentage increases in traffic. Significant increases in two way flow of between 600 and 800 vehicles per hour are forecast in the morning and evening peak hours. Flows in Aberford increase by a smaller absolute amount of around 300 vehicles in the morning peak and 450 vehicles in the evening peak.

3.6. Notwithstanding the reduced number of houses, the two large housing sites still generate a significant volume of trips out from the sites in the morning peak and into the sites in the evening peak.

3.7. Traffic flow changes on key links are illustrated in Table 1, highlighting the more significant changes from the modelled base 2016 situation.

3.8. The biggest absolute changes in flow are experienced on the M1 westbound in the AM peak (+1253 vehicles which is +26%). Flows on the B1217 between the Parlington site access and M1 junction 47 also increase significantly in the AM peak. In the eastbound direction the flow increases by a much lower amount in the PM peak. This suggests that traffic uses alternative routes away from the M1 to return to the Parlington site and other destinations served by the B1217 reflecting capacity issues affecting the EB off slip at junction 47.

- 3.9. In percentage terms the minor road network around Aberford and Barwick in Elmet is forecast to experience by far the biggest increases in traffic flow, with a number of links forecast to more than double or treble the level of traffic. Flows on Cattle Lane are forecast to rise by over 150% westbound in the morning peak and by over 350% eastbound in the evening peak. It should be noted that the base year flows are low on these links even at peak hours. For example a 2 way flow of 250pcus in the AM peak is modelled for Cattle Lane in 2016. As noted previously flows through Aberford are forecast to increase in the peak direction of travel (towards Leeds in the AM peak and away from Leeds in the PM peak)
- 3.10. Significant increases in traffic of over 50% are also forecast for the A642 and A656 around Garforth particularly in the vicinity of M1 junction 47. This is very similar to the situation with the larger amount of housing assessed previously.

Table 1 : Changes in traffic flow on key links between the base year (2016) and the forecast year (2028) in the Do Minimum situation without any mitigation for the 2 large sites

Key link	Dirn	Base conditions 2016		Do minimum 2028		Change from 2016		%age Change from 2016	
		Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour
		Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow
Scenario 1b									
A63 east of Garforth	WB	668	611	811	507	143	-104	21%	-17%
A63 east of Garforth	EB	495	578	457	725	-39	147	-8%	25%
A63 Garforth (E of Lidgett La)	WB	1139	775	1270	717	131	-58	12%	-8%
A63 Garforth (E of Lidgett La)	EB	581	1029	506	1118	-75	89	-13%	9%
A63 west of Garforth	WB	1807	935	2124	791	317	-143	18%	-15%
A63 west of Garforth	EB	1035	1723	916	1900	-118	178	-11%	10%
A656 south of Jn 47	NB	846	354	891	827	45	473	5%	134%
A656 south of Jn 47	SB	371	843	733	1016	361	173	97%	21%
A656 south of A63	NB	579	458	698	654	119	195	21%	43%
A656 south of A63	SB	447	550	655	722	208	172	46%	31%
A642 south of Jn 47	NB	609	619	749	984	140	365	23%	59%
A642 south of Jn 47	SB	540	580	833	767	293	187	54%	32%
A642 south of A63	NB	548	431	834	744	287	313	52%	72%
A642 south of A63	SB	475	706	759	1141	285	436	60%	62%
B1217 north of Jn 47	WB	584	260	1078	476	494	216	85%	83%
B1217 north of Jn 47	EB	230	488	326	539	96	51	42%	10%
Main St Aberford	NB	289	251	617	254	328	2	113%	1%
Main St Aberford	SB	234	238	238	684	4	447	2%	188%
Cattle La	WB	143	124	379	132	237	8	166%	6%
Cattle La	EB	115	117	185	532	70	415	61%	355%
Long La south of Barwick	NB	250	249	291	163	42	-86	17%	-35%
Long La south of Barwick	SB	197	240	254	392	57	152	29%	64%
Leeds Rd west of Barwick	WB	429	292	754	258	325	-35	76%	-12%
Leeds Rd west of Barwick	EB	199	362	332	1001	134	639	67%	176%
Leeds Rd west of Scholes	WB	324	246	832	301	508	54	157%	22%
Leeds Rd west of Scholes	EB	145	296	345	1040	200	744	138%	251%
M1 Jn 47-48	WB	4106	3573	4707	3889	602	316	15%	9%
M1 Jn 47-48	EB	4021	3750	4024	4024	3	274	0%	7%
M1 Jn 46-47	WB	4835	3525	6088	4462	1253	937	26%	27%
M1 Jn 46-47	EB	3854	4380	4680	4747	826	367	21%	8%
M1 Jn 45-46	WB	5975	4482	6220	4931	245	449	4%	10%
M1 Jn 45-46	EB	4611	5449	5279	5349	669	-100	14%	-2%

Absolute changes of between +/- 100 and +/- 499 vehicles have been highlighted in orange. Changes that are greater than +/- 500 vehicles have been highlighted in red. Percentage changes between +/- 10% and +/- 50% are highlighted in orange. Percentage changes in excess of +/- 50% are highlighted in red.

- 3.11. Figures 1 and 2 indicate which links are used by traffic generated by the two developments in the morning peak in 2028. This shows that without any mitigation measures most traffic generated by the Parlington site routes through M1 junction 47 to access the M1 westbound in the AM peak. The minor road network through Aberford and Barwick in Elmet is used by a very small number of trips. The modelling predicts that the A63 through Garforth will experience an increase in westbound traffic in the AM peak. The most popular route for traffic from the East of Garforth site to access the M1 south is via the A63 through Garforth. The A63 is the preferred route for most traffic generated by developments on this corridor. A small proportion of traffic from the East of Garforth site is forecast to route via M1 junction 47, the M1 and junction 46 to access the Thorpe Park area.
- 3.12. Figures 3 and 4 indicate which links are used by traffic attracted by the two developments in the evening peak. This shows that without any mitigation measures most traffic destined for the Parlington site routes through M1 junction 47 to access the site in the PM peak. Again very little traffic uses the minor road network to access the Parlington site. The modelling predicts that the A63 through Garforth will experience an increase in eastbound traffic in the PM peak. As in the AM peak, the A63 through Garforth is the preferred route to the East of Garforth site.

Figure 1 : Do Minimum trips from the Parlington site in the AM peak (2028).

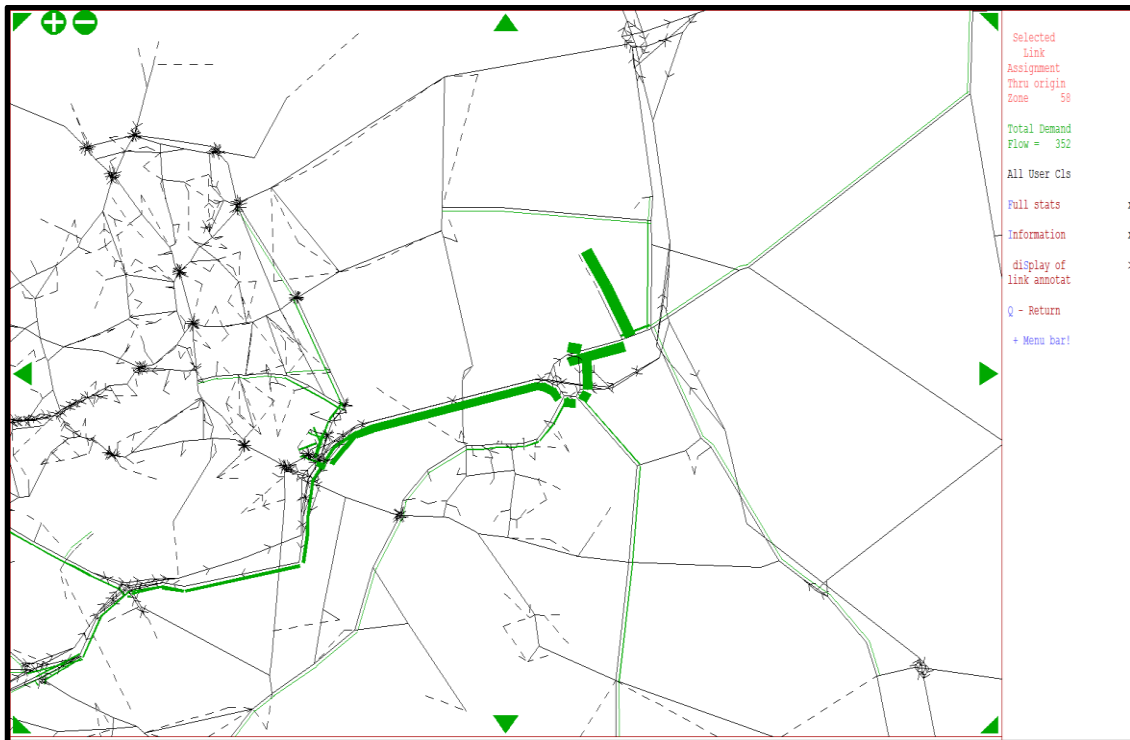


Figure 2 : Do Minimum trips from the East of Garforth Site in the AM peak (2028).

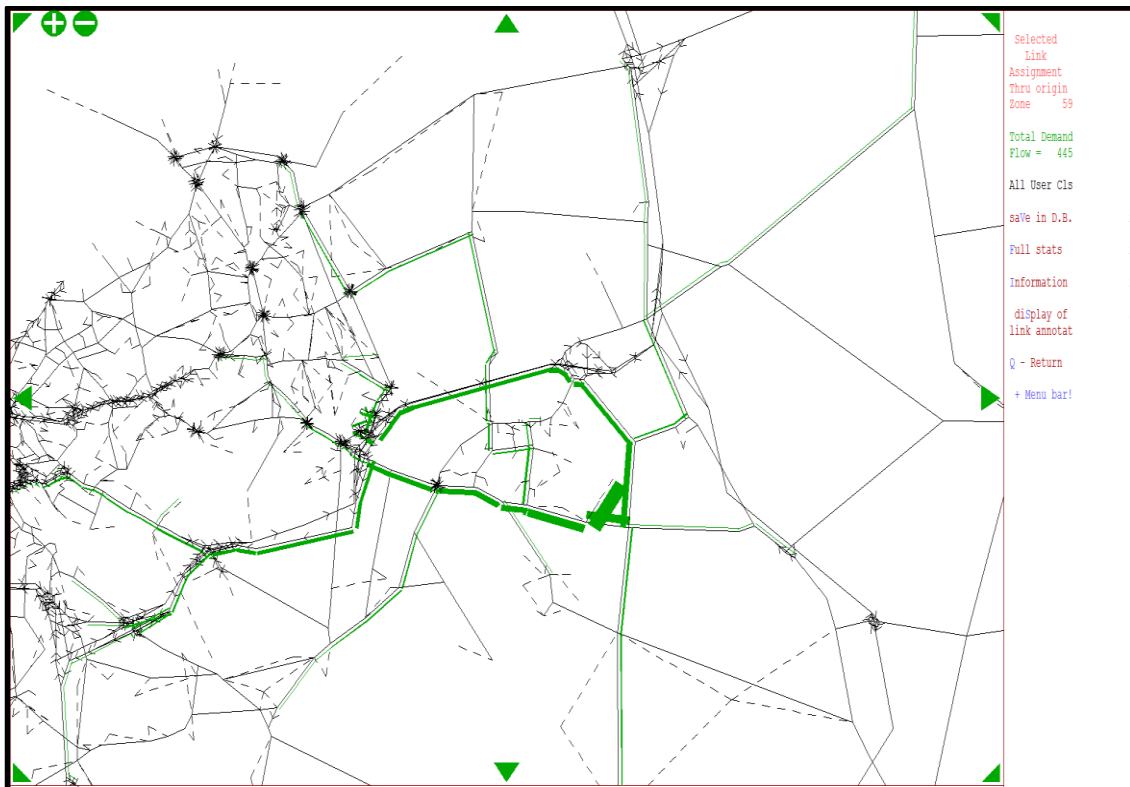


Figure 3 : Do Minimum trips to the Parlington site in the PM peak (2028).

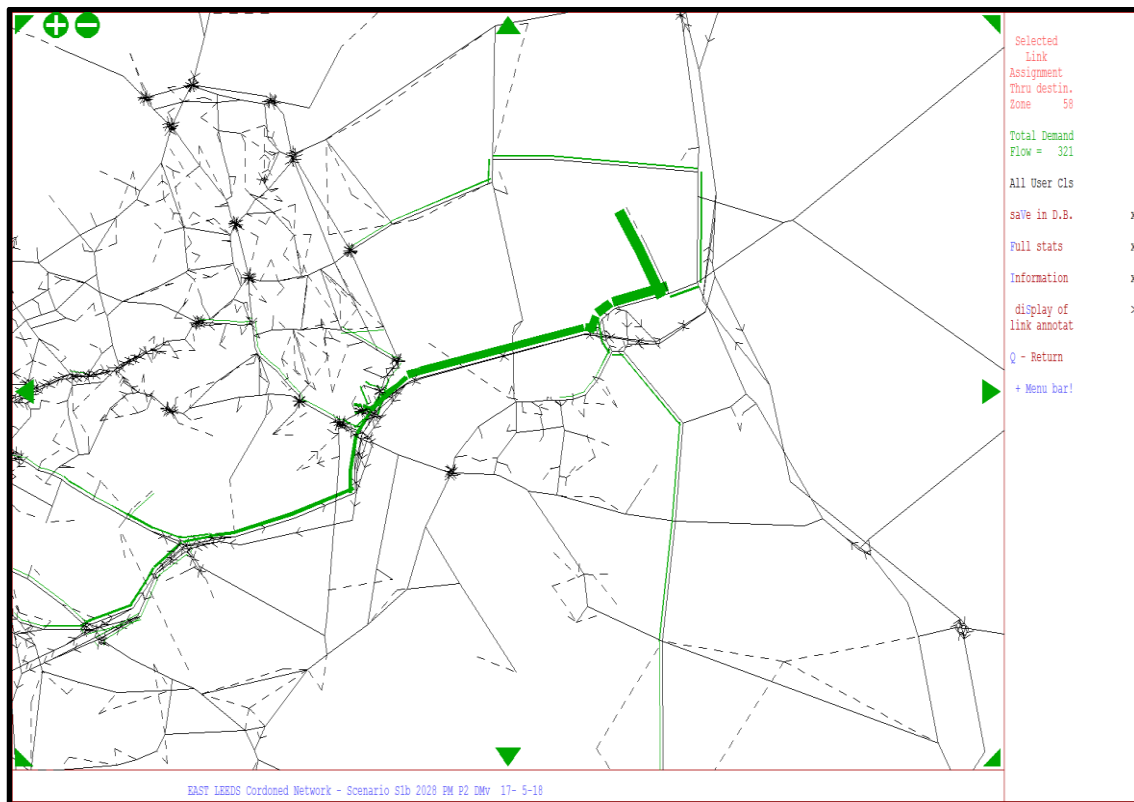
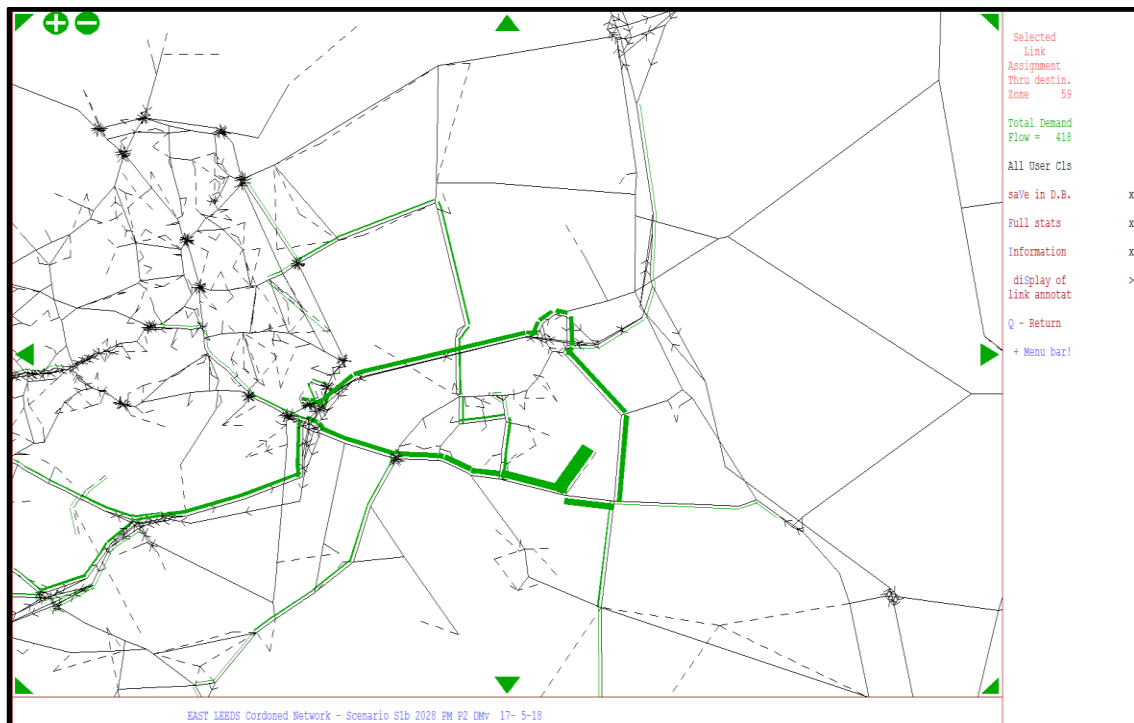


Figure 4 : Do Minimum trips to the East of Garforth Site in the PM peak (2028).



3.13. Tables 2 and 3 show the proportion of traffic generated by the two developments (away from the site in the AM and into the site in the PM) on key links in the without mitigation situation. It should be noted that trips can pass through more than 1 of the listed sites (for example some trips will route on the A656 and on the M1 between junctions 47 and 46), so

the figures in the table can't be aggregated to give a total distribution. The tables show that the proportion of trips using the M1 varies significantly between the two sites. Most of the traffic from Parlington in the morning and to Parlington in the evening uses the M1 between junction 46 and 47 (about two thirds in the morning and three quarters in the evening). A much lower proportion of trips from/ to the east of Garforth sites uses the M1 (between a quarter and a third of trips).

- 3.14. Without mitigation a small amount of traffic from / to Parlington uses minor roads in and around Aberford to avoid delays on the main road network, but most traffic uses the major road network. Just under 40% of traffic from / to the East of Garforth site passes through Garforth on the A63. Between 11 and 14% of traffic from/to both sites is forecast to use the East Leeds link road between M1 junction 45 and the City Centre.
- 3.15. The impact of the developments on key junctions in the Garforth area is illustrated in Tables 4 and 5, which compare traffic volumes and delays in the base year (2016) with the Do Minimum in 2028. Substantial increases in delay are forecast a number of key junctions in and around Garforth.
- 3.16. Two of the biggest increases in delay are forecast for the roundabout junction of the A63 and A642 to the south west of Garforth (the Old George), where increases of around 7 minutes per pcu are forecast for the AM and PM peaks. Delays are also forecast to increase at junctions 46 and 47 of the M1. Around 4 to 5 minutes of additional delay per pcu forecast at junction 47. An additional 15 minutes of delay per pcu forecast at junction 46, with notable increases on the A63 towards Leeds and the M1 northbound off slip in the AM peak, and the A6120 eastbound plus M1 northbound off slip in the evening peak. Forecast increases in junction delay are minimal along the A63 through Garforth (in part because the delays at the A63 / A642 junction restrict flow onto the A63 through Garforth eastbound), with the biggest increase at the Lidgett lane traffic signals in the PM peak of around 30 seconds per pcu. The section of the A63 between Leeds road and the B6137 Lidgett Lane is forecast to be approaching link capacity in the AM peak westbound, which also limits the increase in junction delay.
- 3.17. Increases in delays are also forecast at the A656/Church La junction and the junctions of the A642 north of Garforth with Bar La and Main St , reflecting the significant increases in traffic using these roads (around 40 to 60% increase in peak hour traffic in the peak direction).
- 3.18. Journey times have been extracted from the model for a route along the A63, for 2016 (base year) and 2028 scenario 1 (Do Minimum without any mitigation). Westbound the route starts at the A656/A63 roundabout and finishes on the A6120 just west of M1 junction 46. The eastbound route matches the westbound in reverse. Table 6 illustrates the journey times and change from base to forecast year. As might be expected the biggest changes are westbound in the AM peak and eastbound in the PM peak.
- 3.19. In the absence of mitigation journey times in the peak direction are forecast to increase by 50 to 70%. The increase in the AM peak is around 6 minutes in 2028 westbound towards Leeds and 5 minutes eastbound in the PM peak.
- 3.20. It should be noted that when considering the outputs from the model runs that historically traffic growth has tended to be well below forecasts, so that the levels of growth predicted

are unlikely to occur in practise². However, the effects of congestion tends to be under predicted in models (because they cannot account for the peak of the peak effect and also assume a greater degree of driver awareness than occurs in practise). This means that the average delays forecast by the model are likely to be significantly exceeded during the most congested parts of the peak hours.

Table 2 : Proportion of development related traffic on key links from (in the AM) and to (in the PM) the Parlington site in 2028.

Proportion of traffic from / to Parlington in 2028 Sc1b in Do Minimum situation						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	41	12%	nb	21	7%
A656 Ridge Road (south of M1 J47)	sb	23	7%	nb	22	7%
A656 Ridge Road (south of A63)	sb	23	7%	nb	22	7%
A1(M) (south of A63)	sb	5	1%	nb	4	1%
A63 (between Ninelands Lane and B6137)	wb	5	1%	eb	2	1%
A1(M)(between J46 and J47)	wb	235	67%	eb	229	71%
A63 East Leeds Link Road	wb	47	13%	eb	46	14%
A1(M) (north of A64)	nb	7	2%	sb	4	1%
A64 (east of A1(M))	eb	0	0%	wb	0	0%
Barwick Road (south of M1)	sb	0	0%	nb	0	0%
Leeds Road, Scholes (east of Scholes)	wb	7	2%	eb	23	7%
Main Street, Aberford	nb	20	6%	sb	31	10%
Cattle Lane, Barwick in Elmet	wb	10	3%	eb	25	8%
TOTAL	OUT	352		IN	321	

Table 3 : Proportion of development related traffic on key links from (in the AM) and to (in the PM) the East of Garforth site in 2028.

