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CALDERDALE LOCAL PLAN TRANSPORT EVIDENCE BASE

TECHNICAL NOTE 6: SITE APPORTIONMENT

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WSP | PARSONS BRINCKERHOFF

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WSP | Parsons Brinckerhoff
Three White Rose Office Park
Leeds
LS11 0DL

Tel: 0113 395 6200

www.wsp-pb.com

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1 INTRODUCTION

1.1 BACKGROUND

1.1.1 WSP | Parsons Brinckerhoff has been commissioned by Calderdale Metropolitan Borough Council (CMBC) to prepare an evidence based structure to inform the decisions made for the Local Plan allocations of development sites around the authority and potential mitigation schemes required for the developments to reduce traffic congestion to base year or better conditions.

1.1.2 Previous to this report today there has been 5 reported stages:

- Technical Note 1: Future Network Baseline
- Technical Note 2: Implications of Settlement Growth
- Technical Note 3: Preferred Spatial Strategy
- Technical Note 4: Initial Assessment of Cumulative Impact
- Technical Note 5: Hipperholme Sensitivity Test
- Technical Note 6: Site Apportionment

1.1.3 Technical Note 1 set out a 'snapshot' of future network operation prior to the application of growth to be allocated under the Local Plan but following realisation of committed developments, windfalls and planned major transport schemes.

1.1.4 Technical Note 2 looked at the relative macro-level implications likely to result from development in each settlement. The purpose of the note was to inform a preferred distribution of growth across settlements within Calderdale.

1.1.5 Following the submission of these documents to CMBC, alongside a range of other non-transport considerations, an initial decision was made on the likely distribution of development within Calderdale. Technical Note 3 shows the supporting transport evidence for this preferred development distribution.

1.1.6 Technical Note 4 details the stages 5a and 5b of the study. The initial stage 5a reports the initial traffic modelling exercise undertaken with the best known information at the time for the spatial allocation of sites across the district. Stage 5b was the penultimate modelling exercise with a more up to date allocations list and what would be assumed to be the final Local Plan iteration of sites.

1.1.7 Technical Note 5 describes the Hipperholme Sensitivity Test. This final stage of demand changes allows a small amount of development to be allowed within the settlement of Hipperholme, and the network constraints and results from loading extra trips from the associated development sites are documented within this Technical Note.

1.2 THIS DOCUMENT

1.2.1 This Technical Note outlines the methodology used to identify congested nodes and the contribution made by individual planned developments over the timeframe of the Local Plan. The likely form of improvements at these locations is also described in order to inform the future infrastructure plan.

1.2.2 The key contributions, in terms of traffic, to the Calderdale network from future developments in Kirklees are also summarised.

1.3 PREVIOUS MODELLING

1.3.1 The analysis described in this report further interrogates the modelled outputs of the cumulative impact assessment of the preferred Local Plan sites, as described in detail in Technical Note 4. Further details of the modelling approach taken and its underlying assumptions should be taken from that parallel report.

2 CONGESTED NODE ANALYSIS

2.1 INTRODUCTION

2.1.1 In order to assess the likelihood of achieving developer contributions or other infrastructure investment to address network issues, a site apportionment exercise is necessary. This identifies which proposed developments from the Local Plan contribute significantly to locations identified as being significantly congested as a result of the Local Plan growth.

2.2 METHOD

2.2.1 All modelled links have been output from the SATURN model, along with flows and the Volume/Capacity ratio. The links have two identifying nodes, an entry node (A node) and an exit node (B node).

2.2.2 The B node has been used for the purposes of filtering since all traffic on a particular link will travel towards this node, which has allowed a filtered list of nodes matching the below 'congested' criteria to be produced.

2.2.3 For the site apportionment exercise, the congested nodes have been defined as having traffic flows of at least 300pcu and a Volume/Capacity Ratio in excess of 85%. This is to establish points in the network with significant movements that are congested.