Proportion of traffic from / to East of Garforth in 2028 Sc1b in Do Minimum situation						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	0	0%	nb	0	0%
A656 Ridge Road (south of M1 J47)	nb	128	29%	sb	135	32%
A656 Ridge Road (south of A63)	sb	38	9%	nb	30	7%
A1(M) (south of A63)	sb	5	1%	nb	5	1%
Church lane (Micklefield)	eb	36	8%	wb	2	0%
A63 (between Ninelands Lane and B6137)	wb	165	37%	eb	164	39%
M1 (between J46 and J47)	wb	128	29%	eb	121	29%
A63 East Leeds Link Road	wb	49	11%	eb	53	13%
A1(M) (north of A64)	nb	8	2%	sb	5	1%
A64 (east of A1(M))	eb	0	0%	wb	8	2%
Barwick Road (south of M1)	nb	29	7%	sb	43	10%
Leeds Road, Scholes (east of Scholes)	wb	25	6%	eb	39	9%
Main Street, Aberford	nb	12	3%	sb	1	0%
Cattle Lane, Barwick in Elmet	wb	0	0%	eb	0	0%
TOTAL	OUT	445		IN	418	

² See CD1/35 Infrastructure Background Paper Appendix 3

Table 4 : Changes in delay between 2016 base year and 2028 Do Minimum in the AM peak at key junctions around Garforth

Key Junction Scenario 1b	Base 2016 Am pk		Do Min 2028 Am pk			Change from 2016		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds 85%	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2382	318	2851	640	5	469	322	20%	101%
A63 Selby Rd / Ninelands La, Garforth	1573	153	1721	155	0	148	1	9%	1%
A63 Selby Rd / B6137 Leeds Rd, Garforth	1889	31	2177	40	0	289	9	15%	27%
A63 Selby Rd / B6137 Lidgett La, Garforth	2131	212	2143	205	1	13	-7	1%	-3%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3481	38	4136	426	3	655	388	19%	1027%
A64/A1(M) Junction 44	3353	70	3741	85	0	388	14	12%	21%
A63 Pontefract La / M1 Junction 45	3111	153	4513	217	1	1402	64	45%	42%
A63 Selby Rd / A6120 / M1 Junction 46	5255	315	6485	1215	10	1230	899	23%	285%
Thorpe Park/Jn46	1563	79	4599	192	2	3036	119	194%	144%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2879	25	4252	307	3	1373	282	48%	1124%
A656 Ridge Rd / Church La	1245	56	1891	259	1	646	203	52%	366%
A656 Ridge Rd / B6137 Longdike La	1417	181	2083	225	0	666	44	47%	24%
A642 Aberford Rd / Bar La, Garforth	1382	29	1792	297	2	410	269	30%	99%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1400	167	2043	550	3	644	383	46%	230%
Leeds Rd / Long La, Barwick	776	18	1252	27	0	477	9	61%	51%
Leeds Rd / Main St, Scholes	808	18	1254	23	0	446	5	55%	30%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	958	39	1586	44	0	628	5	66%	12%
Main St / Cattle La, Aberford	653	16	1039	21	0	386	4	59%	27%

Table 5 : Changes in delay between 2016 base year and 2028 Do Minimum in the PM peak at key junctions around Garforth

Key Junction Scenario 1b	Base 2016 Pm pk		Do Min 2028 Pm pk			Change from 2016		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds 85%	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2280	134	2795	296	3	515	162	23%	121%
A63 Selby Rd / Ninelands La, Garforth	1721	173	1629	179	0	-92	6	-5%	4%
A63 Selby Rd / B6137 Leeds Rd, Garforth	2060	37	2097	39	0	37	2	2%	5%
A63 Selby Rd / B6137 Lidgett La, Garforth	2125	239	2165	269	1	41	30	2%	13%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3444	54	4144	502	3	700	448	20%	822%
A64/A1(M) Junction 44	3253	73	3428	84	0	180	10	6%	14%
A63 Pontefract La / M1 Junction 45	2487	134	4334	155	0	1847	21	74%	16%
A63 Selby Rd / A6120 / M1 Junction 46	5191	434	6091	1275	10	901	841	17%	194%
Thorpe Park/Jn46	1576	78	4373	156	1	2797	78	177%	100%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2799	40	4033	273	1	1234	233	44%	584%
A656 Ridge Rd / Church La	1225	55	1913	445	1	688	390	56%	704%
A656 Ridge Rd / B6137 Longdike La	1471	181	2154	233	0	683	51	46%	28%
A642 Aberford Rd / Bar La, Garforth	1580	35	2032	91	0	452	56	29%	163%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1417	168	1998	229	0	581	60	41%	36%
Leeds Rd / Long La, Barwick	806	18	1401	27	0	595	9	74%	46%
Leeds Rd / Main St, Scholes	876	17	1425	15	0	549	-2	63%	-9%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	897	37	1199	36	0	301	-1	34%	-3%
Main St / Cattle La, Aberford	654	16	1085	19	0	431	2	66%	14%

Table 6 : Changes in journey time between 2016 base year and 2028 Do Minimum in the AM and PM peaks on the A63 through Garforth ³

Journey time results (seconds)		Scenario 1b		
AM	A2 2016	A2 2028 DM	Change	% Change
A63 westbound	547	913	366	67%
A63 eastbound	459	539	80	17%
PM	P2 2016	P2 2028 DM	Change	
A63 westbound	497	531	34	7%
A63 eastbound	582	889	307	53%

³ from A656 roundabout to pedestrian crossing west of M1 junction 46 and vice versa

4. Mitigation Test 1 Impacts (M1 junction 47 capacity upgrade scheme)

- 4.1. The first potential mitigation scheme to be tested involved signalling all entries to M1 junction 47, the widening of the approaches and provision of additional circulatory lanes on the roundabout. Following initial tests that suggested there would be significant delays on the slip road merging onto the M1 westbound in the AM peak, the improvement now includes a “tiger tail” parallel merge on the westbound slip road. Appendix 1 includes an indicative scheme plan showing these potential improvements to M1 junction 47 as developed by SYSTRA on behalf of Highways England. Note that the plan does not include the tiger tail merge. The required merge upgrade will be confirmed by Highways England using a DMRB merge assessment. A scheme to increase capacity at the A63 / A656 roundabout has also been assumed to be built as part of this option. In addition, this option, as with all the mitigation tests, also includes an improvement scheme at M1 Junction 46 (Appendix 1). Both these interventions are currently unfunded.
- 4.2. Table 12 lists the changes in flow between the 2016 Base, 2028 Do Minimum and the 2028 Do Something situation with the Junction 47 improvements in the AM and PM peak hours.
- 4.3. In the AM peak flows on the M1 between junction 46 and 47 are forecast to remain broadly the same as in the Do Minimum situation which is around 29% higher than the base in the peak direction (westbound towards Leeds in the AM) and approaching link capacity. Between junctions 46 and 45 forecast westbound demand exceeds link capacity, adding significantly to delays. The requirement for additional link capacity and merge/diverge upgrades will be confirmed by Highways England using DMRB assessments. To the north between junctions 47 and 48 the flow on the M1 is forecast to increase slightly compared to the Do Minimum with growth of around 10%. It should be noted that more traffic from other developments is also attracted to route via junction 47. Flows on the minor road network around Aberford, Barwick and Scholes are forecast to be much lower than in the Do Minimum situation suggesting that more development traffic uses the strategic network. Traffic is still much higher on these minor roads than it is in the 2016 base, but well within the capacity of the roads. Flows on the A63 through Garforth are slightly lower than in the Do Minimum but still much higher than the base year and approaching the link capacity of the road westbound.
- 4.4. In the PM peak significantly less traffic is forecast to use the minor road network around Aberford, Barwick and Scholes than in the Do Minimum. This traffic routes via M1 junction 47 instead, as evidenced by the significant increase in northbound traffic flow on the B1217 just north of M1 junction 47 (on the section leading to the Parlington development access) which is 105% higher than the Do Minimum. Traffic flows on the M1 between 46 and 47 eastbound are nearly 20% higher than in the base year, but within the capacity of the road. Eastbound flows on the A63 through Garforth are again forecast to be higher than in the base year (between 7 and 12% higher), but only around 3% higher than in the Do Minimum situation.
- 4.5. Figures 7 and 8 indicate which links are used by traffic generated by the two developments in the morning peak. This shows that with the mitigation measures at Junction 47 nearly all of the traffic generated by the Parlington site would route through M1 junction 47 to access the M1 in the AM peak. East of Garforth traffic is more split between the M1 and A63 routes.
- 4.6. Figures 9 and 10 indicate which links are used by traffic attracted by the two developments in the evening peak. As in the AM peak, this indicates that nearly all trips to Parlington are

forecast to route via junction 47 of the M1. Traffic returning to the East of Garforth site is split fairly evenly between the route through Garforth on the A63 and the route via junction 47 of the M1.

- 4.7. Tables 13 and 14 show the proportion of traffic generated by the two developments (away from the site in the AM and into the site in the PM) on key links in the with M1 Junction 47 scheme situation. This shows that for the Parlington site the proportion of traffic associated with the developments using the M1 between junctions 46 and 47 increases to around two thirds of trips in the AM peak and nearly 80% of trips in the PM peak. The proportion from the East of Garforth site in the AM peak is around 30% but this rises to nearly 40% in the PM peak. The mitigation at junction 47 reduces the proportion of trips from / to Parlington using minor roads in and around Aberford to less than 5% in the AM peak and around 3% in the PM peak. The proportion of traffic from / to the East of Garforth site passing through Garforth on the A63 reduces to just under 40% in the AM and PM peaks. A smaller amount of traffic routes via M1 junction 47. As in the Do Minimum between 10 and 13% of traffic from/to both sites is forecast to use the East Leeds link road between M1 junction 45 and the City Centre.
- 4.8. The mitigated impact of the developments on key junctions in the Garforth area is illustrated in Tables 15 and 16, which compare traffic volumes and delays in the Base and Do Minimum situations with the Do Something (junction 47 only) situation in 2028.
- 4.9. Notwithstanding the improvement scheme, between the 2016 base year and 2028 flows through the junctions and delays are forecast to increase significantly. The biggest absolute change in delay is forecast at the A63/A642 "Old George" roundabout in Garforth where delays are forecast to increase by over 7 minutes per pcu in the AM peak hour (444 seconds) and by 2.5 minutes (166 seconds) in the PM peak.
- 4.10. At the A656 / Church lane junction delays are forecast to increase by around 5 minutes per pcu in the AM peak (281 seconds). The M1 motorway junctions 46 and 47 are also forecast to experience an increase in delay, notwithstanding the mitigation at the latter. (Although the junction is modelled as operating within capacity, there is an inherent delay at signalled junctions compared with roundabouts).
- 4.11. The very significant increase in delay at M1 junction 45 in the PM peak hour is associated with delays on the slip roads affecting the ability of traffic to join the motorway, particularly in the southbound direction. This reflects the high volume of traffic on the motorway itself, although more detailed work will be required to assess the reliability of this forecast as the capacity of such merges is very sensitive to small changes in model parameters, Highways England will undertake a DMRB merge assessment to confirm whether an upgrade to this merge is required.
- 4.12. When compared with the 2028 Do Minimum the impacts of the interventions are to significantly reduce delays at six junctions in the AM peak hour and seven in the PM peak. Of these, five junctions benefit from improvements in both peak hours: Large reductions in delay are forecast for the A63 / A656 junction and M1 junctions 46 and 47 due to the increased capacity provided. In addition the Main Street and Bar Lane junctions with the A642 Aberford Rd in Garforth also get improvements. Overall, the time savings are greatest in the AM peak hour.
- 4.13. The A63/Leeds Rd junction shows improvements in the AM peak but increased delays in the PM peak.

- 4.14. Delays are, however, forecast to rise at the M1 junction 46 dumbbells at Thorpe Park, particularly in the PM peak where the increase is substantial. Further work is currently being carried out to look at the design of this junction with ELOR in place to address this issue.
- 4.15. In most cases (other than the A63 / A656 roundabout and the A63 / Lidgett lane junction in the AM peak) the delays at junctions in 2028 with mitigation are worse than the 2016 base situation, as the impacts of the generated traffic can't be fully mitigated. Some of the intermediate junctions on the A63 through Garforth are forecast to experience relatively small increases in delay. This is likely to be because traffic is unable to reach these junctions due to capacity constraints at the "entry points" to Garforth such as M1 junction 47, the A63 / A642 roundabout and A63/ Ninelands Lane signals. More significant additional capacity would be likely to be required to remove the additional delay forecast for M1 junction 46 in particular.
- 4.16. Journey times have been extracted from the model for a route along the A63, for the situation with the junction 47 scheme in place and for the same route in the 2016 Base and Do Minimum. Table 17 shows the journey times and changes. As might be expected the biggest changes are westbound in the AM peak and eastbound in the PM peak. The AM peak westbound towards Leeds sees just over 1 minutes less delay compared to the Do Minimum but just under 5 minutes more delay compared to the base year. The benefit of the junction 47 scheme is more apparent in the PM peak with a time saving of over 3 minutes eastbound compared with the Do Minimum, though again journey times are greater than in the 2016 base year.

Table 12 : Changes in traffic flow on key links in the forecast year 2028 between the Do Minimum situation without mitigation and the Do Something with a mitigation scheme for junction 47 (only).

Key link Scenario 1b	Dirn	Base conditions 2016		Do Minimum 2028		Do something 2028		Change from 2016 Base		% Change from 2016 Base		Change from Do min		%age Change from 2028 D	
		Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour
		Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow
A63 east of Garforth	WB	668	611	811	507	864	653	197	42	29%	7%	53	146	7%	29%
A63 east of Garforth	EB	495	578	457	725	579	682	83	104	17%	18%	122	-43	27%	-6%
A63 Garforth (E of Lidgett La)	WB	1139	775	1270	717	1207	838	68	62	6%	8%	-63	121	-5%	17%
A63 Garforth (E of Lidgett La)	EB	581	1029	506	1118	643	1155	62	126	11%	12%	137	37	27%	3%
A63 west of Garforth	WB	1807	935	2124	791	2094	1027	287	93	16%	10%	-29	236	-1%	30%
A63 west of Garforth	EB	1035	1723	916	1900	1228	1779	193	56	19%	3%	312	-122	34%	-6%
A656 south of Jn 47	NB	846	354	891	827	1367	668	521	314	62%	89%	476	-159	53%	-19%
A656 south of Jn 47	SB	371	843	733	1016	587	1072	215	229	58%	27%	-146	56	-20%	5%
A656 south of A63	NB	579	458	698	654	1036	656	457	197	79%	43%	338	2	48%	0%
A656 south of A63	SB	447	550	655	722	675	826	228	277	51%	50%	20	105	3%	14%
A642 south of Jn 47	NB	609	619	749	984	614	934	5	314	1%	51%	-135	-51	-18%	-5%
A642 south of Jn 47	SB	540	580	833	767	756	757	216	178	40%	31%	-77	-9	-9%	-1%
A642 south of A63	NB	548	431	834	744	819	656	271	224	50%	52%	-15	-89	-2%	-12%
A642 south of A63	SB	475	706	759	1141	848	886	373	180	79%	26%	89	-255	12%	-22%
B1217 north of Jn 47	WB	584	260	1078	476	1093	469	509	209	87%	80%	15	-7	1%	-2%
B1217 north of Jn 47	EB	230	488	326	539	399	1105	169	617	73%	126%	73	567	22%	105%
Main St Aberford	NB	289	251	617	254	562	295	273	43	94%	17%	-55	41	-9%	16%
Main St Aberford	SB	234	238	238	684	210	402	-25	164	-10%	69%	-28	-283	-12%	-41%
Cattle La	WB	143	124	379	132	368	140	225	16	157%	13%	-12	8	-3%	6%
Cattle La	EB	115	117	185	532	146	248	31	132	27%	113%	-39	-283	-21%	-53%
Long La south of Barwick	NB	250	249	291	163	307	142	58	-108	23%	-43%	16	-21	6%	-13%
Long La south of Barwick	SB	197	240	254	392	233	262	35	22	18%	9%	-21	-130	-8%	-33%
Leeds Rd west of Barwick	WB	429	292	754	258	761	242	332	-50	77%	-17%	7	-16	1%	-6%
Leeds Rd west of Barwick	EB	199	362	332	1001	296	581	97	219	49%	60%	-36	-420	-11%	-42%
Leeds Rd west of Scholes	WB	324	246	832	301	854	290	531	44	164%	18%	23	-10	3%	-3%
Leeds Rd west of Scholes	EB	145	296	345	1040	298	649	153	353	105%	119%	-47	-391	-14%	-38%
M1 Jn 47-48	WB	4106	3573	4707	3889	4569	3879	463	306	11%	9%	-138	-10	-3%	0%
M1 Jn 47-48	EB	4021	3750	4024	4024	4170	3718	149	-33	4%	-1%	146	-307	4%	-8%
M1 Jn 46-47	WB	4835	3525	6088	4462	6214	4445	1379	920	29%	26%	126	-17	2%	0%
M1 Jn 46-47	EB	3854	4380	4680	4747	4482	5148	628	768	16%	18%	-198	401	-4%	8%
M1 Jn 45-46	WB	5975	4482	6220	4931	6220	5329	245	848	4%	19%	0	399	0%	8%
M1 Jn 45-46	EB	4611	5449	5279	5349	5292	5413	681	-36	15%	-1%	13	64	0%	1%

Figure 7 : Do Something (junction 47 only) trips from the Parlington site in the AM peak (2028).

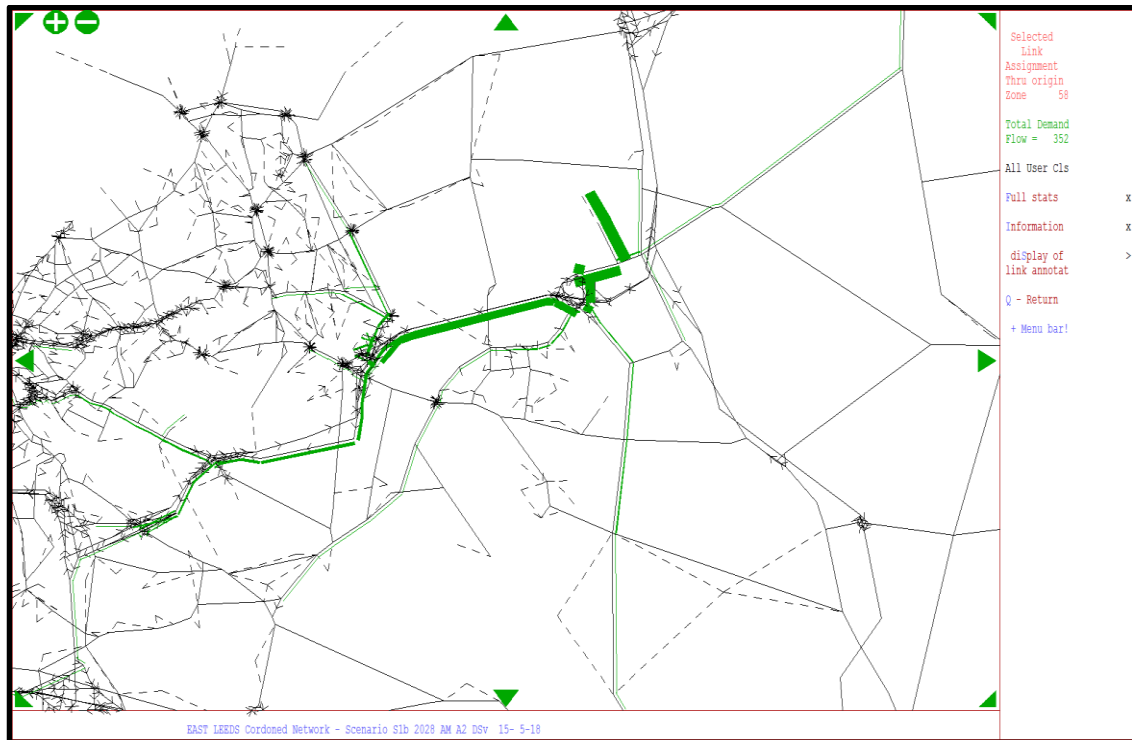


Figure 8 : Do Something (junction 47 only) trips from the East of Garforth site in the AM peak (2028).

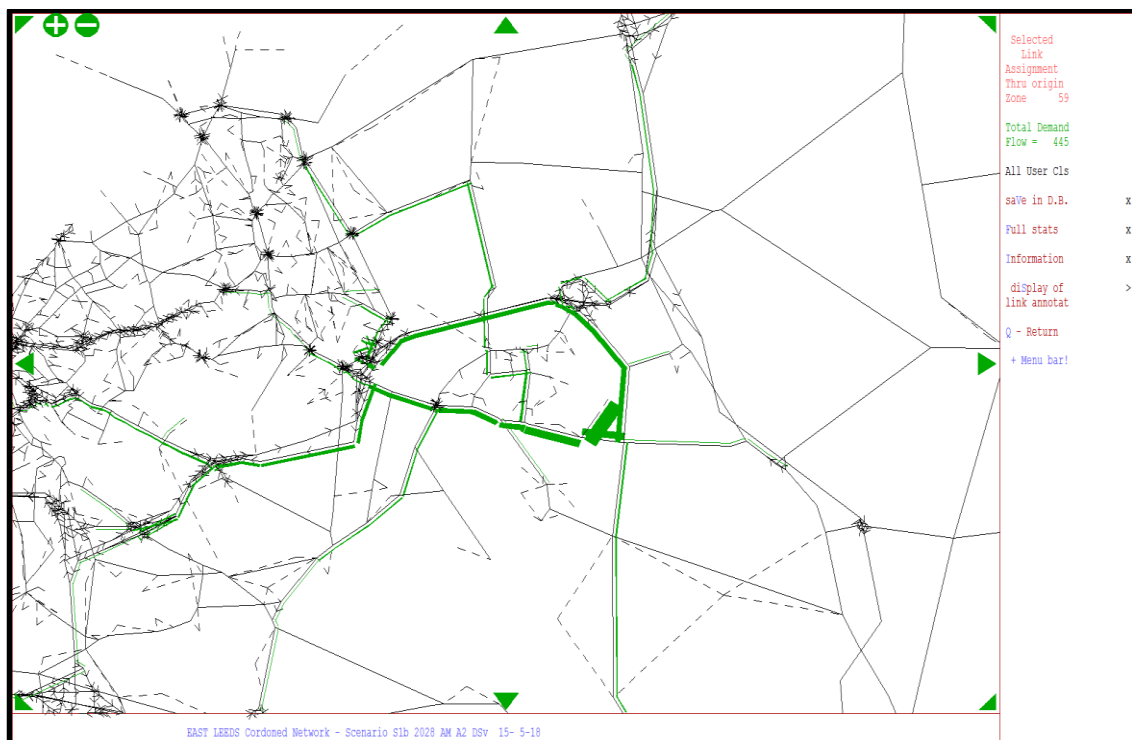


Figure 9 : Do Something (junction 47 only) trips to the Parlington site in the PM peak (2028).

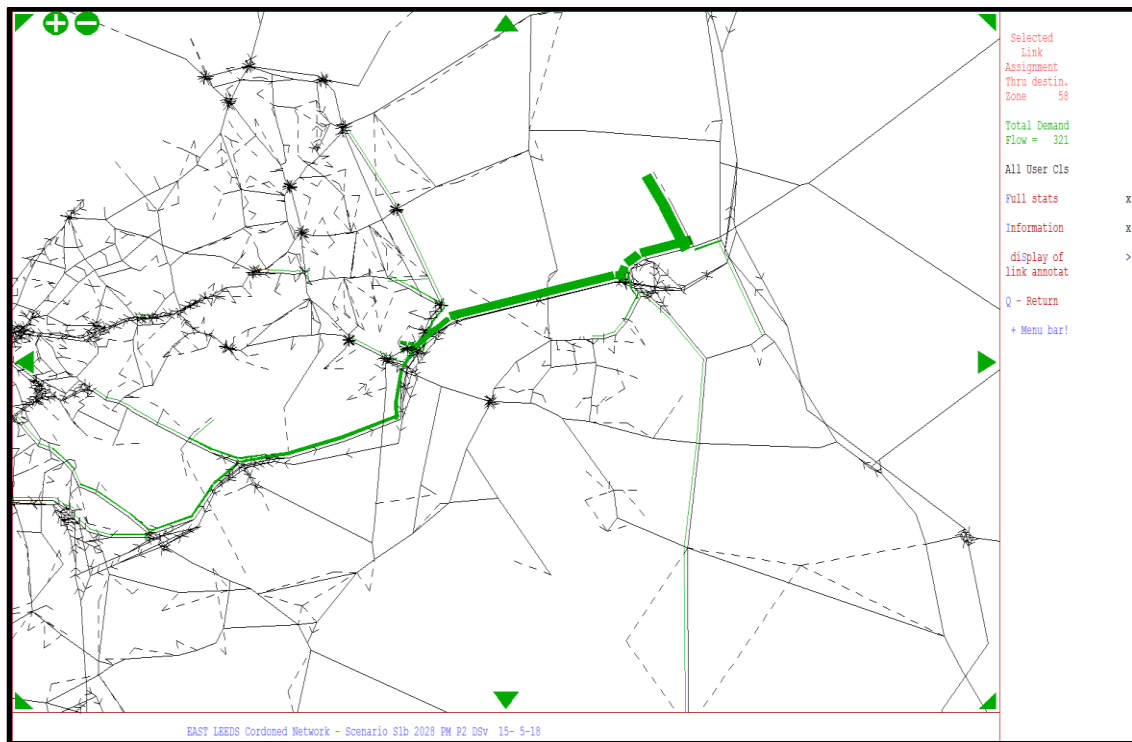


Figure 10 : Do Something (junction 47 only) trips to the East of Garforth site in the PM peak (2028).

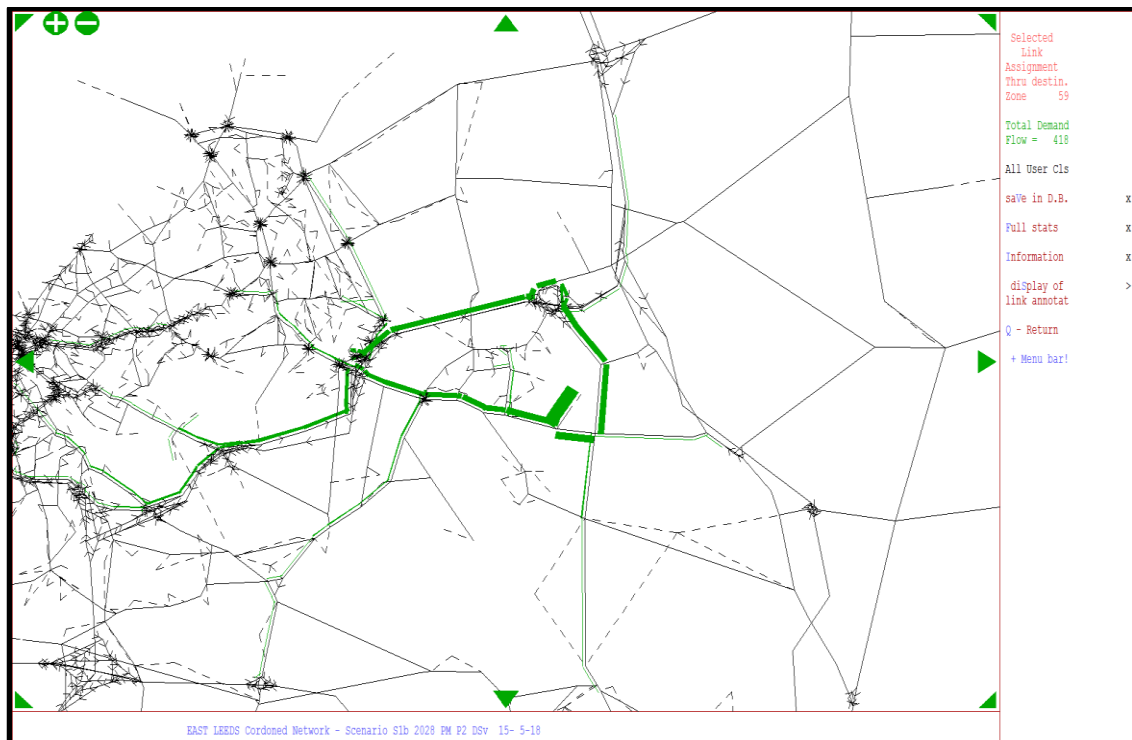


Table 13 : Proportion of development related traffic on key links from (in the AM) and to (in the PM) the Parlington site in 2028.

Proportion of traffic from / to Parlington in 2028 Sc1b with Junction 47 scheme						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	40	11%	nb	20	6%
A656 Ridge Road (south of M1 J47)	sb	29	8%	nb	19	6%
A656 Ridge Road (south of A63)	sb	29	8%	nb	19	6%
A1(M) (south of A63)	sb	6	2%	nb	4	1%
A63 (between Ninelands Lane and B6137)	wb	3	1%	eb	3	1%
A1(M)(between J46 and J47)	wb	238	68%	eb	254	79%
A63 East Leeds Link Road	wb	45	13%	eb	40	12%
A1(M) (north of A64)	nb	7	2%	sb	4	1%
A64 (east of A1(M))	eb	0	0%	wb	0	0%
Barwick Road (south of M1)	sb	0	0%	nb	0	0%
Leeds Road, Scholes (east of Scholes)	wb	2	1%	eb	1	0%
Main Street, Aberford	nb	15	4%	sb	9	3%
Cattle Lane, Barwick in Elmet	wb	6	2%	eb	3	1%
TOTAL	OUT	352		IN	321	

Table 14 : Proportion of development related traffic on key links from (in the AM) and to (in the PM) the East of Garforth site in 2028.

Proportion of traffic from / to East of Garforth in 2028 Sc1b with Junction 47 scheme						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	0	0%	nb	0	0%
A656 Ridge Road (south of M1 J47)	nb	145	33%	sb	176	42%
A656 Ridge Road (south of A63)	sb	38	9%	nb	28	7%
A1(M) (south of A63)	sb	5	1%	nb	5	1%
Church lane (Micklefield)	eb	14	3%	wb	3	1%
A63 (between Ninelands Lane and B6137)	wb	164	37%	eb	163	39%
M1 (between J46 and J47)	wb	123	28%	eb	162	39%
A63 East Leeds Link Road	wb	47	11%	eb	45	11%
A1(M) (north of A64)	nb	9	2%	sb	5	1%
A64 (east of A1(M))	eb	12	3%	wb	8	2%
Barwick Road (south of M1)	nb	35	8%	sb	7	2%
Leeds Road, Scholes (east of Scholes)	wb	30	7%	eb	4	1%
Main Street, Aberford	nb	2	0%	sb	1	0%
Cattle Lane, Barwick in Elmet	wb	0	0%	eb	0	0%
TOTAL	OUT	445		IN	418	

Table 15 : Changes in delay between 2028 Do Minimum and 2028 Do Something (Junction 47 only) in the AM peak at key junctions around Garforth

Key Junction Scenario 1b	Base 2016		Do Min 2028 Am pk			Do Som 2028 Am pk			Change from 2016 Base		%age change from 2016		Change from Do Min		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	Traffic	Delay	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2382	318	2851	640	5	3256	138	0	873	-181	37%	-57%	405	-503	14%	-79%
A63 Selby Rd / Ninelands La, Garforth	1573	153	1721	155	0	1702	158	0	130	5	8%	3%	-19	3	-1%	2%
A63 Selby Rd / B6137 Leeds Rd, Garforth	1889	31	2177	40	0	2032	31	0	144	0	8%	-1%	-145	-9	-7%	-23%
A63 Selby Rd / B6137 Lidgett La, Garforth	2131	212	2143	205	1	2222	201	0	91	-11	4%	-5%	79	-4	4%	-2%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3481	38	4136	426	3	4463	482	3	982	444	28%	1175%	327	56	8%	13%
A64/A1(M) Junction 44	3353	70	3741	85	0	3637	86	0	284	16	8%	22%	-104	1	-3%	2%
A63 Pontefract La / M1 Junction 45	3111	153	4513	217	1	4507	243	1	1396	90	45%	59%	-6	26	0%	12%
A63 Selby Rd / A6120 / M1 Junction 46	5255	315	6485	1215	10	7134	517	6	1879	201	36%	64%	648	-698	10%	-57%
Thorpe Park/Jn46	1563	79	4599	192	2	4743	242	4	3181	163	204%	207%	145	50	3%	26%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2879	25	4252	307	3	4290	165	0	1411	140	49%	556%	38	-142	1%	-46%
A656 Ridge Rd / Church La	1245	56	1891	259	1	2099	336	1	854	281	69%	505%	208	77	11%	30%
A656 Ridge Rd / B6137 Longdike La	1417	181	2083	225	0	2257	257	1	840	75	59%	42%	174	31	8%	14%
A642 Aberford Rd / Bar La, Garforth	1382	29	1792	297	2	1942	106	2	560	77	41%	270%	150	-191	8%	-64%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1400	167	2043	550	3	2113	274	2	714	108	51%	64%	70	-276	3%	-50%
Leeds Rd / Long La, Barwick	776	18	1252	27	0	1201	26	0	426	8	55%	45%	-51	-1	-4%	-4%
Leeds Rd / Main St, Scholes	808	18	1254	23	0	1245	24	0	437	6	54%	33%	-9	1	-1%	3%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	958	39	1586	44	0	1528	47	0	570	7	60%	19%	-58	3	-4%	6%
Main St / Cattle La, Aberford	653	16	1039	21	0	952	20	0	299	3	46%	20%	-87	-1	-8%	-6%

Table 16 : Changes in delay between 2028 Do Minimum and 2028 Do Something (Junction 47 only) in the PM peak at key junctions around Garforth

Key Junction Scenario 1b	Base 2016		Do Min 2028 Pm pk			Do Som 2028 Pm pk			Change from 2016 Base		%age change from 2016		Change from Do Min		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	Traffic	Delay	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2280	134	2795	296	3	2831	113	0	551	-21	24%	-16%	36	-183	1%	-62%
A63 Selby Rd / Ninelands La, Garforth	1721	173	1629	179	0	1839	191	0	118	17	7%	10%	210	11	13%	6%
A63 Selby Rd / B6137 Leeds Rd, Garforth	2060	37	2097	39	0	2255	50	0	195	13	9%	37%	158	12	8%	30%
A63 Selby Rd / B6137 Lidgett La, Garforth	2125	239	2165	269	1	2290	320	1	165	82	8%	34%	124	52	6%	19%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3444	54	4144	502	3	3978	220	2	534	166	16%	305%	-166	-282	-4%	-56%
A64/A1(M) Junction 44	3248	73	3428	84	0	3490	86	0	242	12	7%	17%	62	2	2%	2%
A63 Pontefract La / M1 Junction 45	2487	134	4334	155	0	2614	1066	2	127	932	5%	696%	-1720	911	-40%	587%
A63 Selby Rd / A6120 / M1 Junction 46	5191	434	6091	1275	10	6456	630	6	1265	196	24%	45%	364	-645	6%	-51%
Thorpe Park/Jn46	1576	78	4373	156	1	4300	584	4	2724	506	173%	649%	-73	427	-2%	273%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2799	40	4033	273	1	4429	135	0	1630	95	58%	239%	397	-138	10%	-50%
A656 Ridge Rd / Church La	1225	55	1913	445	1	1836	408	1	611	352	50%	636%	-78	-37	-4%	-8%
A656 Ridge Rd / B6137 Longdike La	1471	181	2154	233	0	2179	230	0	708	49	48%	27%	25	-2	1%	-1%
A642 Aberford Rd / Bar La, Garforth	1580	35	2032	91	0	1947	63	0	367	29	23%	84%	-84	-27	-4%	-30%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1417	168	1998	229	0	1725	184	0	308	15	22%	9%	-273	-45	-14%	-20%
Leeds Rd / Long La, Barwick	806	18	1401	27	0	966	20	0	160	1	20%	8%	-435	-7	-31%	-26%
Leeds Rd / Main St, Scholes	876	17	1425	15	0	1009	15	0	133	-2	15%	-13%	-416	-1	-29%	-4%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	897	37	1199	36	0	1459	46	0	562	8	63%	23%	261	10	22%	27%
Main St / Cattle La, Aberford	654	16	1085	19	0	870	18	0	216	1	33%	8%	-215	-1	-20%	-6%

Table 17 : Changes in journey time between 2016 base year and 2028 Do Something (junction 47 only) in the AM and PM peak hours on the A63 through Garforth

Journey time results (seconds)		Scenario 1b					
AM	A2 2016	A2 2028 DM	A2 2028 DS	change from base	% change	change from Do Min	% change
A63 westbound	547	913	840	293	54%	-73	-8%
A63 eastbound	459	539	526	67	15%	-13	-2%
PM	P2 2016	P2 2028 DM	P2 2028 DS	change from base	% change	change from Do Min	% change
A63 westbound	497	531	478	-19	-4%	-53	-10%
A63 eastbound	582	889	696	114	20%	-193	-22%

5. Mitigation Test 2 Impacts (Garforth Southern Bypass)

- 5.1. The second potential mitigation scheme to be tested involved a new wide single carriageway road providing a southern bypass of Garforth between the A63 / A642 roundabout and the Ninelands Lane junction with the A63. It would include a new intermediate roundabout junction with the B6137 Leeds road and a realigned junction at Ninelands Lane. The A63 / A642 roundabout would be signalised to provide sufficient capacity for the additional traffic anticipated to be attracted by the bypass. No improvements were assumed at M1 junction 47. This test also includes a signalled junction for the East of Garforth development on the A63⁴, although further work will be required to establish the nature and form of the access arrangements for this site. Appendix 1 includes an indicative scheme plan showing a potential alignment for a Garforth Southern Bypass. Note that the modelled scheme varies slightly from the plan included here, with a realigned signalised junction at Ninelands Lane tested rather than a new roundabout, no changes at the Lidgett La junction and modifications to the new traffic signals on the A63 / A642 roundabout.
- 5.2. Table 18 lists the changes in flow between the 2016 Base, 2028 Do Minimum and the 2028 Do Something situation with Garforth Southern bypass in the AM and PM peak hours.
- 5.3. In the AM peak flows on the M1 are forecast to remain broadly the same as in the Do Minimum situation. The forecast flow on the M1 westbound between junction 47 and 46 is significantly higher than the base and approaching the capacity of the link in the AM peak, which may lead to additional delays, while between junctions 46 and 45 westbound demand is forecast to exceed link capacity. The requirement for additional link capacity and merge/diverge upgrades will be confirmed by Highways England using DMRB assessments.
- 5.4. Flows on the minor road network around Aberford, Barwick and Scholes are forecast to be much lower than in the Do Minimum, but generally much higher than the base. The most popular route for traffic from the East of Garforth site to access the M1 at junction 46, is via the Garforth Southern bypass. In the AM peak there is a forecast 17% increase in westbound traffic on the A63 west of Garforth (between the bypass and M1 junction 46) compared to the Do Minimum. This flow is just under 40% greater than in the base year, but still well within the link capacity. As would be expected flows on the bypassed section of the A63 through Garforth reduce substantially compared to both the base and Do Minimum.
- 5.5. In the PM peak significantly less traffic is forecast to use the minor road network around Aberford, Barwick and Scholes than in the Do Minimum. Although much greater flows are forecast than in the base the flows are still well within link capacities. Flows increase by 30% eastbound on the A63 between M1 junction 46 and Garforth, as this is the single most popular route for traffic to the East of Garforth site. This is over 40% higher than in the base year. As in the AM peak, traffic flows decrease significantly on the bypassed section of the A63 through Garforth. Although flows on the A63 between M1 junction 46 and Garforth are significantly higher than the base, the link capacity would not be exceeded.
- 5.6. Figures 11 and 12 indicate which links are used by traffic generated by the two developments in the morning peak. This shows that with the Garforth southern bypass nearly all of the traffic generated by the Parlington site would route through M1 junction 47 to access the M1 in the AM peak. More traffic generated by the East of Garforth

⁴ Due to increased traffic levels on the A63 with the bypass tests.

development now routes along the bypass to access the M1 south at junction 46 and to the City centre via M1 junction 45. Trips from the East of Garforth site to Thorpe Park and destinations close to the new East Leeds Orbital Road still route via M1 junction 47.

- 5.7. Figures 13 and 14 indicate which links are used by traffic attracted by the two developments in the evening peak. This indicates that nearly all trips to Parlington are now forecast to route via junction 47 of the M1. Traffic to the East of Garforth site predominantly routes via the A63 through Garforth with a smaller proportion of traffic using junction 47.
- 5.8. Tables 19 and 20 show the proportion of traffic generated by the two developments (away from the site in the AM and into the site in the PM) on key links in the with the Garforth Southern bypass scheme. This shows that for the Parlington site the proportion of traffic from the development using the M1 between junctions 46 and 47 increases slightly to around 70% of trips in the AM peak and nearly 80% in the PM peak. The Garforth Southern Bypass reduces the proportion of trips from / to Parlington using minor roads in and around Aberford slightly to a maximum of 4% in the AM and PM peaks. The proportion of traffic from / to the East of Garforth site passing Garforth on the A63 bypass is 57% in the AM and 48% in the PM. Similarly to the Do Minimum between 11% and 14% of traffic from/to both sites is forecast to use the East Leeds link road between M1 junction 45 and the City Centre.
- 5.9. The mitigated impact of the developments on key junctions in the Garforth area is illustrated in Tables 21 and 22 which compare traffic volumes and delays in the Do Minimum with the Do Something (Garforth southern bypass) situation in 2028.
- 5.10. The Bypass option attracts more traffic into the A63 corridor, however, this scheme provides only limited relief to traffic levels at M1 junction 47 compared with the Do Minimum. In most cases the delays at junctions in 2028 with mitigation are worse than the 2016 base situation, as the impacts of the generated traffic can't be fully mitigated. The main exceptions are the A63 / B6137 Lidgett Lane junction which is bypassed by the scheme and so delays are less than in the base year and the A63/A656 roundabout (where an improvement has been assumed). More significant additional capacity would be likely to be required to remove the additional delay forecast for M1 junction 46 in particular.
- 5.11. Between the Do Minimum and Do something scenarios in 2028, delays are reduced by at least 10% at 10 junctions in the AM peak hour and by 8 in the PM peak. This includes reductions in both peaks at the A63/A656 roundabout (due to the improvement), the A63 / Lidgett La and A63 / A642 'Old George' junctions (due to the bypass), M1 junctions 46 and 47, the A642 junctions with Bar La and Main St and the Leeds Rd / Long La junction in Barwick. The A656 / Church La junction also benefits from reduced AM peak delays.
- 5.12. Some additional delay is forecast at the new roundabout junction between the B6137 Leeds road (from Kippax) and the A63 bypass, (although it is less than one minute), resulting from the increased traffic attracted to use the A63 passing through the junction. Detailed design of the roundabout would be anticipated to result in a roundabout design capable of accommodating the volume of traffic forecast for 2028. In general the operation of the key junctions improve with less movements over capacity than in the Do Minimum.
- 5.13. There is a forecast increase in delays at the M1 junction 46 dumbbells in the AM peak, although the junction is modelled as operating just within capacity in this time period and the more significant issues in the PM peak with the M1 junction 47 scheme do not materialise.

5.14. Journey times have been extracted from the model for a route along the A63 between the A656 and the 'Cracked Egg' Century Way junction, for the situation with the Garforth Bypass scheme in place and for the same route in the base and Do Minimum. Table 23 illustrates the journey times and changes. As might be expected the biggest changes are westbound in the AM peak and eastbound in the PM peak. The AM peak westbound towards Leeds sees nearly 3.5 minutes less delay compared to the Do Minimum, while the time saving in the PM peak is approaching 5 minutes. Nevertheless, journey times in both peaks are still greater than in the 2016 base year.

Table 18 Changes in traffic flow on key links in the forecast year 2028 between the Do Minimum situation without mitigation and the Do Something with a Garforth southern bypass.

Key link	Dirn	Base conditions 2016		Do Minimum 2028		Do something 2028		Change from 2016 Base		% Change from 2016 Base		Change from Do min		%age Change from 2028 D	
		Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour
		Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow
A63 east of Garforth	WB	668	611	811	507	1216	529	548	-81	82%	-13%	405	22	50%	4%
A63 east of Garforth	EB	495	578	457	725	526	1021	31	443	6%	77%	70	297	15%	41%
A63 Garforth (E of Lidgett La)	WB	1139	775	1270	717	356	180	-783	-595	-69%	-77%	-914	-537	-72%	-75%
A63 Garforth (E of Lidgett La)	EB	581	1029	506	1118	120	386	-461	-643	-79%	-62%	-386	-732	-76%	-65%
A63 west of Garforth	WB	1807	935	2124	791	2478	990	670	55	37%	6%	354	199	17%	25%
A63 west of Garforth	EB	1035	1723	916	1900	1079	2475	44	752	4%	44%	163	575	18%	30%
A63 Garforth Southern Bypass	WB	n/a	n/a	n/a	n/a	1737	820	1737	820	n/a	n/a	1737	820	n/a	n/a
A63 Garforth Southern Bypass	EB	n/a	n/a	n/a	n/a	583	1440	583	1440	n/a	n/a	583	1440	n/a	n/a
A656 south of Jn 47	NB	846	354	891	827	955	788	109	434	13%	123%	63	-39	7%	-5%
A656 south of Jn 47	SB	371	843	733	1016	636	930	265	88	71%	10%	-97	-86	-13%	-8%
A656 south of A63	NB	579	458	698	654	946	580	368	122	64%	27%	248	-74	36%	-11%
A656 south of A63	SB	447	550	655	722	669	701	222	151	50%	27%	14	-21	2%	-3%
A642 south of Jn 47	NB	609	619	749	984	821	927	212	307	35%	50%	72	-58	10%	-6%
A642 south of Jn 47	SB	540	580	833	767	784	794	243	214	45%	37%	-50	27	-6%	4%
A642 south of A63	NB	548	431	834	744	767	578	220	147	40%	34%	-67	-166	-8%	-22%
A642 south of A63	SB	475	706	759	1141	856	1132	382	427	80%	60%	97	-9	13%	-1%
B1217 north of Jn 47	WB	584	260	1078	476	946	423	363	163	62%	63%	-131	-53	-12%	-11%
B1217 north of Jn 47	EB	230	488	326	539	341	596	111	107	48%	22%	15	57	5%	11%
Main St Aberford	NB	289	251	617	254	509	284	220	32	76%	13%	-108	30	-18%	12%
Main St Aberford	SB	234	238	238	684	248	474	14	236	6%	99%	10	-211	4%	-31%
Cattle La	WB	143	124	379	132	276	126	133	2	93%	2%	-104	-6	-27%	-4%
Cattle La	EB	115	117	185	532	177	288	62	171	54%	146%	-8	-244	-4%	-46%
Long La south of Barwick	NB	250	249	291	163	283	136	33	-113	13%	-45%	-9	-27	-3%	-16%
Long La south of Barwick	SB	197	240	254	392	205	270	8	30	4%	13%	-49	-122	-19%	-31%
Leeds Rd west of Barwick	WB	429	292	754	258	654	226	225	-66	53%	-23%	-100	-31	-13%	-12%
Leeds Rd west of Barwick	EB	199	362	332	1001	312	635	113	273	57%	75%	-21	-366	-6%	-37%
Leeds Rd west of Scholes	WB	324	246	832	301	749	278	425	32	131%	13%	-83	-23	-10%	-7%
Leeds Rd west of Scholes	EB	145	296	345	1040	313	713	168	417	116%	141%	-32	-327	-9%	-31%
M1 Jn 47-48	WB	4106	3573	4707	3889	4685	3859	580	286	14%	8%	-22	-30	0%	-1%
M1 Jn 47-48	EB	4021	3750	4024	4024	4124	3945	102	194	3%	5%	99	-80	2%	-2%
M1 Jn 46-47	WB	4835	3525	6088	4462	6050	4326	1215	801	25%	23%	-38	-136	-1%	-3%
M1 Jn 46-47	EB	3854	4380	4680	4747	4562	4695	708	315	18%	7%	-118	-51	-3%	-1%
M1 Jn 45-46	WB	5975	4482	6220	4931	6220	4913	245	431	4%	10%	0	-17	0%	0%
M1 Jn 45-46	EB	4611	5449	5279	5349	5290	5443	679	-5	15%	0%	11	94	0%	2%

Figure 11 Do Something (Garforth southern bypass) trips from the Parlington site in the AM peak (2028).

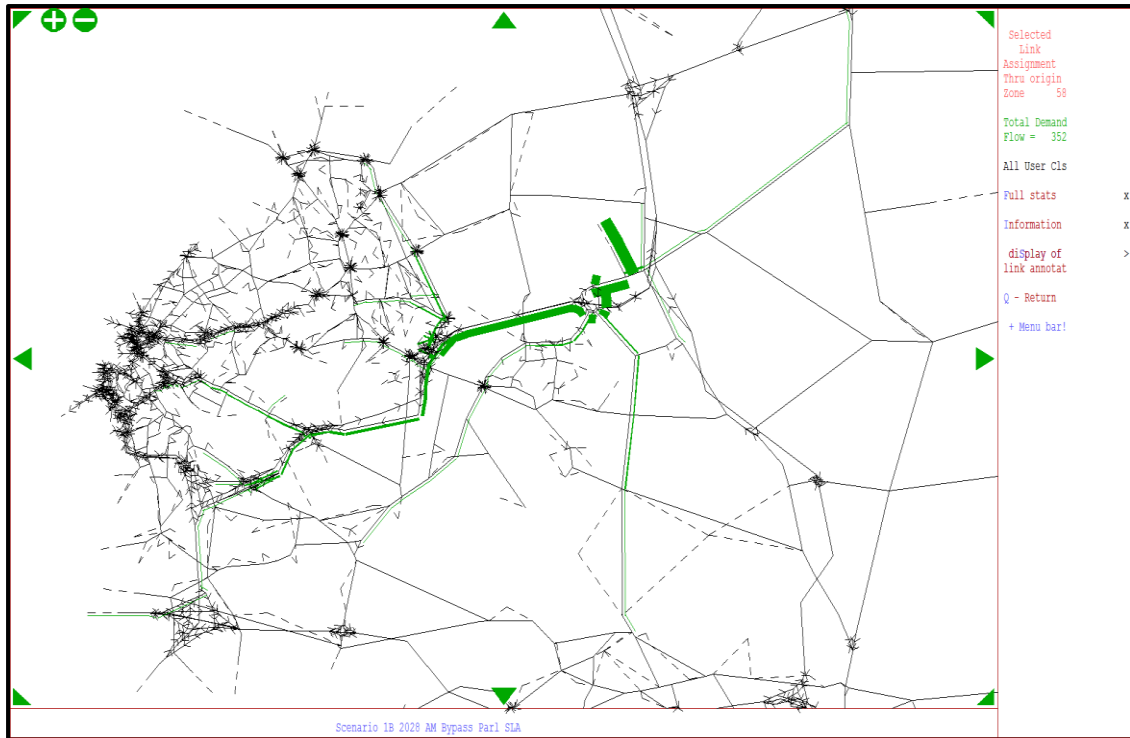


Figure 12 Do Something (Garforth southern bypass) trips from the East of Garforth site in the AM peak (2028).