2.2.4 The filtered list of B nodes experiencing congestion has then been analysed against the spatial location of the junction that it leads to, and then split out depending on the situation that has occurred at that node:

- If a single link leads to a secondary link, then this is not classified as a junction and has been discounted from the list;
- If a junction leads directly to a development zone, then any impact is assumed to be directly from the development and any mitigation would be picked up as part of the usual development planning process; and
- If the junction is outside of the Calderdale boundary, this is ignored.

2.2.5 This leaves only the junctions that we consider to be over or close to capacity, and that could be worsened by individual development traffic.

2.2.1 The full list of junctions identified is shown in Table 3.1.

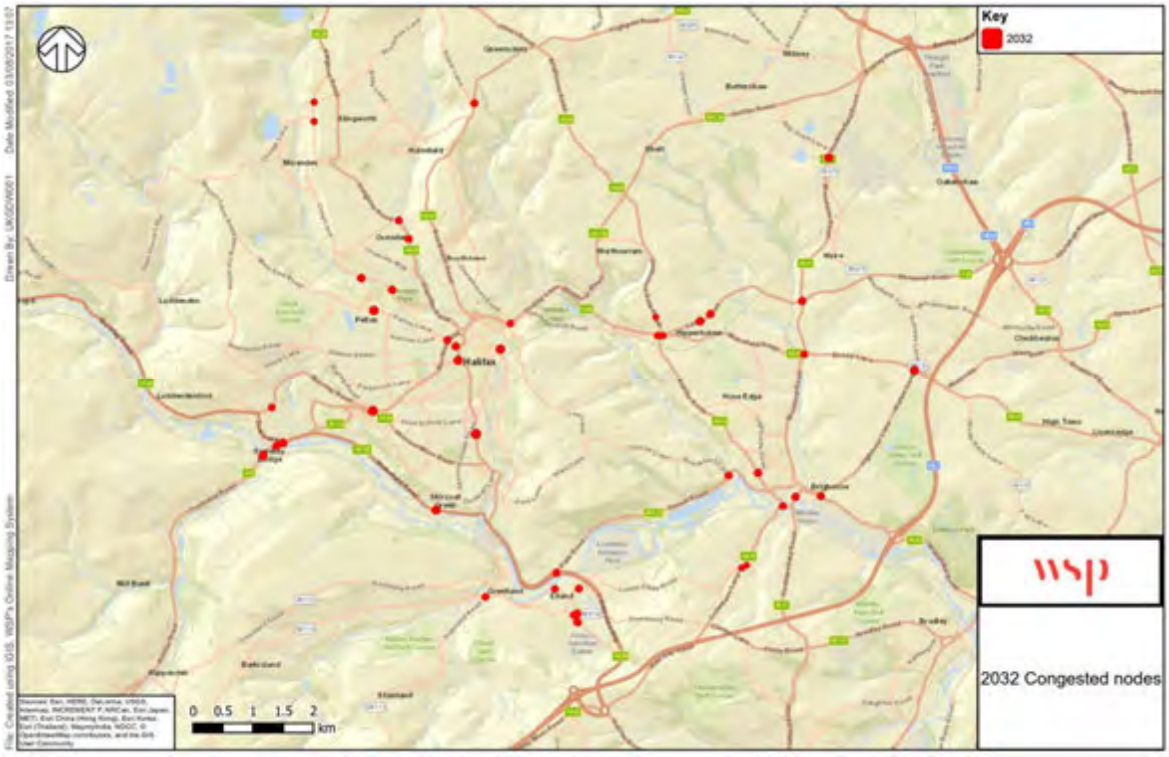
Table 2-1 -2032 Congested nodes

NODE NUMBER	JUNCTION LOCATION
4430	A58 Leeds Road/A649 Wakefield Road
4285	A644 Denholme Gate/Towngate
4014	A647 Halifax Road/Roper Lane
3998	White Gate/Field Head Lane
3997	Mixenden Lane/Mill Lane
3948	Stainland Road/Saddleworth Road
3934	A58 Leeds Road/A644 Brighouse Road
3933	A58 Leeds Road/A641 Huddersfield Road
3932	A649 Wakefield Road/A641 Huddersfield Road

NODE NUMBER	JUNCTION LOCATION
3916	A643 Church Street/Ogden Lane
3376	Huddersfield Road/James Street
3253	Elland Riorges Link/Jubilee Way
3247	A6025 Park Road/Exley Lane
3242	A6025 Elland Road/Brookfoot Lane
3199	A58 Leeds Road/Syke Lane/Knowle Top Road
3192	Elland Riorges Link/B6114 Dewsbury Road
3165	A644 Halifax Road/Brighouse Wood Lane
3091	A644 Wakefield Road/Grove Street
2275	A58 Wharf Street/Old Cawsey
1460	A6026 Wakefield Road/Copley Lane
1161	A58 Godley Road/New Bank
1143	A629 Ovenden Road/Grove Avenue
1096	A646 Burnley Road/Steps Lane
1084	A58 Wharf Street/Tuel Lane
1080	A646 Burnley Road/Warley Road
1049	Pellon New Road/Pellon Lane
1045	Hebble Lane/Brackenbed Lane
1029	A629 Orange Street/Broad Street
1023	Cripplegate/Bank Bottom/Lower Kirkgate
7102	A629 Ovenden Road/Shay Lane
3915	A643 Bramston Street/Bridge End
3913	Elland Riorges Link/Southgate/Huddersfield Road Roundabout
3901	A641 Woodside Road/B6379 Huddersfield Road
3827	A58 West Street/Station Road
3250	Briggate/Northgate
3200	A58 Leeds Road/Sutherland Road
3073	A649 Halifax Road/A643 Walton Lane
3034	A643 Owler Rings Road/Mill Royd Street
3008	A641 Huddersfield Road/Mill Lane
1400	A629 Huddersfield Road/Heath Lane
1127	Shroggs Road/Hebble Lane
1052	Pellon Lane/New Brunswick Street
1028	A629 Cow Street/Pellon Lane/Central Street

2.2.2 Figure 2-1 shows the 2032 congested node locations.

Figure 2-1 – 2032 Congested nodes



2.2.3 Select Link Analysis has then been undertaken for each B node on all arms leading to that node. This produces a trip matrix so that the zones producing the traffic that affect the node can be identified.

2.2.4 Sites identified with trips below 10 are deemed as insignificant and therefore discounted from the apportionment process.

2.2.5 Where 10 or more trips are from multiple development sites but modelled as a single zone, a factor based on site size has been produced to approximate the level of traffic from each site. Sites with fewer than 10 trips are also deemed to have an insignificant impact. The proportion of sites within the zone will always sum to 100%, and is not an average across all sites.

2.2.6 Analysis has been carried out based on trip origins, therefore the AM trip origins have been examined for the residential sites whilst the PM trip origins have been used for the employment sites, reflecting the generally tidal nature of commuting trips.

2.3 PREFERRED RESIDENTIAL SITES – JUNCTIONS IMPACTED

2.3.1 An analysis has been conducted to highlight all junctions that will be impacted by the Local Plan development sites. Following the identification of all “congested” nodes, thresholds were used to focus on key junctions where increases and impacts will be most severe and can be apportioned to individual development sites.

2.3.2 These thresholds include:

- Greater than 10% increase from 2014 to 2032;
- Greater than 10 trips; and

- Local Plan sites must be within 3 miles of impacted junction.

2.3.3 Distances between the Local Plan sites and the impacted junctions were measured using Google Maps shortest distance route planner. Based on satellite imagery, a site access was identified from where to make these distance measurements. A more detailed analysis of site access may be required for larger sites. This is necessary in case the selected site access in this methodology could potentially be in a different zone to the Local Plan site in question.

2.3.4 The analysis presented in the section that follows details all sites which meet the above thresholds and provides satellite imagery highlighting the affected junction/arm.

A58 / TUEL LANE (NODE 1084)

Table 2-2 - Node 1084 – Local Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	% DIFF.
968	Land at West End Golf Club Paddock Lane	81	27	Tuel Lane	1.9	1356_1084	407	537	32%
11	Tenterfield Burnley Road	68	19	Tuel Lane	1.5	1356_1084	407	537	32%

2.3.5 The table above shows a total increase of 32% on Tuel Lane. This increase comprises 11% traffic associated with the development sites and 21% from general background growth. The above sites will contribute 46 trips of 131 trips (total growth) on Tuel Lane. The below images highlight the location of the affected junction and show the Local Plan sites in relation to the impacted junction. It should be noted that three further sites contribute to traffic growth at this location; however, they are either too far away or on an arm of the junction where growth from 2014 is minimal.