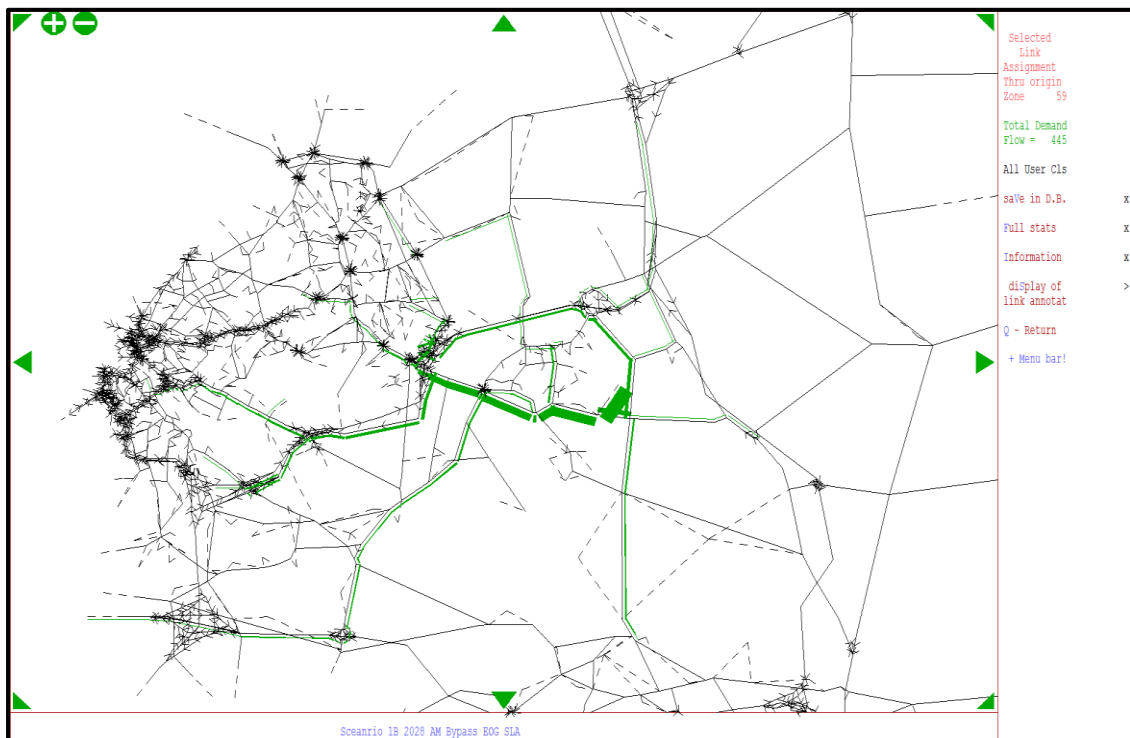


Figure 13 Do Something (Garforth southern bypass) trips to the Parlington site in the PM peak (2028).

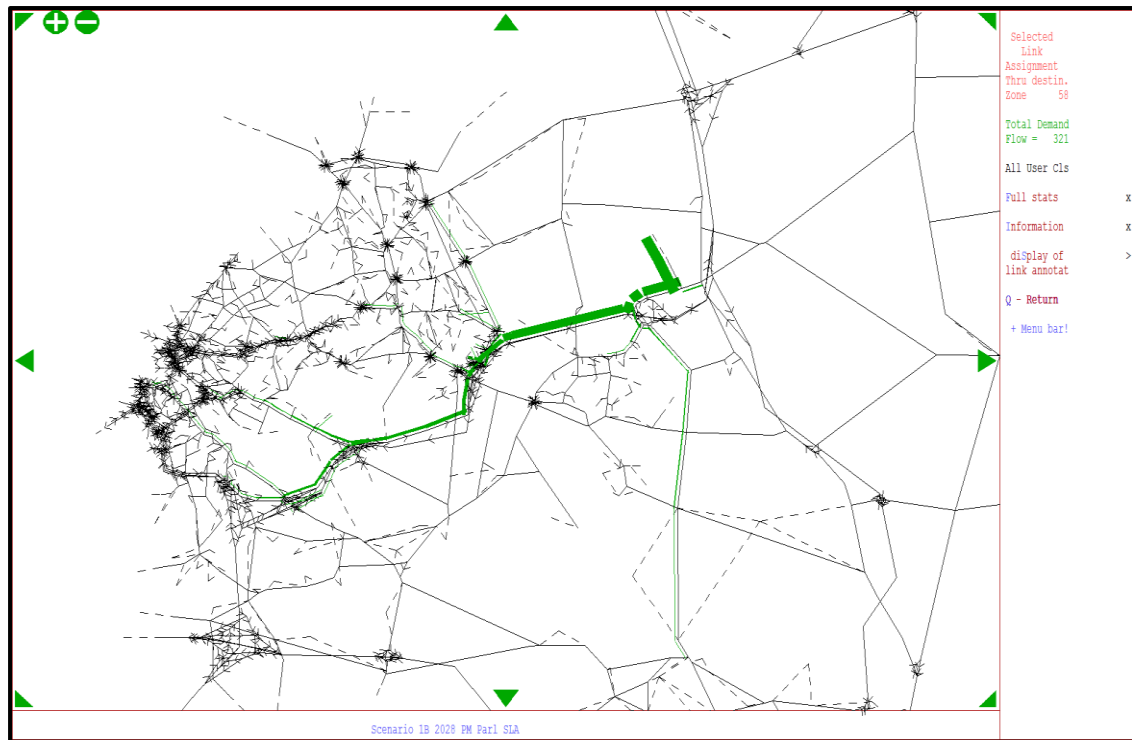


Figure 14 Do Something (Garforth southern bypass) trips to the East of Garforth site in the PM peak (2028).

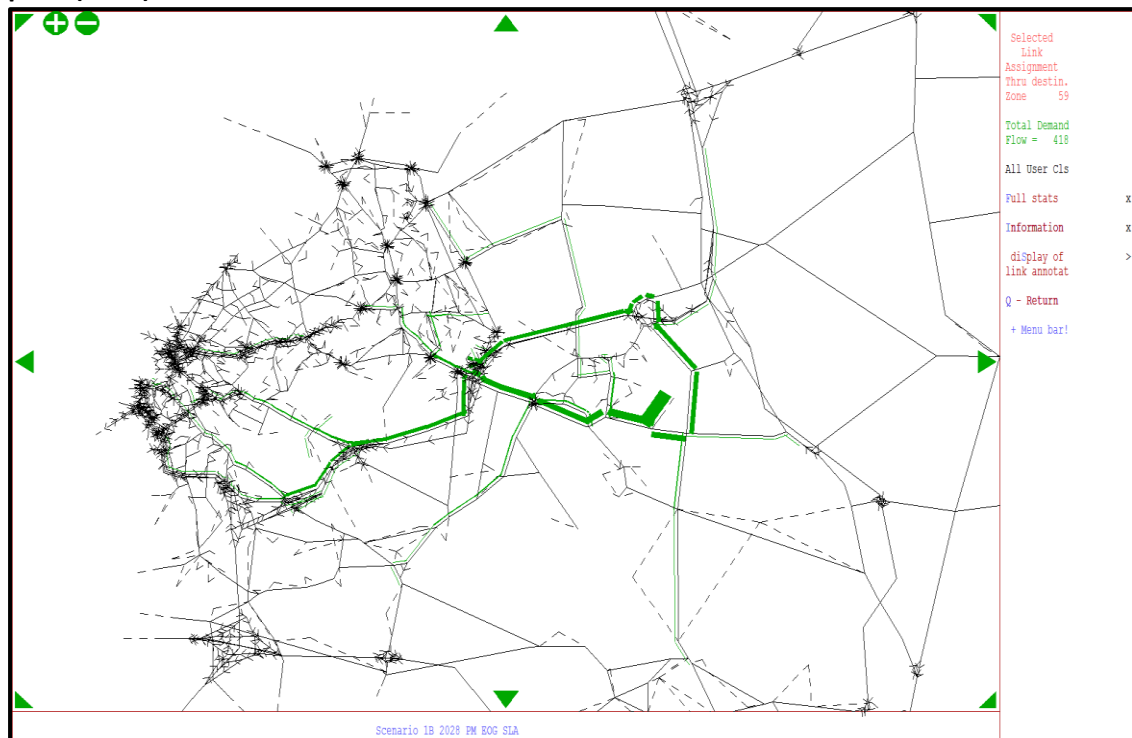


Table 19 Proportion of development related traffic on key links from (in the AM) and to (in the PM) the Parlington site in 2028.

Proportion of traffic from / to Parlington in 2028 Sc1b with Garforth southern bypass scheme						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	42	12%	nb	21	7%
A656 Ridge Road (south of M1 J47)	sb	26	7%	nb	21	7%
A656 Ridge Road (south of A63)	sb	26	8%	nb	21	6%
A1(M) (south of A63)	sb	4	1%	nb	3	1%
A63 (between Ninelands Lane and B6137)	wb	5	1%	eb	3	1%
M1 (between J46 and J47)	wb	238	68%	eb	252	78%
A63 East Leeds Link Road	wb	42	12%	eb	46	14%
A1(M) (north of A64)	nb	7	2%	sb	4	1%
A64 (east of A1(M))	eb	0	0%	wb	0	0%
Barwick Road (south of M1)	sb	0	0%	nb	0	0%
Leeds Road, Scholes (east of Scholes)	wb	3	1%	eb	1	0%
Main Street, Aberford	nb	16	4%	sb	9	3%
Cattle Lane, Barwick in Elmet	wb	6	2%	eb	3	1%
TOTAL	OUT	352		IN	321	

Table 20 Proportion of development related traffic on key links from (in the AM) and to (in the PM) the East of Garforth site in 2028.

Proportion of traffic from / to East of Garforth in 2028 Sc1b with Garforth southern bypass scheme						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	0	0%	nb	0	0%
A656 Ridge Road (south of M1 J47)	nb	0	0%	sb	0	0%
A656 Ridge Road (south of A63)	sb	38	9%	nb	28	7%
A1(M) (south of A63)	sb	5	1%	nb	5	1%
Church lane (Micklefield)	eb	18	4%	wb	2	0%
A63 (between Ninelands Lane and B6137)	wb	256	57%	eb	198	48%
M1 (between J46 and J47)	wb	52	12%	eb	119	28%
A63 East Leeds Link Road	wb	48	11%	eb	55	13%
A1(M) (north of A64)	nb	9	2%	sb	5	1%
A64 (east of A1(M))	eb	9	2%	wb	8	2%
Barwick Road (south of M1)	nb	15	3%	sb	15	4%
Leeds Road, Scholes (east of Scholes)	wb	11	2%	eb	12	3%
Main Street, Aberford	nb	3	1%	sb	1	0%
Cattle Lane, Barwick in Elmet	wb	0	0%	eb	0	0%
TOTAL	OUT	445		IN	418	

Table 21 Changes in delay between 2028 Do Minimum and 2028 Do Something (Garforth S bypass) in the AM peak at key junctions around Garforth

Key Junction Scenario 1b	Base 2016		Do Min 2028 Am pk			Do Som 2028 Am pk			Change from 2016 Base		%age change from 2016		Change from Do Min		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	Traffic	Delay	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2382	318	2851	640	5	3144	122	0	762	-196	32%	-62%	293	-518	10%	-81%
A63 Selby Rd / Ninelands La, Garforth	1573	153	1721	155	0	2229	165	0	1470	11	93%	7%	508	10	30%	6%
A63 Selby Rd / B6137 Leeds Rd, Garforth	1889	31	2177	40	0	2974	76	0	-427	44	-23%	-142%	797	36	37%	89%
A63 Selby Rd / B6137 Lidgett La, Garforth	2131	212	2143	205	1	938	166	0	-1731	-46	-81%	-22%	-1205	-39	-56%	-19%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3481	38	4136	426	3	4701	302	2	1220	264	35%	700%	565	-124	14%	-29%
A64/A1(M) Junction 44	3353	70	3741	85	0	3698	85	0	345	14	10%	20%	-43	0	-1%	0%
A63 Pontefract La / M1 Junction 45	3111	153	4513	217	1	4519	223	1	1408	71	45%	46%	6	6	0%	3%
A63 Selby Rd / A6120 / M1 Junction 46	5255	315	6485	1215	10	7308	597	5	2053	282	39%	89%	822	-617	13%	-51%
Thorpe Park/Jn46	1563	79	4599	192	2	4680	273	4	3117	195	199%	247%	81	81	2%	42%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2879	25	4252	307	3	4110	153	3	1231	127	43%	508%	-142	-154	-3%	-50%
A656 Ridge Rd / Church La	1245	56	1891	259	1	1796	201	1	551	146	44%	262%	-95	-58	-5%	-22%
A656 Ridge Rd / B6137 Longdike La	1417	181	2083	225	0	2498	294	1	1081	113	76%	63%	415	69	20%	31%
A642 Aberford Rd / Bar La, Garforth	1382	29	1792	297	2	1750	55	0	368	27	27%	93%	-42	-242	-2%	-81%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1400	167	2043	550	3	1584	182	0	184	15	13%	9%	-459	-368	-22%	-67%
Leeds Rd / Long La, Barwick	776	18	1252	27	0	1102	22	0	326	5	42%	27%	-151	-4	-12%	-16%
Leeds Rd / Main St, Scholes	808	18	1254	23	0	1155	21	0	347	3	43%	17%	-99	-2	-8%	-10%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	958	39	1586	44	0	1305	40	0	347	1	36%	2%	-281	-4	-18%	-9%
Main St / Cattle La, Aberford	653	16	1039	21	0	923	19	0	270	3	41%	17%	-116	-2	-11%	-8%

Table 22 : Changes in delay between 2028 Do Minimum and 2028 Do Something (Garforth S bypass) in the PM peak at key junctions around Garforth

Key Junction Scenario 1b	Base 2016		Do Min 2028 Pm pk			Do Som 2028 Pm pk			Change from 2016 Base		%age change from 2016		Change from Do Min		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	Traffic	Delay	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2280	134	2795	296	3	2919	120	0	639	-14	28%	-11%	124	-176	4%	-59%
A63 Selby Rd / Ninelands La, Garforth	1721	173	1629	179	0	2151	201	0	1072	28	62%	16%	522	22	32%	12%
A63 Selby Rd / B6137 Leeds Rd, Garforth	2060	37	2097	39	0	3081	82	0	-221	45	-11%	-123%	984	44	47%	113%
A63 Selby Rd / B6137 Lidgett La, Garforth	2125	239	2165	269	1	798	172	0	-1783	-66	-84%	-28%	-1367	-96	-63%	-36%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3444	54	4144	502	3	4723	315	0	1279	261	37%	479%	579	-187	14%	-37%
A64/A1(M) Junction 44	3248	73	3428	84	0	3442	84	0	194	11	6%	15%	14	0	0%	0%
A63 Pontefract La / M1 Junction 45	2487	134	4334	155	0	4228	163	1	1741	29	70%	22%	-106	8	-2%	5%
A63 Selby Rd / A6120 / M1 Junction 46	5191	434	6091	1275	10	6733	1139	7	1542	705	30%	163%	641	-136	11%	-11%
Thorpe Park/Jn46	1576	78	4373	156	1	3947	154	0	2371	76	150%	98%	-426	-2	-10%	-1%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2799	40	4033	273	1	3905	225	1	1106	185	40%	465%	-128	-48	-3%	-17%
A656 Ridge Rd / Church La	1225	55	1913	445	1	1818	433	1	593	378	48%	682%	-95	-12	-5%	-3%
A656 Ridge Rd / B6137 Longdike La	1471	181	2154	233	0	2222	235	0	750	54	51%	30%	67	2	3%	1%
A642 Aberford Rd / Bar La, Garforth	1580	35	2032	91	0	1929	60	0	349	25	22%	73%	-102	-31	-5%	-34%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1417	168	1998	229	0	1756	187	0	339	19	24%	11%	-242	-42	-12%	-18%
Leeds Rd / Long La, Barwick	806	18	1401	27	0	1002	20	0	195	2	24%	10%	-400	-7	-29%	-25%
Leeds Rd / Main St, Scholes	876	17	1425	15	0	1055	15	0	178	-2	20%	-14%	-370	-1	-26%	-5%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	897	37	1199	36	0	957	35	0	60	-2	7%	-6%	-241	-1	-20%	-3%
Main St / Cattle La, Aberford	654	16	1085	19	0	892	18	0	238	1	36%	9%	-193	-1	-18%	-4%

Table 23 : Changes in journey time between 2016 base year and 2028 Do Something (Garforth southern bypass only) in the AM and PM peak hours on the A63 through Garforth

Journey time results (seconds)			Scenario 1b				
	A2 2016	A2 2028 DM	A2 2028 DS	change from base	% change	change from Do Min	% change
AM							
A63 westbound	547	913	711	164	30%	-202	-22%
A63 eastbound	459	539	493	34	7%	-46	-9%
PM	P2 2016	P2 2028 DM			% change		% change
A63 westbound	497	531	435	-62	-12%	-96	-18%
A63 eastbound	582	889	607	25	4%	-282	-32%

NOTE the do something route is via the new bypass

6. Mitigation Test 3 Impacts (M1 junction 47 improvement and Garforth Southern Bypass combined)

- 6.1. The third option tested involved a combination of the two previously tested options for M1 junction 47 plus a new wide single carriageway road providing a southern bypass of Garforth between the A63 / A642 roundabout and the Ninelands Lane junction with the A63. Note that the Improvements at Junction 47 don't include the widening of the westbound slip road to 2 lanes with a parallel merge as the initial tests suggest this is not required in combination with the Garforth Southern bypass. In common with Test 3 this test also includes a signalled junction for the East of Garforth development on the A63⁵, although further work will be required to establish the nature and form of the access arrangements for this site.
- 6.2. Table 24 lists the changes in flow between the 2016 Base, 2028 Do Minimum and the 2028 Do Something situation with Junction 47 plus Garforth Southern bypass in the AM and PM peak hours.
- 6.3. In the AM peak flows on the M1 are forecast to remain broadly the same as in the Do Minimum situation, with flows approaching link capacity between junctions 47 and 46 and exceeding it between 46 and 45 westbound. The requirement for additional link capacity and merge diverge upgrades will be confirmed by Highways England using DMRB assessments. Flows on the minor road network around Aberford, Barwick and Scholes are forecast to be lower than in both Tests 1 and 2, but still higher than in the base situation.
- 6.4. In the AM peak traffic from the East of Garforth site routes via the Garforth Southern bypass to access the M1 at junction 46. Compared to the Do Minimum, flows increase by 18% westbound on the A63 west of Garforth, which is similar to Test 2. As would be expected flows on the bypassed section of the A63 through Garforth reduce significantly. The flow on the Garforth southern bypass is very similar to the option with the bypass alone, suggesting that the additional capacity at M1 junction 47 doesn't limit the amount of traffic that will reassign to the bypass
- 6.5. The usage of the bypass is similar in the PM peak to the AM peak with a two way flow of some 2200 vehicles although the flow in the peak direction is lower. As with the AM peak, usage of the A63 and the existing road remains at a similar level to Test 2 (bypass only). Flows increase by 24% eastbound on the A63 between M1 junction 46 and Garforth and are reduced significantly on the old road (down more than 70%). In the PM peak significantly less traffic is forecast to use the minor road network around Aberford, Barwick and Scholes than in the Do Minimum, but again more than in the base. The combined option provides the greatest reduction in flow compared to the Do Minimum for Main Street in Aberford and Leeds Road west of Barwick. Virtually all traffic returning to Parlington in the PM peak does so via M1 junction 47 as evidenced by the increased flow on the B1217 north of M1 junction 47 between the M1 and the access to the Parlington site (+332 pcus compared to the Do minimum).
- 6.6. Figures 15 and 16 indicate which links are used by traffic generated by the two developments in the morning peak. This shows that with Junction 47 and the Garforth southern bypass nearly all of the traffic generated by the Parlington site would route through M1 junction 47 to access the M1 in the AM peak. About half of traffic generated by the East of Garforth development routes along the Garforth bypass to access the M1 south

⁵ Due to increased traffic levels on the A63 with the bypass tests.

at junction 46. Trips from the East of Garforth site to and from Thorpe Park and destinations close to the new East Leeds Orbital Road route via M1 junction 47.

- 6.7. Figures 17 and 18 indicate which links are used by traffic attracted by the two developments in the evening peak. This indicates that nearly all trips to Parlington are now forecast to route via junction 47 of the M1. Traffic to the East of Garforth site routes via several routes although the single most popular route for traffic is the A63 Garforth Southern bypass. In comparison to the morning peak, more traffic routes via M1 junction 47
- 6.8. Tables 25 and 26 show the proportion of traffic generated by the two developments (away from the site in the AM and into the site in the PM) on key links in the situation with the M1 Junction 47 scheme and Garforth Southern bypass combined. This shows that for the Parlington site the proportion of traffic associated with the developments using the M1 between junctions 46 and 47 increases to 68% in the AM and nearly 80% of trips in the PM. Trips from / to the East of Garforth site using the bypass are 51% in the AM peak and 43% in the PM Peak hour. The inclusion of the Junction 47 improvements, results in slightly more traffic routing via Junction 47. Usage of the M1 between junctions 46 and 47 is 17% in the AM peak but much higher at 35% in the PM peak.
- 6.9. The mitigation at junction 47 reduces the proportion of trips from / to Parlington using minor roads in and around Aberford to less than 4% in the AM peak and virtually zero in the PM peak. As in the Do Minimum between 11 and 14% of traffic from/to both sites is forecast to use the East Leeds link road between M1 junction 45 and the City Centre.
- 6.10. The mitigated impact of the developments on key junctions in the Garforth area is illustrated in Tables 27 and 28 which compare traffic volumes and delays in the Base and Do Minimum with the Do Something (J47 and Garforth southern bypass) situation in 2028.
- 6.11. Between the base year and 2028 Do Something situation flows through the junctions and delays are forecast to increase significantly, but generally less than with the Junction 47 scheme or the bypass schemes alone.
- 6.12. Most junctions operate satisfactorily with the 2 mitigation schemes in place. Delays are forecast to fall by at least 10% compared with the Do Minimum at eight junctions in both the AM and PM peak hours. This includes reductions in both peaks at the A63/A656 roundabout (due to the improvement), the A63 / Lidgett La and A63 / A642 'Old George' junctions (due to the bypass), M1 junctions 46 and 47, the A642 junctions with Bar La and Main St and the Leeds Rd / Long La junction in Barwick.
- 6.13. The combination of the bypass with M1 junction 47 improvement results in a slight fall in traffic passing through junction 47 in the AM peak but a small rise in the PM peak compared with the Do Minimum. The scheme provides relief to the junction with delays significantly down and all arms operating satisfactorily in both peaks. The bypass attracts more traffic into the A63 corridor to a similar extent as Test 2 (bypass alone). The Church Lane approach to the A656 remains an issue for traffic leaving Micklefield in the both peaks. In the PM peak particularly, M1 junction 46 still has some issues at the Thorpe Park dumbbells. As noted already, the design of this junction is being reviewed as part of the ELOR scheme.
- 6.14. In most cases the delays at junctions in 2028 with mitigation are worse than the 2016 base situation, as the impacts of the generated traffic can't be fully mitigated. The only exception is the A63 / B6137 Lidgett Lane junction which is bypassed by the Garforth southern bypass scheme and so delays are less than in the base year. More significant additional capacity

would be likely to be required to remove the additional delay forecast for M1 junction 46 in particular.