Figure 2-2 - Node 1084 – Local Plan Sites

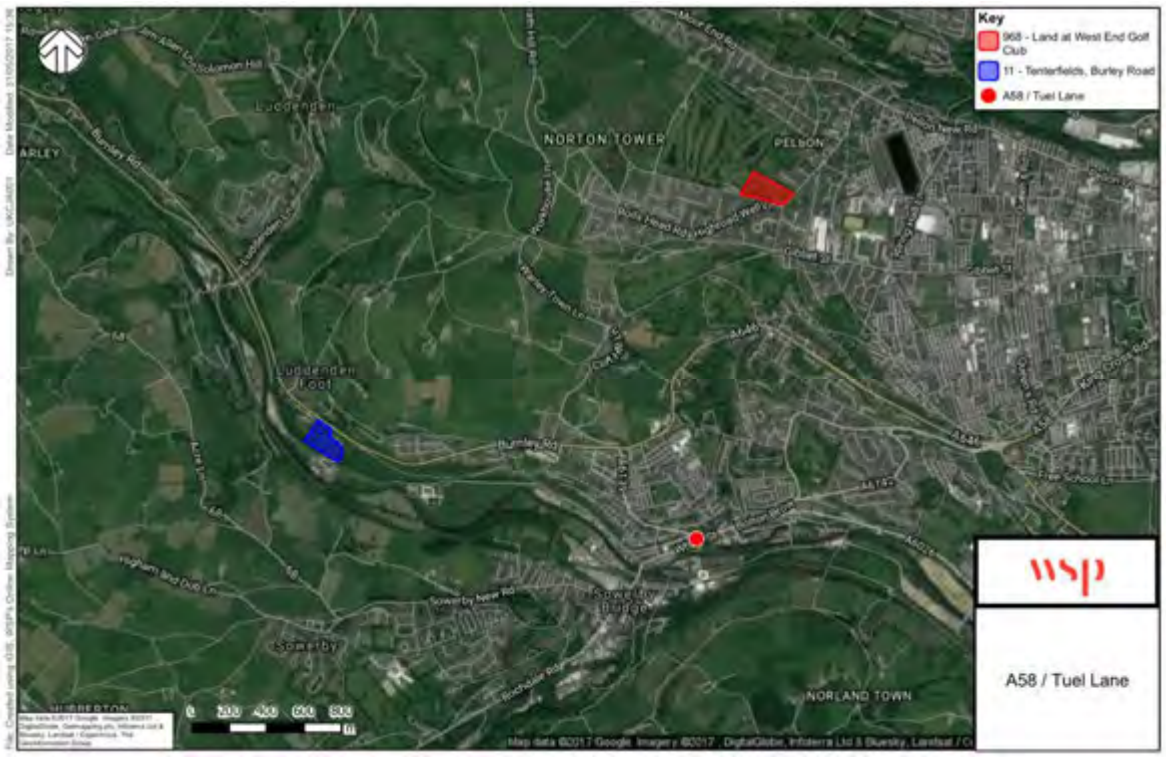


Figure 2-3 - Node 1084 – Tuel Lane

A629 AT OLD LANE (OVENDEN) - NODE 1143

Table 2-3 - Node 1143 – Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	% DIFF.
1229	Near Royd	370	17	A629 South	adjacent the site	2407_1143	488	645	32%

2.3.6 The table above shows a total increase of 32% on the A629 south. This increase is 3% from the development sites and the remaining 29% is from background growth. The above site contributes 17 trips of 157 trips (total growth) on the A629. The below images highlights the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-4 - Node 1143 – Local Plan Sites

Figure 2-5 - Node 1143 – A629 South

WAKEFIELD ROAD/COPLEY LANE (COPLEY) NODE 1460

2.3.7 The below table shows a total increase of 78% on Wakefield Road east. This increase is 28% of trips from the development sites and the remaining 50% is from general background growth. Local Plan sites 177 and 1567 will contribute 276 trips of 341 trips (total growth) on Wakefield Road (east).

Table 2-4 - Node 1460 – Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
1567	Land to the North of Elland	616	100	Wakefield Road East	2	2267_1460	439	780	78%
1470	Land behind West View	87	14	Wakefield Road East	2.9	2267_1460	439	780	78%
177	Land adjacent Ellistones Place Saddleworth Road	279	11	Wakefield Road East	2.4	2267_1460	439	780	78%

2.3.8 The below images show the location of the affected junction and the Local Plan sites in relation to the impacted junction.

Figure 2-6 - Node 1460 – Local Plan Sites

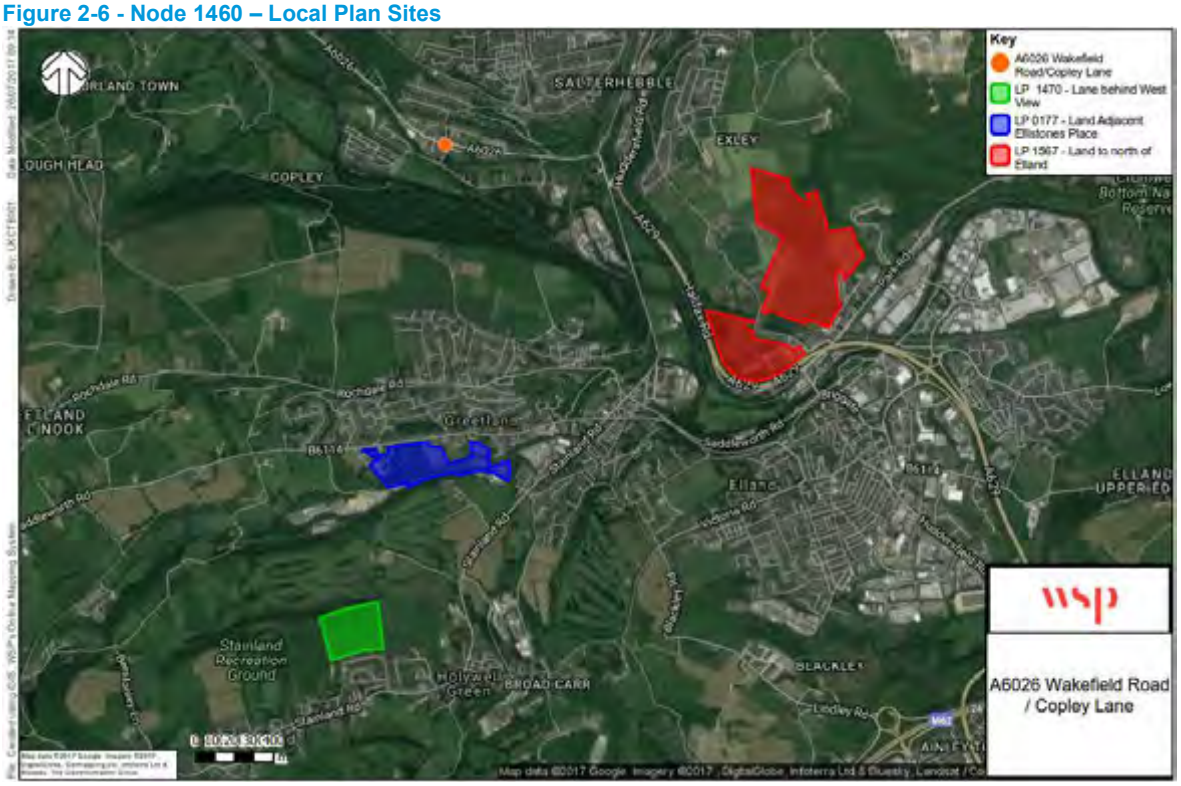


Figure 2-7 - Node 1460 – Wakefield Road

DEWSBURY ROAD/ELLAND RIORGES LINK (ELLAND) NODE 3192

Table 2-5 - Node 3192 – Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
893	Boothroyd Farm Boothroyd Lane	225	66	Dewsbury Road	1.6	3191_3192	486	669	38%
978	Land off Lower Edge Road/Shaw Lane	248	54	Elland Riorges Link	0.7	3263_3192	702	863	23%
1078	Land between Dewsbury Road and New Hey Road	275	28	Dewsbury Road	1.3	3191_3192	486	669	38%

2.3.9 There is an overall increase in traffic of nearly 40% on the Dewsbury Road arm and over 20% on the Elland Riorges Link arm.