- 6.15. Additional delays of around 40 seconds per pcu is forecast at the new roundabout junction between the B6137 Leeds road (from Kippax) and the A63 bypass in both peaks resulting from the increased flow attracted to use the A63 passing through the junction. Detailed design of the roundabout would be anticipated to result in a roundabout design capable of accommodating the volume of traffic forecast for 2028.
- 6.16. Journey times have been extracted from the model for a route along the A63 between the A656 and the 'Cracked Egg' Century Way junction, for the situation with the Garforth Bypass scheme in place and for the same route in the base and Do Minimum. Table 29 illustrates the journey times and changes. In the AM peak hour westbound journey times are reduced by almost 3.5 minutes compared with the Do Minimum and in the PM peak eastbound by 5.5 minutes. Although AM peak journey times remain longer than in the 2016 base, in the PM peak the modelling suggests that a saving from 2016 could be achieved.

Table 24 : Changes in traffic flow on key links in the forecast year 2028 between the Do Minimum situation without mitigation and the Do Something with J47 improvements and a Garforth southern bypass.

Key link	Dirn	Base conditions 2016		Do Minimum 2028		Do something 2028		Change from 2016 Base		% Change from 2016 Base		Change from Do min		%age Change from 2028 D	
		Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour
		Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow
A63 east of Garforth	WB	668	611	811	507	1138	581	471	-30	71%	-5%	327	74	40%	15%
A63 east of Garforth	EB	495	578	457	725	533	945	37	366	7%	63%	76	220	17%	30%
A63 Garforth (E of Lidgett La)	WB	1139	775	1270	717	352	181	-787	-595	-69%	-77%	-918	-536	-72%	-75%
A63 Garforth (E of Lidgett La)	EB	581	1029	506	1118	120	314	-461	-715	-79%	-69%	-386	-805	-76%	-72%
A63 west of Garforth	WB	1807	935	2124	791	2499	990	692	56	38%	6%	375	199	18%	25%
A63 west of Garforth	EB	1035	1723	916	1900	1134	2359	99	637	10%	37%	218	459	24%	24%
A63 Garforth Southern Bypass	WB	n/a	n/a	n/a	n/a	1737	824	1737	824	n/a	n/a	1737	824	n/a	n/a
A63 Garforth Southern Bypass	EB	n/a	n/a	n/a	n/a	593	1406	593	1406	n/a	n/a	593	1406	n/a	n/a
A656 south of Jn 47	NB	846	354	891	827	1190	685	344	331	41%	94%	298	-142	33%	-17%
A656 south of Jn 47	SB	371	843	733	1016	629	1054	258	211	69%	25%	-103	38	-14%	4%
A656 south of A63	NB	579	458	698	654	949	534	370	75	64%	16%	251	-120	36%	-18%
A656 south of A63	SB	447	550	655	722	663	728	216	178	48%	32%	8	6	1%	1%
A642 south of Jn 47	NB	609	619	749	984	760	899	151	279	25%	45%	10	-86	1%	-9%
A642 south of Jn 47	SB	540	580	833	767	769	835	228	255	42%	44%	-65	68	-8%	9%
A642 south of A63	NB	548	431	834	744	762	508	214	76	39%	18%	-72	-237	-9%	-32%
A642 south of A63	SB	475	706	759	1141	850	1124	376	418	79%	59%	91	-17	12%	-2%
B1217 north of Jn 47	WB	584	260	1078	476	972	414	388	154	67%	59%	-106	-62	-10%	-13%
B1217 north of Jn 47	EB	230	488	326	539	349	871	119	382	52%	78%	24	332	7%	62%
Main St Aberford	NB	289	251	617	254	449	296	160	44	55%	18%	-167	42	-27%	17%
Main St Aberford	SB	234	238	238	684	241	291	7	53	3%	22%	3	-394	1%	-58%
Cattle La	WB	143	124	379	132	240	137	97	14	68%	11%	-139	6	-37%	4%
Cattle La	EB	115	117	185	532	172	122	57	5	49%	4%	-13	-410	-7%	-77%
Long La south of Barwick	NB	250	249	291	163	289	138	40	-112	16%	-45%	-2	-25	-1%	-16%
Long La south of Barwick	SB	197	240	254	392	213	228	16	-12	8%	-5%	-41	-164	-16%	-42%
Leeds Rd west of Barwick	WB	429	292	754	258	623	236	194	-57	45%	-19%	-131	-22	-17%	-9%
Leeds Rd west of Barwick	EB	199	362	332	1001	311	426	112	64	56%	18%	-22	-575	-7%	-57%
Leeds Rd west of Scholes	WB	324	246	832	301	717	288	393	42	121%	17%	-115	-12	-14%	-4%
Leeds Rd west of Scholes	EB	145	296	345	1040	309	516	164	220	113%	74%	-36	-524	-11%	-50%
M1 Jn 47-48	WB	4106	3573	4707	3889	4599	3838	493	265	12%	7%	-108	-51	-2%	-1%
M1 Jn 47-48	EB	4021	3750	4024	4024	4174	3813	153	63	4%	2%	150	-212	4%	-5%
M1 Jn 46-47	WB	4835	3525	6088	4462	6113	4314	1277	788	26%	22%	24	-149	0%	-3%
M1 Jn 46-47	EB	3854	4380	4680	4747	4513	5050	660	670	17%	15%	-167	304	-4%	6%
M1 Jn 45-46	WB	5975	4482	6220	4931	6220	4915	245	433	4%	10%	0	-16	0%	0%
M1 Jn 45-46	EB	4611	5449	5279	5349	5288	5499	678	50	15%	1%	9	150	0%	3%

Figure 15 Do Something (J47 and Garforth southern bypass) trips from the Parlington site in the AM peak (2028).

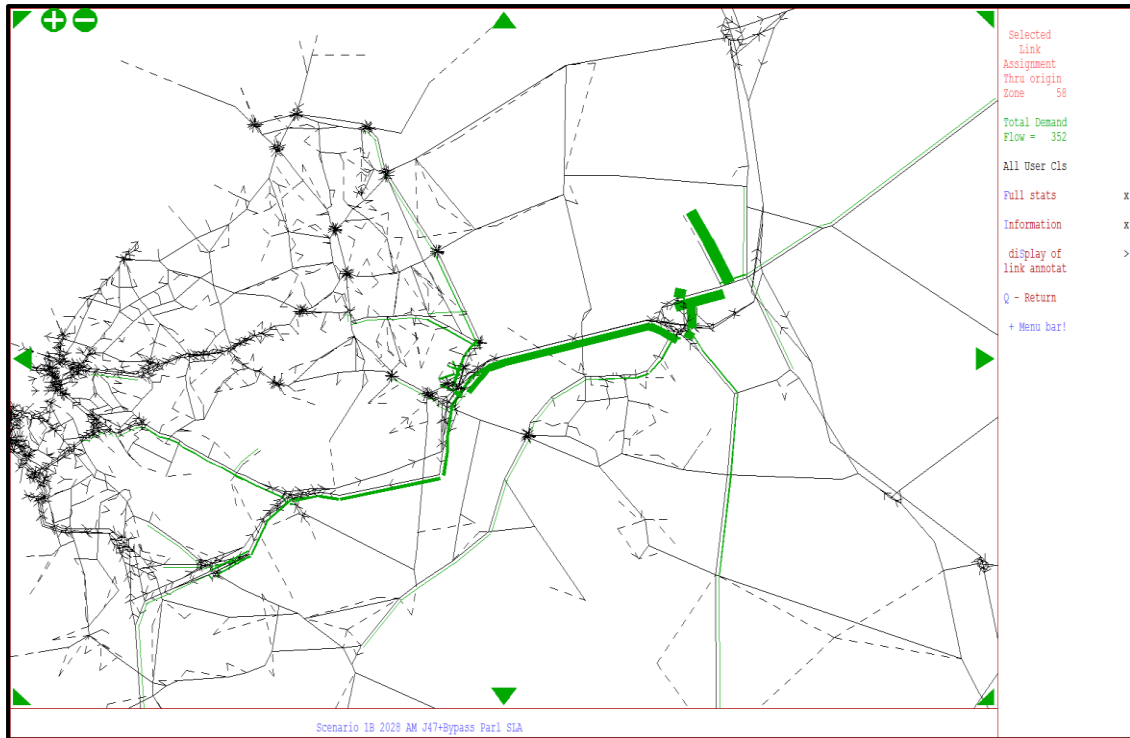


Figure 16 Do Something (J47 and Garforth southern bypass) trips from the East of Garforth site in the AM peak (2028).

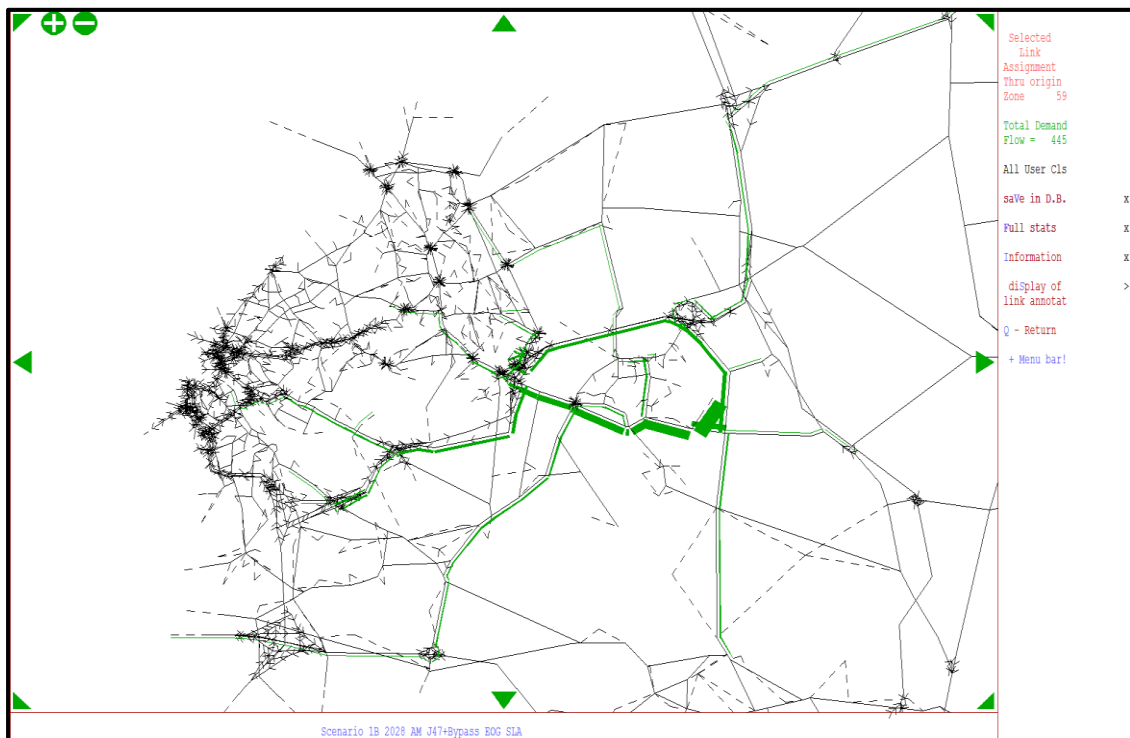


Figure 17 Do Something (J47 and Garforth southern bypass) trips to the Parlington site in the PM peak (2028).

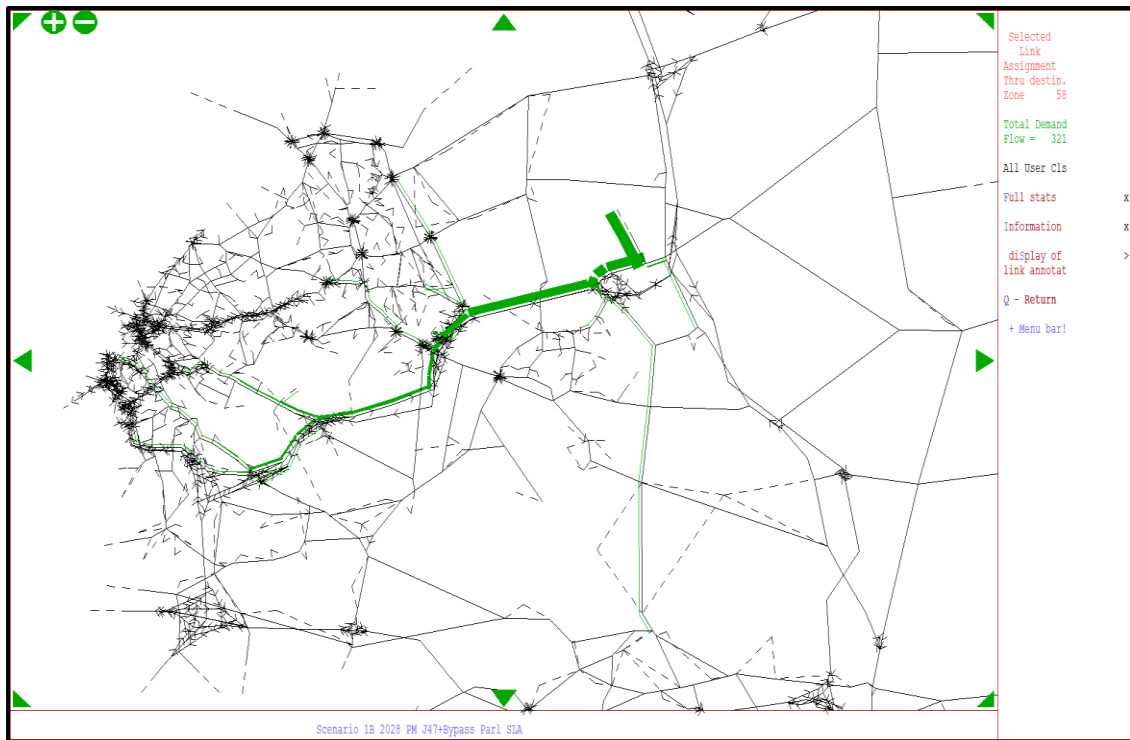


Figure 18 Do Something (J47 and Garforth southern bypass) trips to the East of Garforth site in the PM peak (2028).

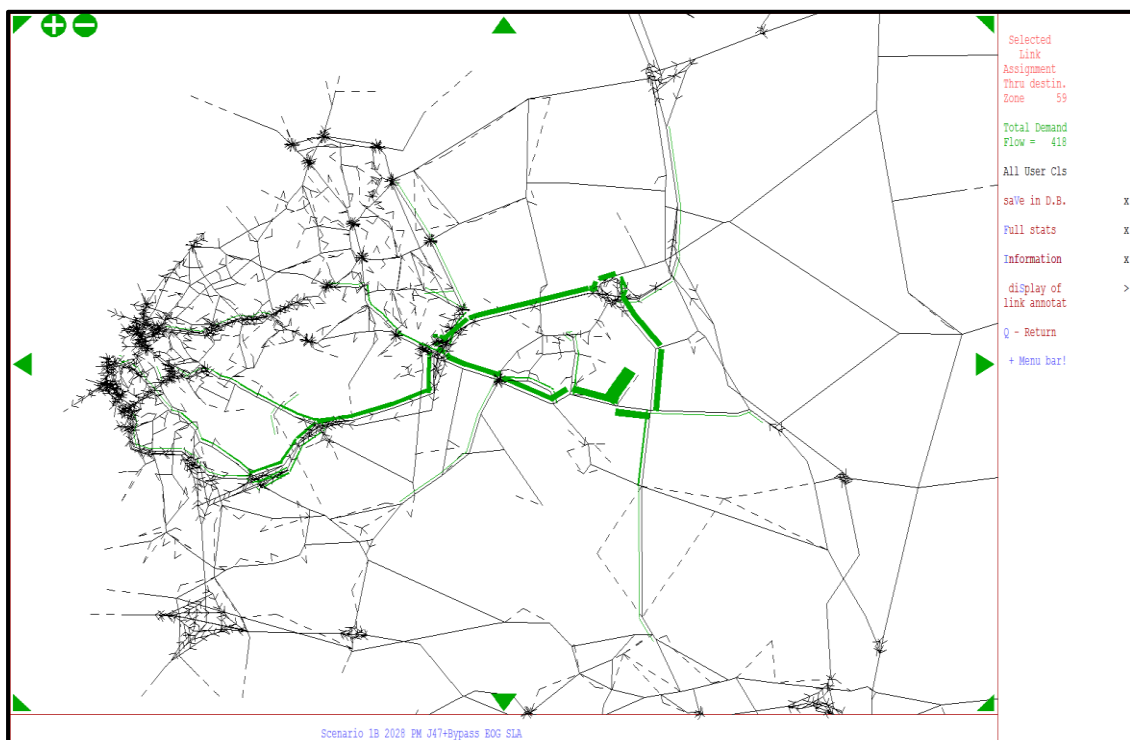


Table 25 : Proportion of development related traffic on key links from (in the AM) and to (in the PM) the Parlington site in 2028

Proportion of traffic from / to Parlington in 2028 Sc1b with M1 junc 47 imp and Garforth southern bypass scheme						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	41	12%	nb	17	5%
A656 Ridge Road (south of M1 J47)	sb	28	8%	nb	19	6%
A656 Ridge Road (south of A63)	sb	27	8%	nb	19	6%
A1(M) (south of A63)	sb	4	1%	nb	4	1%
A63 (between Ninelands Lane and B6137)	wb	4	1%	eb	3	1%
M1 (between J46 and J47)	wb	239	68%	eb	258	80%
A63 East Leeds Link Road	wb	42	12%	eb	46	14%
A1(M) (north of A64)	nb	7	2%	sb	4	1%
A64 (east of A1(M))	eb	0	0%	wb	0	0%
Barwick Road (south of M1)	sb	0	0%	nb	0	0%
Leeds Road, Scholes (east of Scholes)	wb	2	1%	eb	0	0%
Main Street, Aberford	nb	14	4%	sb	8	3%
Cattle Lane, Barwick in Elmet	wb	5	1%	eb	2	1%
TOTAL	OUT	352		IN	321	

Table 26 : Proportion of development related traffic on key links from (in the AM) and to (in the PM) the East of Garforth site in 2028.

Proportion of traffic from / to East of Garforth in 2028 Sc1b with M1 junc 47 imp and Garforth southern bypass scheme						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	0	0%	nb	0	0%
A656 Ridge Road (south of M1 J47)	nb	0	0%	sb	0	0%
A656 Ridge Road (south of A63)	sb	37	8%	nb	28	7%
A1(M) (south of A63)	sb	5	1%	nb	5	1%
Church lane (Micklefield)	eb	14	3%	wb	2	0%
A63 (between Ninelands Lane and B6137)	wb	229	51%	eb	180	43%
M1 (between J46 and J47)	wb	77	17%	eb	148	35%
A63 East Leeds Link Road	wb	48	11%	eb	54	13%
A1(M) (north of A64)	nb	9	2%	sb	5	1%
A64 (east of A1(M))	eb	12	3%	wb	8	2%
Barwick Road (south of M1)	nb	18	4%	sb	5	1%
Leeds Road, Scholes (east of Scholes)	wb	14	3%	eb	1	0%
Main Street, Aberford	nb	2	0%	sb	1	0%
Cattle Lane, Barwick in Elmet	wb	0	0%	eb	0	0%
TOTAL	OUT	445		IN	418	

Table 27 : Changes in delay between 2028 Do Minimum and 2028 Do Something (J47 and Garforth S bypass) in the AM peak at key junctions

Key Junction Scenario 1b	Base 2016		Do Min 2028 Am pk			Do Som 2028 Am pk			Change from 2016 Base		%age change from 2016		Change from Do Min		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	Traffic	Delay	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2382	318	2851	640	5	3303	140	0	920	-178	39%	-56%	452	-500	16%	-78%
A63 Selby Rd / Ninelands La, Garforth	1573	153	1721	155	0	2172	164	0	599	11	38%	7%	451	9	26%	6%
A63 Selby Rd / B6137 Leeds Rd, Garforth	1889	31	2177	40	0	2970	76	0	-428	44	-23%	141%	793	36	36%	89%
A63 Selby Rd / B6137 Lidgett La, Garforth	2131	212	2143	205	1	935	166	0	-1196	-46	-56%	-22%	-1208	-39	-56%	-19%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3481	38	4136	426	3	4764	298	2	1283	260	37%	688%	628	-128	15%	-30%
A64/A1(M) Junction 44	3353	70	3741	85	0	3660	85	0	307	15	9%	21%	-81	0	-2%	0%
A63 Pontefract La / M1 Junction 45	3111	153	4513	217	1	4512	224	1	1401	71	45%	46%	-2	6	0%	3%
A63 Selby Rd / A6120 / M1 Junction 46	5255	315	6485	1215	10	7349	606	4	2095	291	40%	92%	864	-609	13%	-50%
Thorpe Park/In46	1563	79	4599	192	2	4699	272	4	3136	194	201%	246%	100	80	2%	42%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2879	25	4252	307	3	4150	143	0	1270	118	44%	472%	-102	-164	-2%	-53%
A656 Ridge Rd / Church La	1245	56	1891	259	1	1969	336	1	724	281	58%	504%	78	77	4%	30%
A656 Ridge Rd / B6137 Longdike La	1417	181	2083	225	0	2500	297	1	1083	116	76%	64%	417	71	20%	32%
A642 Aberford Rd / Bar La, Garforth	1382	29	1792	297	2	1712	45	0	330	16	24%	57%	-79	-252	-4%	-85%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1400	167	2043	550	3	1580	175	0	181	8	13%	5%	-463	-375	-23%	-68%
Leeds Rd / Long La, Barwick	776	18	1252	27	0	1073	21	0	297	4	38%	21%	-180	-5	-14%	-20%
Leeds Rd / Main St, Scholes	808	18	1254	23	0	1122	20	0	314	2	39%	12%	-132	-3	-11%	-13%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	958	39	1586	44	0	1247	40	0	289	1	30%	3%	-339	-4	-21%	-9%
Main St / Cattle La, Aberford	653	16	1039	21	0	860	18	0	207	2	32%	12%	-179	-2	-17%	-12%

Table 28 : Changes in delay between 2028 Do Minimum and 2028 Do Something (J47 and Garforth S bypass) in the PM peak at key junctions

Key Junction Scenario 1b	Base 2016		Do Min 2028 Pm pk			Do Som 2028 Pm pk			Change from 2016 Base		%age change from 2016		Change from Do Min		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	Traffic	Delay	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2280	134	2795	296	3	2905	118	0	625	-16	27%	-12%	110	-178	4%	-60%
A63 Selby Rd / Ninelands La, Garforth	1721	173	1629	179	0	2119	195	0	398	22	23%	13%	490	16	30%	9%
A63 Selby Rd / B6137 Leeds Rd, Garforth	2060	37	2097	39	0	2966	81	0	-1324	44	-64%	119%	869	42	41%	108%
A63 Selby Rd / B6137 Lidgett La, Garforth	2125	239	2165	269	1	725	172	0	-1400	-67	-66%	-28%	-1440	-97	-67%	-36%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3444	54	4144	502	3	4540	311	0	1096	257	32%	472%	396	-191	10%	-38%
A64/A1(M) Junction 44	3248	73	3428	84	0	3473	85	0	225	12	7%	16%	45	1	1%	2%
A63 Pontefract La / M1 Junction 45	2487	134	4334	155	0	4153	187	1	1666	53	67%	39%	-181	31	-4%	20%
A63 Selby Rd / A6120 / M1 Junction 46	5191	434	6091	1275	10	6750	954	5	1559	520	30%	120%	658	-321	11%	-25%
Thorpe Park/In46	1576	78	4373	156	1	4234	443	3	2658	365	169%	468%	-139	286	-3%	183%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2799	40	4033	273	1	4199	118	0	1399	78	50%	197%	166	-155	4%	-57%
A656 Ridge Rd / Church La	1225	55	1913	445	1	1838	438	1	613	383	50%	691%	-76	-7	-4%	-2%
A656 Ridge Rd / B6137 Longdike La	1471	181	2154	233	0	2178	227	0	707	45	48%	25%	23	-6	1%	-3%
A642 Aberford Rd / Bar La, Garforth	1580	35	2032	91	0	1894	52	0	314	17	20%	50%	-138	-39	-7%	-43%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1417	168	1998	229	0	1650	176	0	233	7	16%	4%	-348	-53	-17%	-23%
Leeds Rd / Long La, Barwick	806	18	1401	27	0	805	18	0	-1	0	0%	0%	-596	-8	-43%	-31%
Leeds Rd / Main St, Scholes	876	17	1425	15	0	868	15	0	-8	-2	-1%	-14%	-556	-1	-39%	-5%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	897	37	1199	36	0	1160	40	0	262	3	29%	9%	-39	4	-3%	12%
Main St / Cattle La, Aberford	654	16	1085	19	0	745	17	0	91	1	14%	5%	-340	-2	-31%	-8%