2.3.10 The development sites of LP 893 and LP 1078 contribute 19% of trips on to Dewsbury Road with the remaining 19% made up from background growth. Local Plan sites 893 and 1078 contribute 94 of the 183 trips (total growth) on the Dewsbury Road arm.

2.3.11 Local plan site 978 contributes 8% of traffic increase on to the junction, with the remaining 15% being from background growth. Site 978 contributes 54 trips of the 161 (total growth) seen on Elland Riorges Link.

2.3.12 One further site also contributed greater than 10 trips; however it is too far away to be reasonably linked to this location. The below images show the location of the Local Plan sites in relation to the junction and the arm of the junction affected.

Figure 2-8 - Node 3192 – Local Plan sites

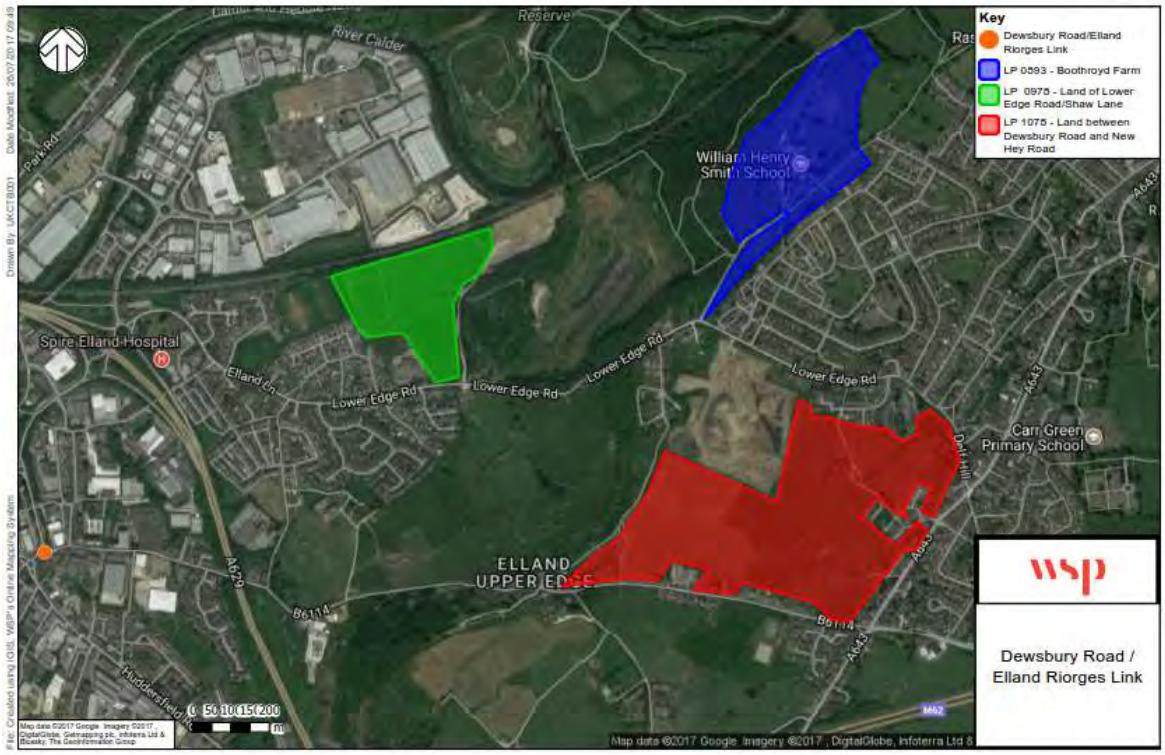
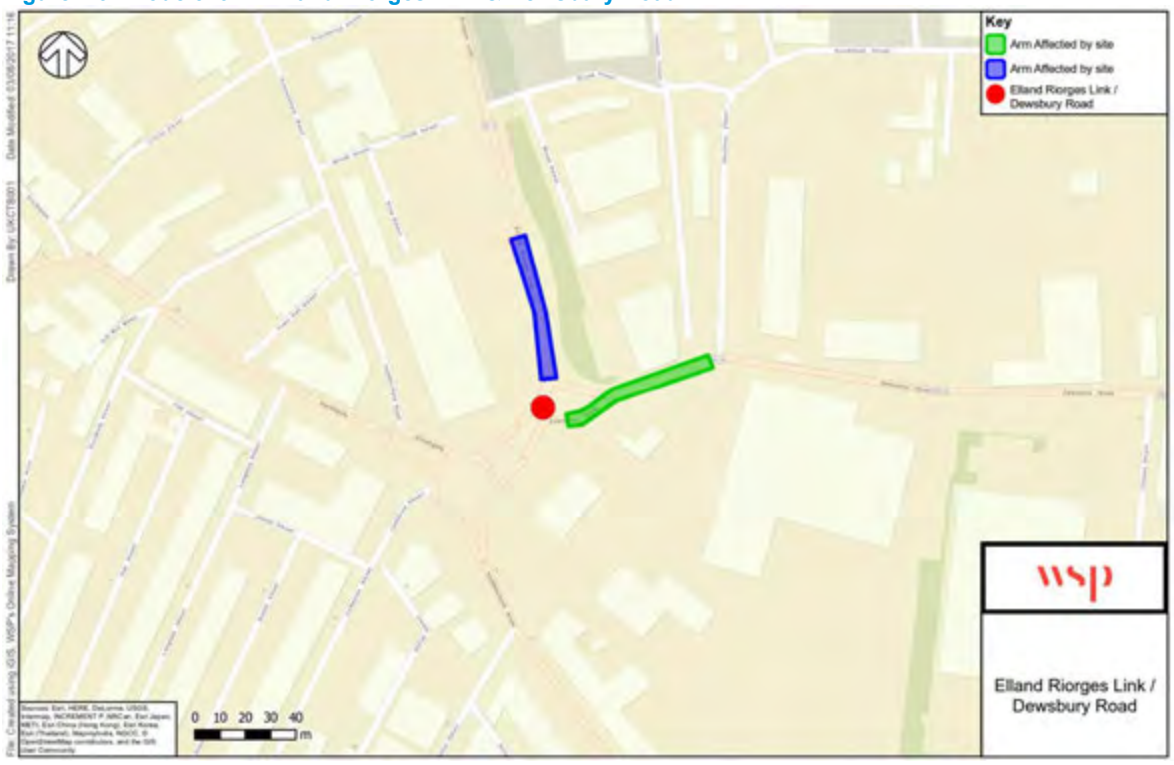


Figure 2-9 - Node 3192 – Elland Riorges Link & Dewsbury Road



A6025/EXLEY LANE (ELLAND) NODE 3247

Table 2-6 - Node 3247 – Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
1567	Land to the North of Elland	616	144	Exley Lane	adjacent the site	3356_3247	401	715	78%
856	Land off West Lane	122	27	Exley Lane	3	3356_3247	401	715	78%
952	Land at New Gate Farm Saddleworth Road	276	11	Exley Lane	2	3356_3247	401	715	78%
177	Land adjacent Ellistones Place Saddleworth Road	279	28	A6025 west	1.6	3248_3247	783	938	20%

2.3.13 The above table shows a total increase of 78% on Exley Lane east and 20% on A6025 west. Of the increase on Exley Lane, 45% of the 78% is from the development sites and the remaining 33% is from background growth. Local Plan sites 1567, 856 and 952 will contribute approximately 182 trips of 314 trips (total growth) on Exley Lane.