Table 29 : Changes in journey time between 2016 base year and 2028 Do Something (J47 and Garforth southern bypass) in the AM and PM peak hours on the A63 through Garforth

Journey time results (seconds)			Scenario 1b				
				change from base	% change	change from Do Min	% change
AM	A2 2016	A2 2028 DM	A2 2028 DS				
A63 westbound	547	913	706	159	29%	-207	-23%
A63 eastbound	459	539	501	42	9%	-38	-7%
PM	P2 2016	P2 2028 DM	P2 2028 DS	change from base	% change	change from Do Min	% change
A63 westbound	497	531	438	-59	-12%	-93	-18%
A63 eastbound	582	889	565	-17	-3%	-324	-36%

7. Mitigation Test 4 Impacts (link road from Parlington development to Long Lane Barwick-in-Elmet “Barwick Link road” with Junction 47 improvements)

- 7.1. The fourth option tested involved a new single carriageway road providing a link between the Parlington development and Long Lane. A new roundabout junction has been assumed on Long Lane approximately half way between Barwick-in-Elmet and Garforth. Note that this test also includes improvements at M1 Junction 47. There is no indicative scheme plan available for the link road, however Appendix 1 includes a Plot of the SATURN test network to show how the link road ties in to the existing network on Long Lane.
- 7.2. Table 30 lists the changes in flow between the 2016 Base, 2028 Do Minimum and the 2028 Do Something situation with the Barwick Link Road in the AM and PM peak hours.
- 7.3. In the AM peak westbound flows on the M1 between junction 47 and 46 are forecast to be very similar to the Do Minimum situation (about 30% higher than in the base) with flows approaching link capacity. Between junctions 46 and 45 forecast westbound demand exceeds link capacity. The requirement for additional link capacity and merge/diverge upgrades will be confirmed by Highways England using DMRB assessments. Flows on Main Street and Cattle Lane Aberford, are forecast to be lower than in the Do Minimum, but substantially higher than the base. Unsurprisingly flows increase on Long Lane and Leeds Road Scholes and Leeds Road Barwick-in-Elmet with this test, though the changes are relatively small from the Do Minimum. Flows on the A656 northbound towards the M1 increase by 53% compared to the Do Minimum in the AM peak reflecting the impact of the additional capacity at junction 47. There are only marginal changes in westbound flows on the A63 indicating that this option doesn't make a significant impact on reducing traffic levels here. In addition, contra-peak (eastbound) flows are forecast to rise by 25-30%.
- 7.4. In the PM peak a similar pattern is observed to the AM. The eastbound M1 between junction 46 and 47 is forecast to see an 8% increase in traffic compared with the Do Minimum as a result of the increased capacity on the eastbound off slip road at junction 47. Traffic flows through Aberford increase compared to the base, but are generally significantly less than in the Do Minimum situation and the same applies to the roads through Scholes and Barwick. Flows in and around Garforth on the A63, A642 and A656 are broadly similar to the Do Minimum. The A63 eastbound to the east of Garforth is 8% lower than the Do Minimum again implying that the scheme doesn't make a material impact on the use of the A63, while again contra-peak flows increase.
- 7.5. Figures 19 and 20 indicate which links are used by traffic generated by the two developments in the morning peak. This shows that in the AM peak with the Barwick Link Road and junction 47 improvement in operation most traffic generated by the Parlington site uses junction 47 of the M1. Some traffic generated by the East of Garforth development (34%) routes via M1 junction 47, whilst (37%) still using the A63 through Garforth. This suggests that the junction 47 improvement when combined with the Barwick Link Road attracts some of this development traffic away from the A63.
- 7.6. Figures 21 and 22 indicate which links are used by traffic attracted by the two developments in the evening peak. This indicates that many trips to Parlington are still forecast to route via junction 47 of the M1 with a smaller proportion than in the AM using the new link road. Traffic to the East of Garforth site routes via several routes.
- 7.7. Tables 31 and 32 show the proportion of traffic generated by the two developments (away from the site in the AM and into the site in the PM) on key links in the situation with the

Barwick Link Road scheme. This shows that for the Parlington site the proportion of traffic associated with the developments using the M1 between junctions 46 and 47 is still 52% in the AM and 62% of trips in the PM. 29% of trips from / to the East of Garforth site use the M1 between junctions 46 and 47 in the AM peak. However in the PM this increases to 46%. This suggests that the A63 through Garforth is an attractive route for trips leaving the East of Garforth site, but in the evening the route via M1 junction 47 is preferred more than the A63 (in contrast to the other options tested) with nearly 50% of trips routing this way and only 30% via the A63 through Garforth

- 7.8. The Barwick Link Road reduces the proportion of trips from / to Parlington using minor roads in and around Aberford to about 3% in the AM and PM peaks. The proportion of Parlington trips passing through Barwick (15% in the AM peak and 17% PM peak) is however higher than in the Do Minimum (2% and 7% respectively).
- 7.9. The proportion of traffic from / to the East of Garforth site passing Garforth on the A63 is 37% in the AM and 30% in the PM peak. This is lower than in the tests with a Garforth Southern bypass.
- 7.10. In both peaks around 10% of traffic from/to both sites is forecast to use the East Leeds link road between M1 junction 45 and the City Centre, which is similar to the Do Minimum.
- 7.11. The mitigated impact of the developments on key junctions in the Garforth area is illustrated in Tables 33 and 34 which compare traffic volumes and delays in the 2016 Base and 2028 Do Minimum situation with the Do Something (Barwick Link Road plus Junction 47) situation in 2028.
- 7.12. Between the base year and 2028 Do Something situation flows through the junctions and delays are forecast to increase substantially.
- 7.13. Between the Do Minimum and the Do Something five junctions experience a reduction in delay of at least 19% in both peak hours: the A656 /A63 junction (due to the assumed improvement), M1 junctions 46 and 47, and the Bar La and Main St junctions with the A642 at Garforth. In the PM peak there is a significant reduction in delay at the A63 / A642 "Old George" roundabout and in the AM peak delays increase by almost 30% at the A656 / Church La junction.
- 7.14. Delays are forecast to increase significantly in the PM peak at M1 junction 45 due to the issues with the operation of the slip roads that also occurs in the previous tests. The requirement for additional link capacity and merge/diverge upgrades will be confirmed by Highways England using DMRB assessments. Equally, increased delays at the junction 46 Thorpe Park dumbbells are being looked at as part of the ELOR scheme design.
- 7.15. Table 35 shows the journey time changes for the route along the A63 between the A656 and the 'Cracked Egg' Century Way junction, for the situation with the Garforth Bypass scheme in place and for the same route in the base and Do Minimum. The impact of the interventions is relatively limited in the AM peak hour, but reduced eastbound journey times on the A63 by 26% (4 mins) in the PM peak, though they remain greater than in the 2016 base.

Table 30 Changes in traffic flow on key links in the forecast year 2028 between the Do Minimum situation without mitigation and the Do Something with Barwick Link Road plus Junction 47 improvement combined.

Key link	Dirn	Base conditions 2016		Do Minimum 2028		Do something 2028		Change from 2016 Base		% Change from 2016 Base		Change from Do min		%age Change from 2028 D	
		Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour	Am pk hour	Pm pk hour
		Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow	Actual flow
A63 east of Garforth	WB	668	611	811	507	866	653	199	42	30%	7%	55	146	7%	29%
A63 east of Garforth	EB	495	578	457	725	573	669	78	91	16%	16%	117	-56	26%	-8%
A63 Garforth (E of Lidgett La)	WB	1139	775	1270	717	1205	837	66	61	6%	8%	-65	120	-5%	17%
A63 Garforth (E of Lidgett La)	EB	581	1029	506	1118	641	1152	60	123	10%	12%	136	34	27%	3%
A63 west of Garforth	WB	1807	935	2124	791	2083	1034	276	99	15%	11%	-41	243	-2%	31%
A63 west of Garforth	EB	1035	1723	916	1900	1230	1777	196	55	19%	3%	314	-123	34%	-6%
A656 south of Jn 47	NB	846	354	891	827	1366	667	520	313	61%	89%	475	-160	53%	-19%
A656 south of Jn 47	SB	371	843	733	1016	589	1076	218	233	59%	28%	-144	60	-20%	6%
A656 south of A63	NB	579	458	698	654	1038	655	459	197	79%	43%	340	1	49%	0%
A656 south of A63	SB	447	550	655	722	676	834	229	284	51%	52%	21	112	3%	16%
A642 south of Jn 47	NB	609	619	749	984	619	928	10	309	2%	50%	-131	-56	-17%	-6%
A642 south of Jn 47	SB	540	580	833	767	725	745	185	166	34%	29%	-108	-21	-13%	-3%
A642 south of A63	NB	548	431	834	744	818	654	270	223	49%	52%	-16	-90	-2%	-12%
A642 south of A63	SB	475	706	759	1141	856	892	381	186	80%	26%	96	-249	13%	-22%
B1217 north of Jn 47	WB	584	260	1078	476	1020	415	436	155	75%	59%	-58	-61	-5%	-13%
B1217 north of Jn 47	EB	230	488	326	539	374	1074	144	586	62%	120%	48	535	15%	99%
Main St Aberford	NB	289	251	617	254	552	292	263	40	91%	16%	-65	38	-10%	15%
Main St Aberford	SB	234	238	238	684	209	401	-25	164	-11%	69%	-29	-283	-12%	-41%
Cattle La	WB	143	124	379	132	355	135	212	11	148%	9%	-25	3	-7%	2%
Cattle La	EB	115	117	185	532	144	249	28	132	25%	113%	-41	-283	-22%	-53%
Long La south of Barwick	NB	250	249	291	163	349	168	100	-81	40%	-32%	58	5	20%	3%
Long La south of Barwick	SB	197	240	254	392	250	298	52	59	27%	24%	-4	-94	-2%	-24%
Leeds Rd west of Barwick	WB	429	292	754	258	794	268	365	-24	85%	-8%	40	11	5%	4%
Leeds Rd west of Barwick	EB	199	362	332	1001	314	620	116	258	58%	71%	-18	-381	-5%	-38%
Leeds Rd west of Scholes	WB	324	246	832	301	888	317	564	71	174%	29%	56	17	7%	6%
Leeds Rd west of Scholes	EB	145	296	345	1040	318	672	173	376	119%	127%	-27	-368	-8%	-35%
M1 Jn 47-48	WB	4106	3573	4707	3889	4582	3883	477	310	12%	9%	-125	-6	-3%	0%
M1 Jn 47-48	EB	4021	3750	4024	4024	4170	3723	149	-28	4%	-1%	146	-302	4%	-7%
M1 Jn 46-47	WB	4835	3525	6088	4462	6194	4420	1358	895	28%	25%	105	-42	2%	-1%
M1 Jn 46-47	EB	3854	4380	4680	4747	4465	5145	611	765	16%	17%	-215	399	-5%	8%
M1 Jn 45-46	WB	5975	4482	6220	4931	6220	5337	245	855	4%	19%	0	406	0%	8%
M1 Jn 45-46	EB	4611	5449	5279	5349	5291	5413	680	-35	15%	-1%	12	65	0%	1%

Figure 19 Do Something (Barwick Link Road) trips from the Parlington site in the AM peak (2028).

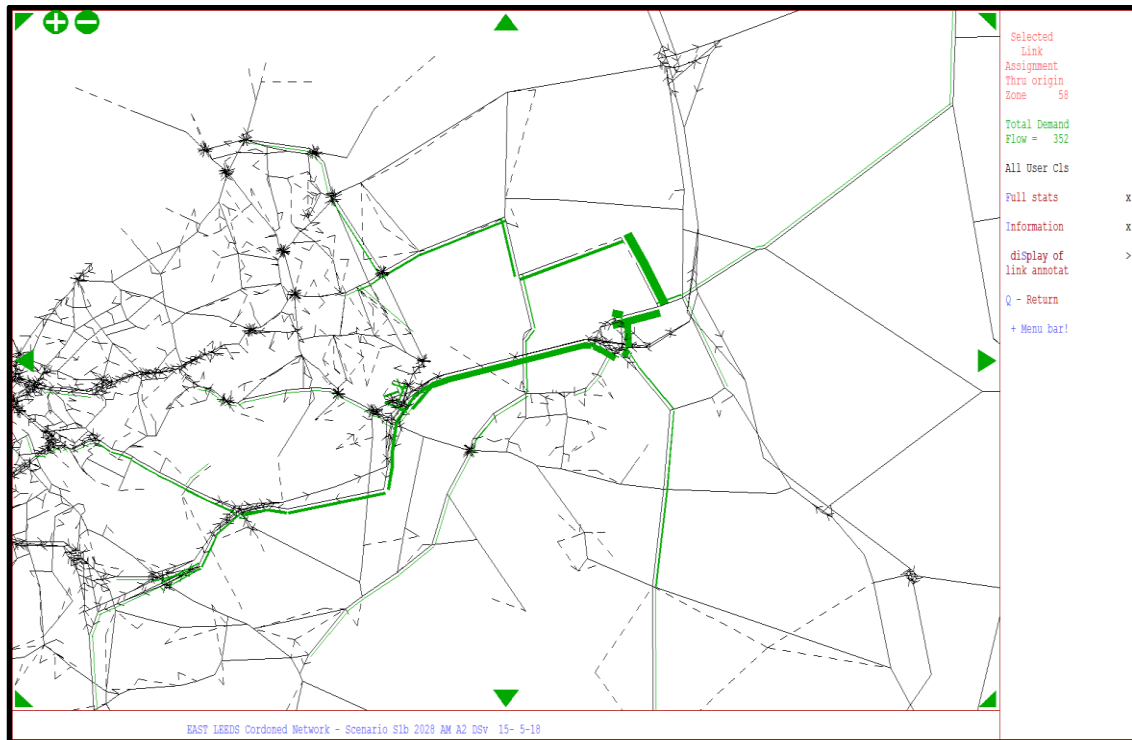


Figure 20 Do Something (Barwick Link Road) trips from the East of Garforth site in the AM peak (2028).

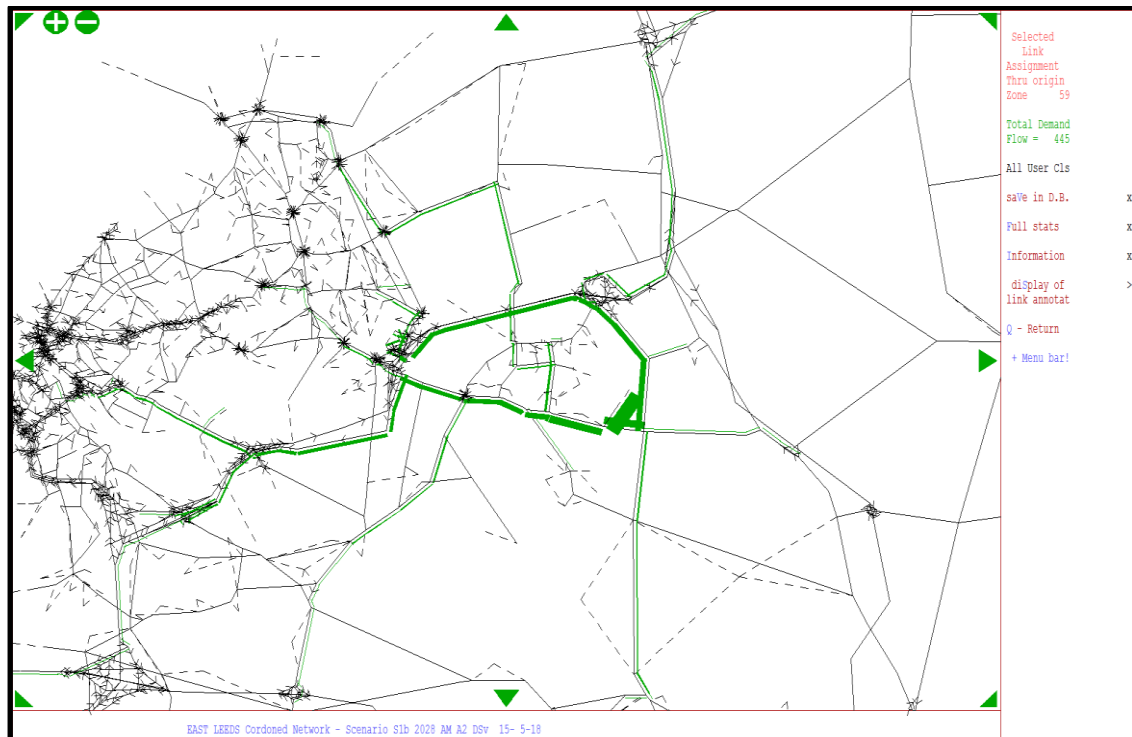


Figure 21 Do Something (Barwick Link Road) trips to the Parlinton site in the PM peak (2028).

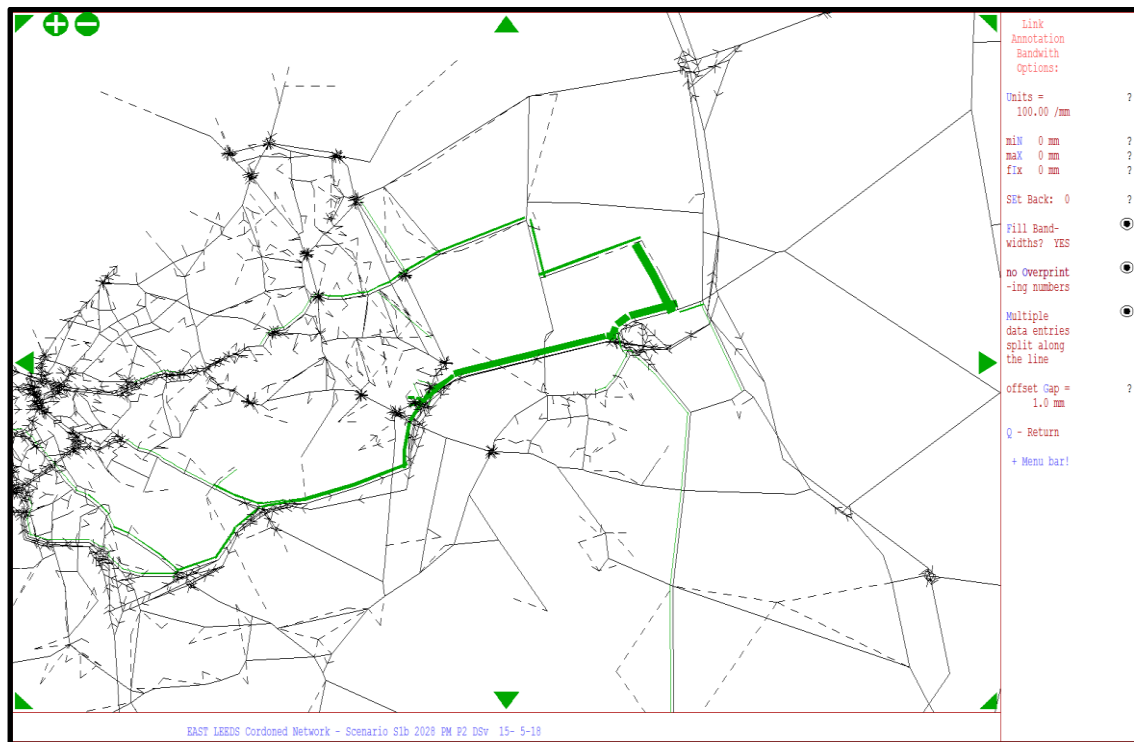


Figure 22 Do Something (Barwick Link Road) trips to the East of Garforth site in the PM peak (2028).

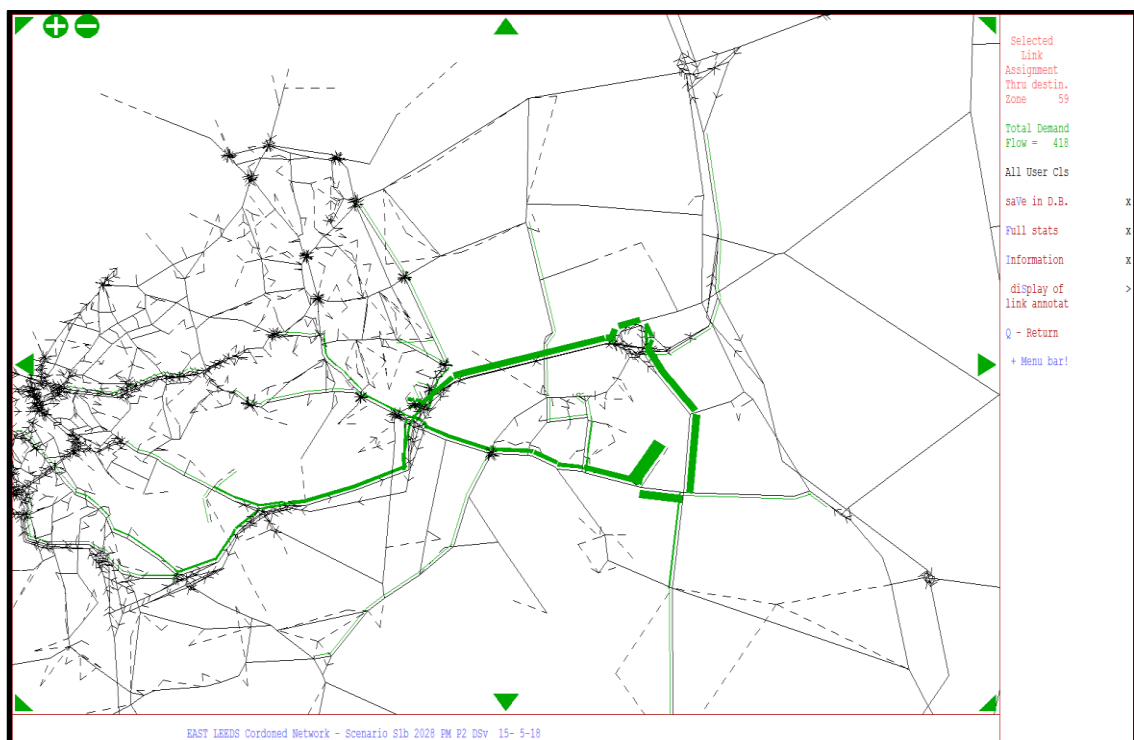


Table 31 Proportion of development related traffic on key links from (in the AM) and to (in the PM) the Parlington site in 2028.

Proportion of traffic from / to Parlington in 2028 Sc1b with Barwick Link Road scheme plus M1 junc 47 imp						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	17	5%	nb	13	4%
A656 Ridge Road (south of M1 J47)	sb	28	8%	nb	19	6%
A656 Ridge Road (south of A63)	sb	28	8%	nb	19	6%
A1(M) (south of A63)	sb	4	1%	nb	7	2%
A63 (between Ninelands Lane and B6137)	wb	4	1%	eb	3	1%
M1 (between J46 and J47)	wb	184	52%	eb	199	62%
A63 East Leeds Link Road	wb	44	13%	eb	37	12%
M1 (north of A64)	nb	7	2%	sb	4	1%
A64 (east of A1(M))	eb	0	0%	wb	0	0%
Barwick Road (south of M1)	sb	25	7%	nb	9	3%
Leeds Road, Scholes (east of Scholes)	wb	54	15%	eb	53	17%
Main Street, Aberford	nb	10	3%	sb	6	2%
Cattle Lane, Barwick in Elmet	wb	0	0%	eb	0	0%
TOTAL	OUT	352		IN	321	

Table 32 Proportion of development related traffic on key links from (in the AM) and to (in the PM) the East of Garforth site in 2028.

Proportion of traffic from / to East of Garforth in 2028 Sc1b with Barwick Link Road scheme plus M1 junc 47 imp						
	Dir	No of trips	% of trips AM (origin)	Dir	No of trips	% of trips PM (destination)
A642 (south of M1 J47 Garforth)	sb	0	0%	nb	1	0%
A656 Ridge Road (south of M1 J47)	nb	153	34%	sb	207	50%
A656 Ridge Road (south of A63)	sb	38	9%	nb	29	7%
A1(M) (south of A63)	sb	5	1%	nb	5	1%
Church lane (Micklefield)	eb	14	3%	wb	3	1%
A63 (between Ninelands Lane and B6137)	wb	164	37%	eb	124	30%
M1 (between J46 and J47)	wb	131	29%	eb	194	46%
A63 East Leeds Link Road	wb	24	5%	eb	43	10%
M1 (north of A64)	nb	9	2%	sb	5	1%
A64 (east of A1(M))	eb	11	2%	wb	8	2%
Barwick Road (south of M1)	nb	28	6%	sb	13	3%
Leeds Road, Scholes (east of Scholes)	wb	24	5%	eb	10	2%
Main Street, Aberford	nb	2	0%	sb	1	0%
Cattle Lane, Barwick in Elmet	wb	0	0%	eb	0	0%
TOTAL	OUT	445		IN	418	

Table 33: Changes in delay between 2028 Do Minimum and 2028 Do Something (Barwick Link Road) in the AM peak at key junctions around Garforth

Key Junction Scenario 1b	Base 2016		Do Min 2028 Am pk			Do Som 2028 Am pk			Change from 2016 Base		%age change from 2016		Change from Do Min		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	Traffic	Delay	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2382	318	2851	640	5	3263	137	0	880	-181	37%	-57%	412	-503	14%	-79%
A63 Selby Rd / Ninelands La, Garforth	1573	153	1721	155	0	1704	158	0	132	5	8%	3%	-17	3	-1%	2%
A63 Selby Rd / B6137 Leeds Rd, Garforth	1889	31	2177	40	0	2035	31	0	147	-1	8%	-2%	-142	-9	-7%	-23%
A63 Selby Rd / B6137 Lidgett La, Garforth	2131	212	2143	205	1	2220	201	0	90	-11	4%	-5%	77	-4	4%	-2%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3481	38	4136	426	3	4457	462	3	976	424	28%	1122%	321	36	8%	8%
A64/A1(M) Junction 44	3353	70	3741	85	0	3639	86	0	287	16	9%	22%	-101	1	-3%	1%
A63 Pontefract La / M1 Junction 45	3111	153	4513	217	1	4505	242	1	1395	89	45%	59%	-8	25	0%	12%
A63 Selby Rd / A6120 / M1 Junction 46	5255	315	6485	1215	10	7131	517	6	1876	202	36%	64%	645	-698	10%	-57%
Thorpe Park/In46	1563	79	4599	192	2	4692	239	4	3130	161	200%	204%	94	47	2%	25%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2879	25	4252	307	3	4209	164	0	1330	139	46%	556%	-43	-142	-1%	-46%
A656 Ridge Rd / Church La	1245	56	1891	259	1	2102	336	1	857	280	69%	503%	211	76	11%	29%
A656 Ridge Rd / B6137 Longdike La	1417	181	2083	225	0	2257	257	1	840	75	59%	42%	174	31	8%	14%
A642 Aberford Rd / Bar La, Garforth	1382	29	1792	297	2	1934	99	2	552	70	40%	246%	142	-198	8%	-67%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1400	167	2043	550	3	2109	267	2	709	100	51%	60%	66	-284	3%	-52%
Leeds Rd / Long La, Barwick	776	18	1252	27	0	1248	26	0	472	8	61%	46%	-5	-1	0%	-4%
Leeds Rd / Main St, Scholes	808	18	1254	23	0	1297	25	0	489	7	61%	40%	43	2	3%	8%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	958	39	1586	44	0	1529	47	0	571	8	60%	19%	-56	3	-4%	6%
Main St / Cattle La, Aberford	653	16	1039	21	0	938	19	0	284	3	44%	18%	-102	-1	-10%	-7%

Table 34: Changes in delay between 2028 Do Minimum and 2028 Do Something (Barwick Link Road) in the PM peak at key junctions around Garforth

Key Junction Scenario 1b	Base 2016		Do Min 2028 Pm pk			Do Som 2028 Pm pk			Change from 2016 Base		%age change from 2016		Change from Do Min		%age change	
	Traffic (pcus)	Delay (secs)	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	No of approaches where v/c exceeds	Traffic (pcus)	Delay (secs)	Traffic	Delay	Traffic (pcus)	Delay (secs)	Traffic	Delay
A63 Selby Rd / A656 Ridge Rd	2280	134	2795	296	3	2823	113	0	543	-21	24%	-16%	28	-183	1%	-62%
A63 Selby Rd / Ninelands La, Garforth	1721	173	1629	179	0	1834	189	0	113	16	7%	9%	205	10	13%	5%
A63 Selby Rd / B6137 Leeds Rd, Garforth	2060	37	2097	39	0	2253	50	0	192	13	9%	35%	155	11	7%	28%
A63 Selby Rd / B6137 Lidgett La, Garforth	2125	239	2165	269	1	2277	314	1	153	75	7%	32%	112	45	5%	17%
A63 Selby Rd / A642 Wakefield Rd, Garforth	3444	54	4144	502	3	3981	219	2	537	164	16%	302%	-163	-284	-4%	-56%
A64/A1(M) Junction 44	3248	73	3428	84	0	3494	86	0	245	12	8%	17%	66	2	2%	2%
A63 Pontefract La / M1 Junction 45	2487	134	4334	155	0	2613	1054	2	126	920	5%	686%	-1720	898	-40%	579%
A63 Selby Rd / A6120 / M1 Junction 46	5191	434	6091	1275	10	6469	632	6	1278	198	25%	46%	377	-643	6%	-50%
Thorpe Park/In46	1576	78	4373	156	1	4281	572	3	2705	494	172%	634%	-91	416	-2%	266%
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2799	40	4033	273	1	4359	135	0	1560	95	56%	238%	326	-138	8%	-51%
A656 Ridge Rd / Church La	1225	55	1913	445	1	1840	410	1	615	354	50%	640%	-74	-35	-4%	-8%
A656 Ridge Rd / B6137 Longdike La	1471	181	2154	233	0	2184	231	0	712	50	48%	27%	29	-2	1%	-1%
A642 Aberford Rd / Bar La, Garforth	1580	35	2032	91	0	1936	61	0	356	26	23%	76%	-96	-30	-5%	-33%
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1417	168	1998	229	0	1719	185	0	302	16	21%	10%	-279	-44	-14%	-19%
Leeds Rd / Long La, Barwick	806	18	1401	27	0	1027	20	0	221	2	27%	11%	-374	-7	-27%	-24%
Leeds Rd / Main St, Scholes	876	17	1425	15	0	1055	15	0	179	-2	20%	-12%	-369	-1	-26%	-4%
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	897	37	1199	36	0	1474	46	0	576	9	64%	24%	275	10	23%	28%
Main St / Cattle La, Aberford	654	16	1085	19	0	866	18	0	212	1	32%	7%	-219	-1	-20%	-6%

Table 35 : Changes in journey time between 2016 base year and 2028 Do Something (Barwick lane Link Road) in the AM and PM peak hours on the A63 through Garforth

Journey time results (seconds)			Scenario 1b				
				change from base	% change	change from Do Min	% change
AM	A2 2016	A2 2028 DM	A2 2028 DS				
A63 westbound	547	913	832	268	49%	-83	-9%
A63 eastbound	459	539	525	50	11%	-13	-2%
PM	P2 2016	P2 2028 DM	P2 2028 DS	change from base	% change	change from Do Min	% change
A63 westbound	497	531	478	-35	-7%	-62	-12%
A63 eastbound	582	889	692	74	13%	-230	-26%

8. Summary and Conclusions

8.1. Four potential mitigation options have been tested for the horizon year of 2028 to evaluate their impacts on reducing the impacts of the Leeds Site Allocations Plan developments in the Garforth and east Leeds area.

- **Test 1 - M1 junction 47 capacity upgrade scheme** (signalising all approaches to M1 junction 47 and widening of the approaches with additional circulatory lanes on the roundabout and a “tiger tail” parallel merge on the westbound slip road). The required merge upgrade will be confirmed by Highways England using a DMRB merge assessment.
- **Test 2 - Garforth Southern Bypass** (a new wide single carriageway road providing a southern bypass of Garforth between the A63 / A642 roundabout and the Ninelands Lane junction with the A63).
- **Test 3 - M1 junction 47 improvement and Garforth Southern Bypass combined** (as per Test 2, but with the junction 47 capacity upgrade from Test 1 included).
- **Test 4 - Link road from Parlington development to Long Lane Barwick-in-Elmet “Barwick Link road” with Junction 47 improvements** (a new single carriageway road providing a link between the Parlington development and Long Lane. A new roundabout junction has been assumed on Long Lane approximately half way between Barwick-in-Elmet and Garforth).

8.2. Without any mitigation scheme traffic levels and congestion are forecast to rise significantly and while none of the interventions fully addresses the rise in congestion it is clear that there are benefits associated with the potential interventions that reduce the level of delays at key junctions and diverts traffic away from more sensitive locations.

8.3. All four interventions have included improvements at the A656/A63 roundabout and at M1 Junction 46. At this stage neither of these interventions are funded. However, work is ongoing as part of the ELOR design to address the congestion issues arising at the junction 46 dumbbells during the PM peak.

8.4. Other than Test 2, all interventions have included improvements to M1 Junction 47, which are also not funded. The current HS2 proposals include modifications to this junction during construction. However, these proposals are still being developed. The modifications will therefore need to be considered in parallel to the proposals for the mitigation scheme at junction 47.

8.5. In addition both the Do Minimum all the options have a significant impact upon delays at the A656/Church Lane junction and mitigation here will need to be considered.

8.6. Tests 2 and 3 included a signalised junction on the A63 to provide for access and egress from the East of Garforth development site. The nature of the access arrangements for this site have not been determined at this stage, however, this was necessary in the bypass tests to reduce delays for development traffic.

8.7. Between M1 junctions 47, 46 and 45 westbound AM peak demand is forecast to get close to or exceed link capacity in all the Tests. The requirement for additional link capacity and merge/diverge upgrades will be confirmed by Highways England using DMRB assessments.

8.8. Following the completion, refinement and analysis of the above tests, a further test was undertaken based on a reduced scale of improvement at M1 junction 47. This was based on Test 3 (Junction 47 and bypass) and was carried out to assess whether an interim scheme could be delivered here that would satisfactorily address the mitigation requirements of the reduced sites at Parlington and East of Garforth. Following an assessment of the Junction 47 results by Highways England it has been concluded that the interim scheme operates reasonably well and therefore provides confidence that that full scheme would not be required with the SC1b scenario. The impacts of this on the wider network are broadly similar to Test 3.

Junction 47 Improvement (Test 1)

8.9. This scheme reduces peak hour delays on the A63⁶ compared with the Do Minimum but does not perform as well as either of the bypass options in this respect.

8.10. Delays at M1 Junction 47 are markedly reduced compared with the Do Minimum.

8.11. Forecast delays at the main M1 Junction 46 roundabout are reduced compared with the Do Minimum but increase at the Thorpe Park dumbbells. This effect is similar in all 4 scenarios although the options without the bypass are slightly better overall.

Garforth Southern Bypass (Test 2)

8.12. This scheme reduces delays on the A63 in both peak hours compared with the Do Minimum to a similar extent as the combination of the bypass and junction scheme.

8.13. The volume of traffic carried by the A63 at Garforth is around 50% greater than options without a bypass but the volume of traffic remaining on the existing road is less than a third of that in the Do Minimum.

8.14. Although delays at Junction 47 are reduced compared with the Do Minimum this option performs less well than the other options

8.15. Forecast delays at the main M1 Junction 46 roundabout are reduced compared with the Do Minimum but increase at the Thorpe Park dumbbells. This effect is similar in all 4 scenarios, although this option performs worst overall at the main junction and best at the dumbbells.

Junction 47 and Garforth bypass (Test 3)

8.16. This combined scheme performs best overall at reducing peak hour delays on the A63 when compared with the Do Minimum although the bypass only option is very similar.

8.17. The volume of traffic carried by the A63 at Garforth is around 50% greater than options without a bypass but the volume of traffic remaining on the existing road is less than a third of that in the Do Minimum.

⁶ A656 to Century Way “Cracked egg” junction.

- 8.18. It also performs best overall at mitigating delays at Junction 47, although it is not markedly different from either of the other options with an improvement at this location.
- 8.19. Forecast delays at the main M1 Junction 46 roundabout are reduced compared with the Do Minimum but increase at the Thorpe Park dumbbells. This effect is similar in all 4 scenarios, however, the overall improvement is least with this option.
- 8.20. This option has the greatest effect at reducing the level of additional traffic using the minor roads through Barwick and Scholes and also through Aberford, with flows some 35-40% less than the Do Minimum.

Junction 47 and Barwick Road Link (Test 4)

- 8.21. This option also reduces delays on the A63 compared with the Do Minimum but to a lesser extent than either of the bypass options and is very similar to the junction 47 only option.
- 8.22. Delays at Junction 47 are reduced to the same extent as the option without the Barwick Road link.
- 8.23. Forecast delays at the main M1 Junction 46 roundabout are reduced compared with the Do Minimum but increase at the Thorpe Park dumbbells. This effect is similar in all 4 scenarios although the options without the bypass are slightly better overall.
- 8.24. This option results in the greatest level of use of the minor road network through Barwick and Scholes with overall, peak hour flows some 20% greater than the best performing option.

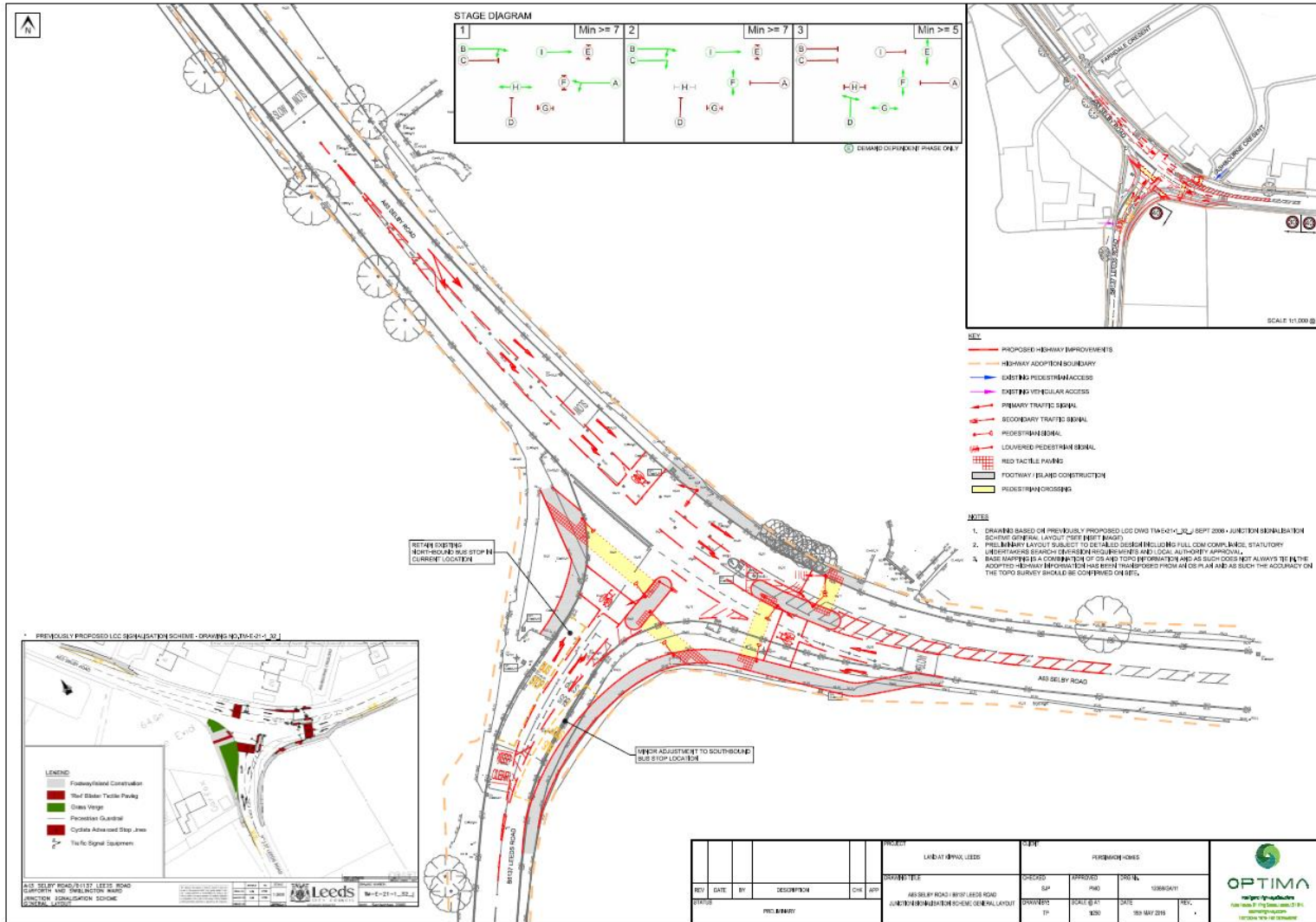
Comparison of the 4 options

- 8.25. The results from the 4 options tested have been summarised in tables that are included in Appendix 2. Tables are included for flows at key junctions, delays at key junctions, flows on key links for the AM and PM peaks, and journey times on the A63 through Garforth.
- 8.26. For each link the option with the highest flow or delay is highlighted in orange and the lowest highlighted in green.

Conclusion

- 8.27. Across all the 4 mitigating options it is considered that the best performing option overall is the combination of the Junction 47 improvement with the Garforth bypass (Test 3).
- 8.28. This is because this option :
- Provides the greatest relief to traffic on the old A63 and greatest reductions in delay at junctions on the A63
 - Has the least impact on minor roads around Barwick, Scholes and Aberford
 - Has the most impact on reducing delay at M1 junction 47
- 8.29. The interim improvement test for Junction 47 has a similar overall impact to Test 3 and therefore represents the preferred option to mitigate the SAP impacts in this area of Leeds.

Plan A2 : A63 Selby Rd / Leeds Rd signalisation scheme



Plan A3 : Manston Lane Link Road and East Leeds Orbital Road Overview Plan



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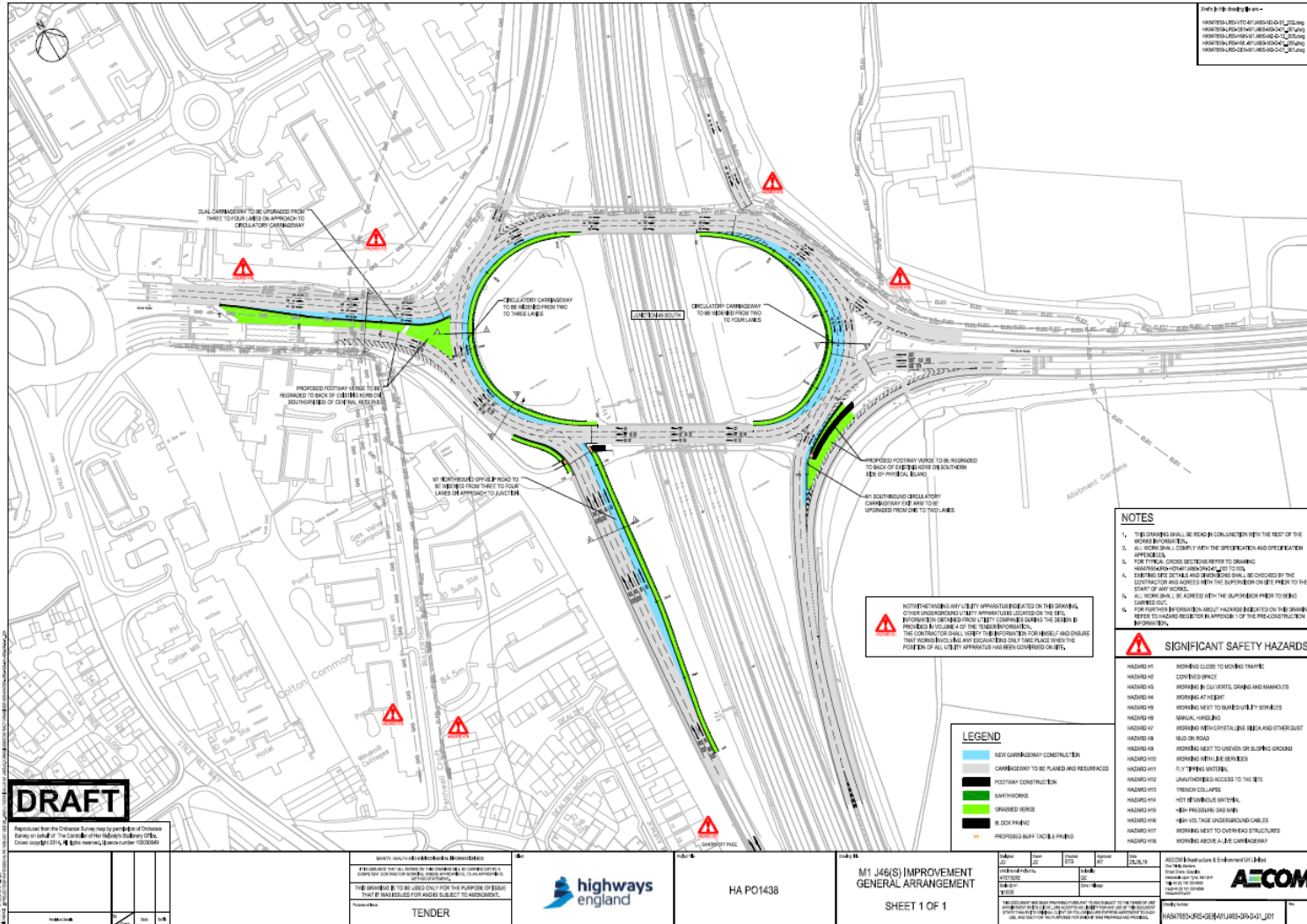


PROJECT
EAST LEEDS ORBITAL ROAD
WORKSTAGE 1

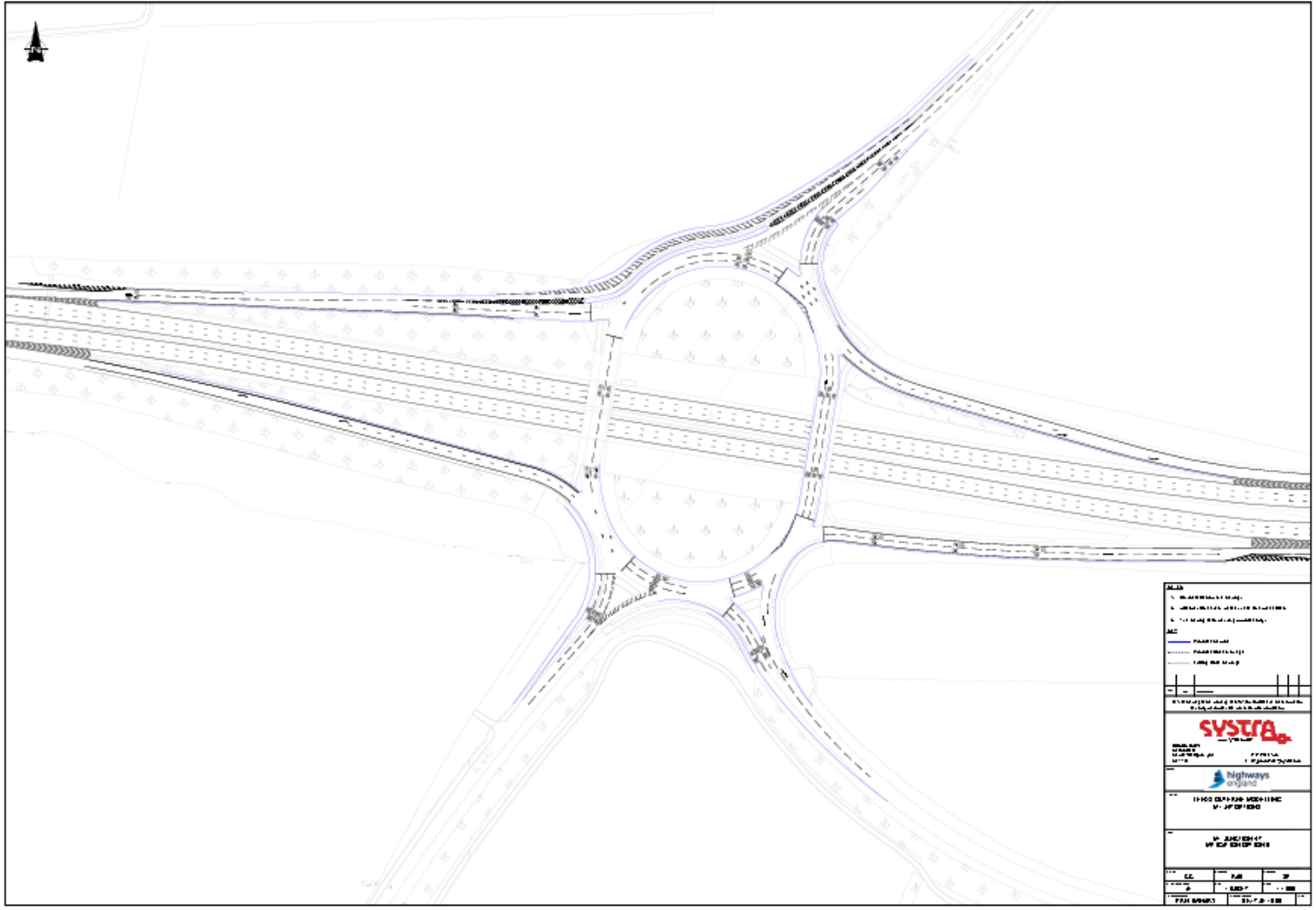
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ELOR GENERAL ARRANGEMENT

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STATUS:	S2 - FOR INFORMATION	
DRAWING NUMBER:	1065376-DWG-002 REVA	

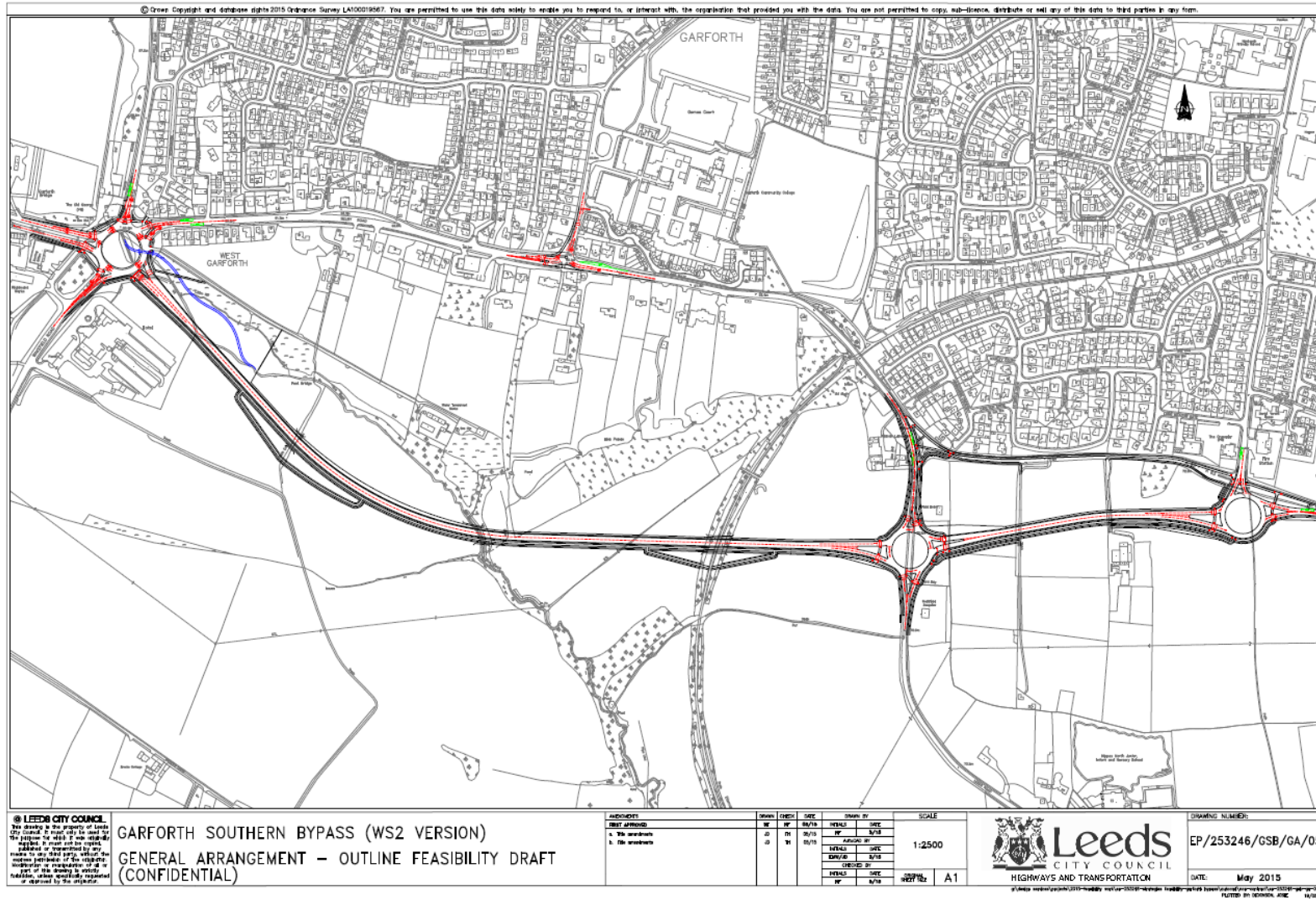
Plan A4 : A63 Potential M1 junction 46 scheme (improvement scheme currently unfunded)



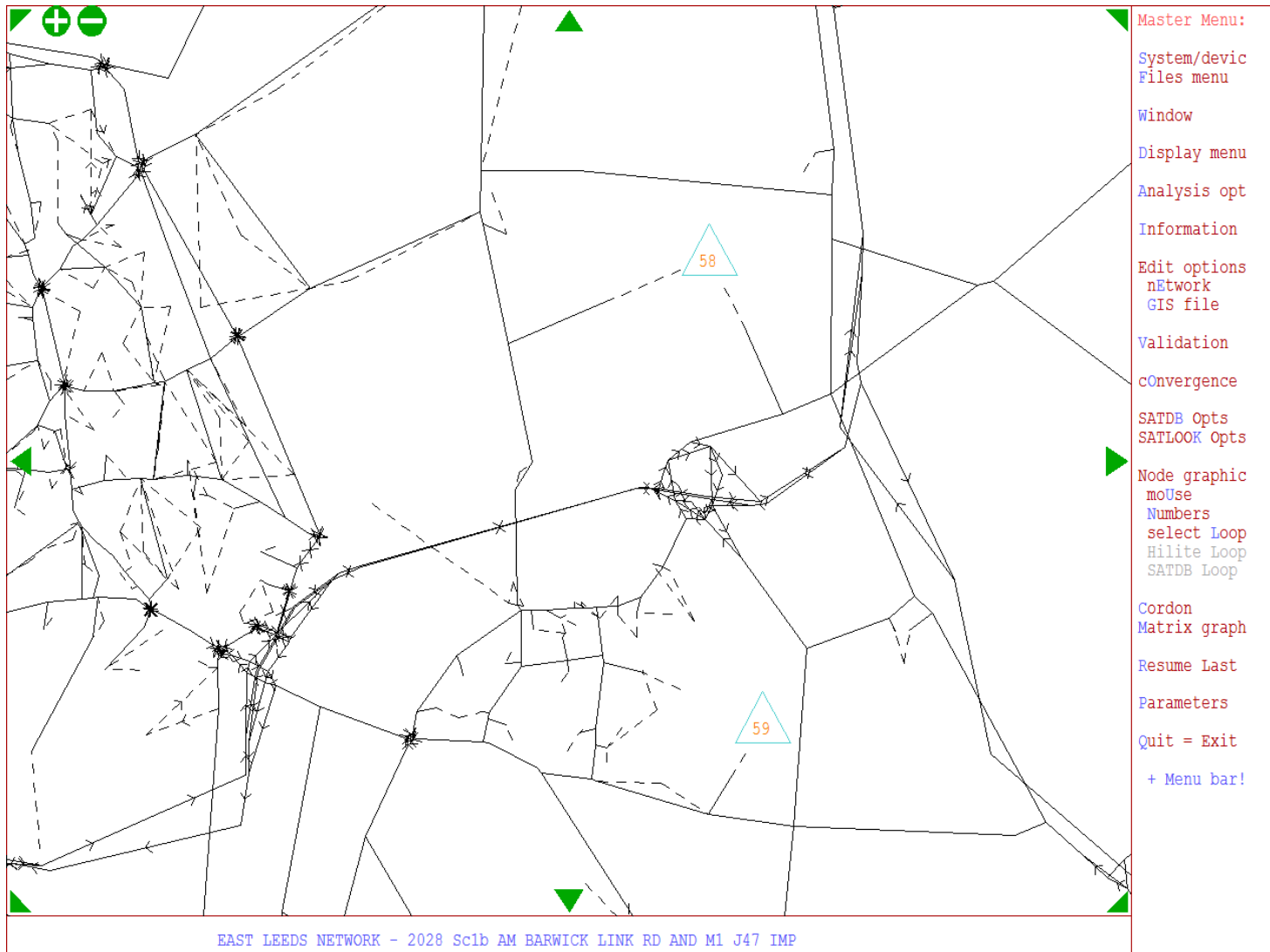
Plan A5 : Potential M1 Junction 47 improvements (currently unfunded)



Plan A6 : Potential Garforth southern bypass (currently unfunded)



Plan A7 : Saturn network plot of the test network with potential Barwick link road and M1 junction 47 improvements



APPENDIX 2 – Summary Tables

KEY JUNCTIONS

Table A1 : AM peak key junctions (traffic)

Am peak hour - traffic (pcus)	Scenario Sc1b					
	Key Junction	Base 2016	Do Min	Do Something		
				Jn 47 BY	Jn 47	Bypass
A63 Selby Rd / A656 Ridge Rd	2382	2851	3303	3256	3144	3263
A63 Selby Rd / Ninelands La, Garforth	1573	1721	2172	1702	2229	1704
A63 Selby Rd / B6137 Leeds Rd, Garforth	1889	2177	2970	2032	2974	2035
A63 Selby Rd / B6137 Lidgett La, Garforth	2131	2143	935	2222	938	2220
A63 Selby Rd / A642 Wakefield Rd, Garforth	3481	4136	4764	4463	4701	4457
A64/A1(M) Junction 44	3353	3741	3660	3637	3698	3639
A63 Pontefract La / M1 Junction 45	3111	4513	4512	4507	4519	4505
A63 Selby Rd / A6120 / M1 Junction 46	5255	6485	7349	7134	7308	7131
Thorpe Park/Jn46	1563	4599	4699	4743	4680	4692
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2879	4252	4150	4290	4110	4209
A656 Ridge Rd / Church La	1245	1891	1969	2099	1796	2102
A656 Ridge Rd / B6137 Longdike La	1417	2083	2500	2257	2498	2257
A642 Aberford Rd / Bar La, Garforth	1382	1792	1712	1942	1750	1934
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1400	2043	1580	2113	1584	2109
Leeds Rd / Long La, Barwick	776	1252	1073	1201	1102	1248
Leeds Rd / Main St, Scholes	808	1254	1122	1245	1155	1297
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	958	1586	1247	1528	1305	1529
Main St / Cattle La, Aberford	653	1039	860	952	923	938

Table A2 : PM peak key junctions (traffic)

Pm peak hour - traffic (pcus)	Scenario Sc1b					
	Key Junction	Base 2016	Do Min	Do Something		
				Jn 47 BY	Jn 47	Bypass
A63 Selby Rd / A656 Ridge Rd	2280	2795	2905	2831	2919	2823
A63 Selby Rd / Ninelands La, Garforth	1721	1629	2119	1839	2151	1834
A63 Selby Rd / B6137 Leeds Rd, Garforth	2060	2097	2966	2255	3081	2253
A63 Selby Rd / B6137 Lidgett La, Garforth	2125	2165	725	2290	798	2277
A63 Selby Rd / A642 Wakefield Rd, Garforth	3444	4144	4540	3978	4723	3981
A64/A1(M) Junction 44	3248	3428	3473	3490	3442	3494
A63 Pontefract La / M1 Junction 45	2487	4334	4153	2614	4228	2613
A63 Selby Rd / A6120 / M1 Junction 46	5191	6091	6750	6456	6733	6469
Thorpe Park/Jn46	1576	4373	4234	4300	3947	4281
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	2799	4033	4199	4429	3905	4359
A656 Ridge Rd / Church La	1225	1913	1838	1836	1818	1840
A656 Ridge Rd / B6137 Longdike La	1471	2154	2178	2179	2222	2184
A642 Aberford Rd / Bar La, Garforth	1580	2032	1894	1947	1929	1936
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	1417	1998	1650	1725	1756	1719
Leeds Rd / Long La, Barwick	806	1401	805	966	1002	1027
Leeds Rd / Main St, Scholes	876	1425	868	1009	1055	1055
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	897	1199	1160	1459	957	1474
Main St / Cattle La, Aberford	654	1085	745	870	892	866

Note: Test 3 (junction 47 and bypass) is shown first in the DS options as it is the preferred option. The remaining three tests are shown in ascending order (Test 1, Test 2 and Test4).

Table A3 : AM peak key junctions (delay)

Am peak hour - delays (secs)	Scenario Sc1b					
	Key Junction	Do Min	Do Something			
	Base 2016	DM 2028	Jn 47 BY	Jn 47	Bypass	BLR J 47
A63 Selby Rd / A656 Ridge Rd	318	640	140	138	122	137
A63 Selby Rd / Ninelands La, Garforth	153	155	164	158	165	158
A63 Selby Rd / B6137 Leeds Rd, Garforth	31	40	76	31	76	31
A63 Selby Rd / B6137 Lidgett La, Garforth	212	205	166	201	166	201
A63 Selby Rd / A642 Wakefield Rd, Garforth	38	426	298	482	302	462
A64/A1(M) Junction 44	70	85	85	86	85	86
A63 Pontefract La / M1 Junction 45	153	217	224	243	223	242
A63 Selby Rd / A6120 / M1 Junction 46	315	1215	606	517	597	517
Thorpe Park/Jn46	79	192	272	242	273	239
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	25	307	143	165	153	164
A656 Ridge Rd / Church La	56	259	336	336	201	336
A656 Ridge Rd / B6137 Longdike La	181	225	297	257	294	257
A642 Aberford Rd / Bar La, Garforth	29	297	45	106	55	99
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	167	550	175	274	182	267
Leeds Rd / Long La, Barwick	18	27	21	26	22	26
Leeds Rd / Main St, Scholes	18	23	20	24	21	25
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	39	44	40	47	40	47
Main St / Cattle La, Aberford	16	21	18	20	19	19

Table A4 : PM peak key junctions (delay)

Pm peak hour - delays (secs)	Scenario Sc1b					
	Key Junction	Do Min	Do Something			
	Base 2016	DM 2028	Jn 47 BY	Jn 47	Bypass	BLR J 47
A63 Selby Rd / A656 Ridge Rd	134	296	118	113	120	113
A63 Selby Rd / Ninelands La, Garforth	173	179	195	191	201	189
A63 Selby Rd / B6137 Leeds Rd, Garforth	37	39	81	50	82	50
A63 Selby Rd / B6137 Lidgett La, Garforth	239	269	172	320	172	314
A63 Selby Rd / A642 Wakefield Rd, Garforth	54	502	311	220	315	219
A64/A1(M) Junction 44	73	84	85	86	84	86
A63 Pontefract La / M1 Junction 45	134	155	187	1066	163	1054
A63 Selby Rd / A6120 / M1 Junction 46	434	1275	954	630	1139	632
Thorpe Park/Jn46	78	156	443	584	154	572
A656 Ridge Rd / A642 Aberford Rd / B1217 Aberford Rd / M1 Junction 47	40	273	118	135	225	135
A656 Ridge Rd / Church La	55	445	438	408	433	410
A656 Ridge Rd / B6137 Longdike La	181	233	227	230	235	231
A642 Aberford Rd / Bar La, Garforth	35	91	52	63	60	61
A642 Aberford Rd / B6137 Main St / Barwick Rd, Garforth	168	229	176	184	187	185
Leeds Rd / Long La, Barwick	18	27	18	20	20	20
Leeds Rd / Main St, Scholes	17	15	15	15	15	15
B1217 Aberford Rd / Gt North Rd / Bunkers Hill, Aberford	37	36	40	46	35	46
Main St / Cattle La, Aberford	16	19	17	18	18	18

Note: Test 3 (junction 47 and bypass) is shown first in the DS options as it is the preferred option. The remaining three tests are shown in ascending order (Test 1, Test 2 and Test4).

KEY LINKS

Table A5 : AM peak key links (flow)

Am peak hour	Scenario SC1b						
			Do Min	Do Something			
Link		Base 2016	DM 2028	Jn 47 BY	Jn 47	Bypass	BLR J 47
A63 east of Garforth	WB	668	811	1138	864	1216	866
A63 east of Garforth	EB	495	457	533	579	526	573
A63 Garforth (E of Lidgett La)	WB	1139	1270	352	1207	356	1205
A63 Garforth (E of Lidgett La)	EB	581	506	120	643	120	641
A63 west of Garforth	WB	1807	2124	2499	2094	2478	2083
A63 west of Garforth	EB	1035	916	1134	1228	1079	1230
A63 Garforth Southern Bypass	WB	n/a	n/a	1737	n/a	1737	n/a
A63 Garforth Southern Bypass	EB	n/a	n/a	593	n/a	583	n/a
A656 south of Jn 47	NB	846	891	1190	1367	955	1366
A656 south of Jn 47	SB	371	733	629	587	636	589
A656 south of A63	NB	579	698	949	1036	946	1038
A656 south of A63	SB	447	655	663	675	669	676
A642 south of Jn 47	NB	609	749	760	614	821	619
A642 south of Jn 47	SB	540	833	769	756	784	725
A642 south of A63	NB	548	834	762	819	767	818
A642 south of A63	SB	475	759	850	848	856	856
B1217 north of Jn 47	WB	584	1078	972	1093	946	1020
B1217 north of Jn 47	EB	230	326	349	399	341	374
Main St Aberford	NB	289	617	449	562	509	552
Main St Aberford	SB	234	238	241	210	248	209
Cattle La	WB	143	379	240	368	276	355
Cattle La	EB	115	185	172	146	177	144
Long La south of Barwick	NB	250	291	289	307	283	349
Long La south of Barwick	SB	197	254	213	233	205	250
Leeds Rd west of Barwick	WB	429	754	623	761	654	794
Leeds Rd west of Barwick	EB	199	332	311	296	312	314
Leeds Rd west of Scholes	WB	324	832	717	854	749	888
Leeds Rd west of Scholes	EB	145	345	309	298	313	318
M1 Jn 47-48	WB	4106	4707	4599	4569	4685	4582
M1 Jn 47-48	EB	4021	4024	4174	4170	4124	4170
M1 Jn 46-47	WB	4835	6088	6113	6214	6050	6194
M1 Jn 46-47	EB	3854	4680	4513	4482	4562	4465
M1 Jn 45-46	WB	5975	6220	6220	6220	6220	6220
M1 Jn 45-46	EB	4611	5279	5288	5292	5290	5291
Total		40681	48867	50469	49792	50473	49775

Note: Test 3 (junction 47 and bypass) is shown first in the DS options as it is the preferred option. The remaining three tests are shown in ascending order (Test 1, Test 2 and Test4).

Table A6 : PM peak key links (flow)

Pm peak hour	Scenario SC1b						
			Do Min	Do Something			
Link		Base 2016	DM 2028	Jn 47 BY	Jn 47	Bypass	BLR J 47
A63 east of Garforth	WB	611	507	581	653	529	653
A63 east of Garforth	EB	578	725	945	682	1021	669
A63 Garforth (E of Lidgett La)	WB	775	717	181	838	180	837
A63 Garforth (E of Lidgett La)	EB	1029	1118	314	1155	386	1152
A63 west of Garforth	WB	935	791	990	1027	990	1034
A63 west of Garforth	EB	1723	1900	2359	1779	2475	1777
A63 Garforth Southern Bypass	WB	n/a	n/a	824	n/a	820	n/a
A63 Garforth Southern Bypass	EB	n/a	n/a	1406	n/a	1440	n/a
A656 south of Jn 47	NB	354	827	685	668	788	667
A656 south of Jn 47	SB	843	1016	1054	1072	930	1076
A656 south of A63	NB	458	654	534	656	580	655
A656 south of A63	SB	550	722	728	826	701	834
A642 south of Jn 47	NB	619	984	899	934	927	928
A642 south of Jn 47	SB	580	767	835	757	794	745
A642 south of A63	NB	431	744	508	656	578	654
A642 south of A63	SB	706	1141	1124	886	1132	892
B1217 north of Jn 47	WB	260	476	414	469	423	415
B1217 north of Jn 47	EB	488	539	871	1105	596	1074
Main St Aberford	NB	251	254	296	295	284	292
Main St Aberford	SB	238	684	291	402	474	401
Cattle La	WB	124	132	137	140	126	135
Cattle La	EB	117	532	122	248	288	249
Long La south of Barwick	NB	249	163	138	142	136	168
Long La south of Barwick	SB	240	392	228	262	270	298
Leeds Rd west of Barwick	WB	292	258	236	242	226	268
Leeds Rd west of Barwick	EB	362	1001	426	581	635	620
Leeds Rd west of Scholes	WB	246	301	288	290	278	317
Leeds Rd west of Scholes	EB	296	1040	516	649	713	672
M1 Jn 47-48	WB	3573	3889	3838	3879	3859	3883
M1 Jn 47-48	EB	3750	4024	3813	3718	3945	3723
M1 Jn 46-47	WB	3525	4462	4314	4445	4326	4420
M1 Jn 46-47	EB	4380	4747	5050	5148	4695	5145
M1 Jn 45-46	WB	4482	4931	4915	5329	4913	5337
M1 Jn 45-46	EB	5449	5349	5499	5413	5443	5413
Total		38515	45787	45356	45346	45902	45405

Note: Test 3 (junction 47 and bypass) is shown first in the DS options as it is the preferred option. The remaining three tests are shown in ascending order (Test 1, Test 2 and Test4).

Table A7 : JOURNEY TIMES (AM and PM)

Scenario Sc1b						
Am peak hour - journey times (secs)		Do Min	Do Something			
Link	Base 2016	DM 2028	Jn 47 BY	Jn 47	Bypass	BLR J 47
A63 westbound	547	913	706	840	711	832
A63 eastbound	459	539	501	526	493	525
	Change from Base 2016					
A63 westbound		366	159	293	164	285
A63 eastbound		80	42	67	34	66
	Change from DM 2028					
A63 westbound			-207	-73	-202	-81
A63 eastbound			-38	-13	-46	-14
Pm peak hour - journey times (secs)		Do Min	Do Something			
Link	Base 2016	DM 2028	Jn 47 BY	Jn 47	Bypass	BLR J 47
A63 westbound	497	531	438	478	435	478
A63 eastbound	582	889	565	696	607	692
	Change from Base 2016					
A63 westbound		34	-59	-19	-62	-19
A63 eastbound		307	-17	114	25	110
	Change from DM 2028					
A63 westbound			-93	-53	-96	-53
A63 eastbound			-324	-193	-282	-197

Note: Test 3 (junction 47 and bypass) is shown first in the DS options as it is the preferred option. The remaining three tests are shown in ascending order (Test 1, Test 2 and Test4).

APPENDIX 3 – LIST OF MODEL TESTS USED FOR THIS REPORT

Do Minimum

SC1b_DMv3_2028

Do Something

Test 1 – Jn 47 impt

SC1b_dsv4_J47_2028

Test 2 – Garforth southern Bypass

SC1b_dsv6_BY_2028

Test 3 – Jn 47 impt and Garforth southern bypass

SC1b_dsv6_J47BY_2028

Test 4 – Jn 47 impt and Barwick Link Road

SC1b_dsv4_BLRJ47_2028