2.3.14 Of the increase on A6025 West, only 4% of the 20% is from development sites leaving 16% from background growth. Local Plan site177 will contribute approximately 28 trips of 155 trips (total growth) on the A6025.

2.3.1 The below images highlights the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-10 - Node 3247 – Local Plan Sites

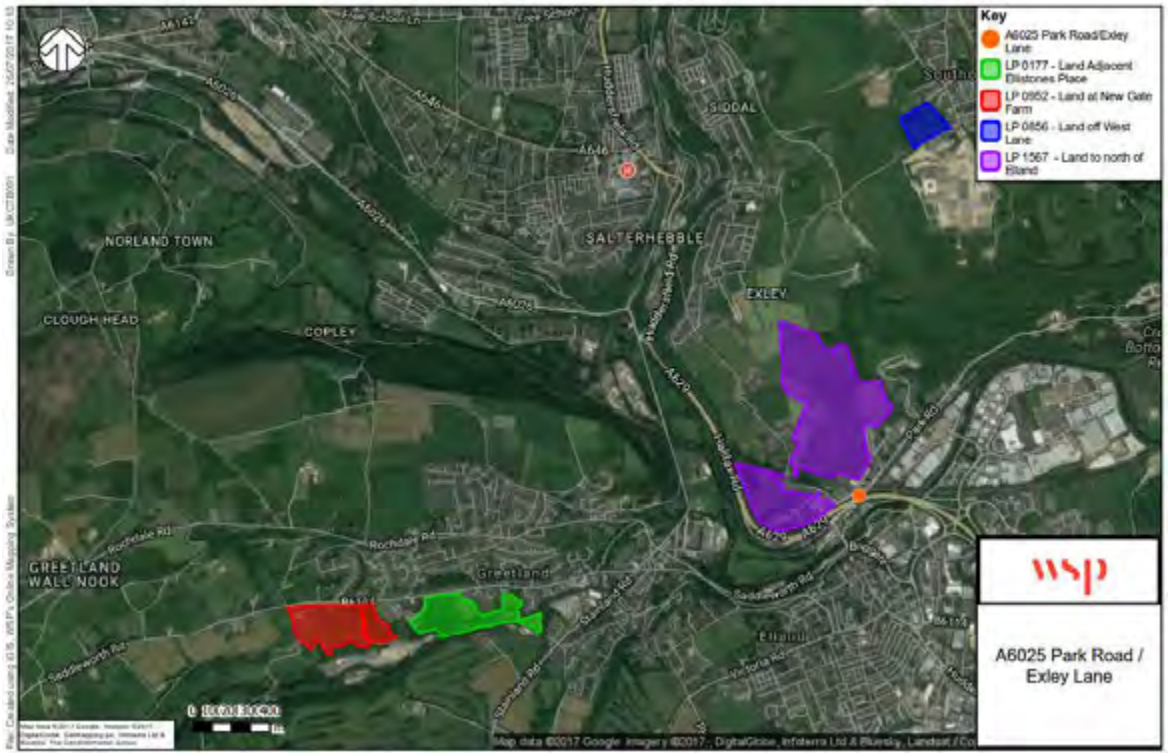


Figure 2-11 - Node 3247 – Exley Lane & A6025 West

ELLAND RIORGES LINK/ JUBILEE WAY (ELLAND) NODE 3253

2.3.2 It should be noted that although this site has been flagged as a congested node, upon further examination it is evident that a built scheme which widened the eastern arm of Elland Riorges Link to three lanes has not been coded as part of the future committed schemes. Therefore it is likely that there has been an over-estimate of the scale of the issue at this location, however the results of the modelling analysis are presented below for completeness.

Table 2-7 - Node 3253 – Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
978	Land off lower edge road /Shaw lane	248	54	Elland Riorges Link East	0.8	3254_3253	849	939	11%

2.3.3 The above table shows a total increase of 11% on Elland Riorges Link east which is only marginally over the 10% growth threshold set. This increase is 6% from the development site shown and the remainder 5% from background growth. Local Plan site 978 contributes 54 trips of 90 (total growth) on Elland Riorges Link (east). Two other development sites contribute significant traffic (more than 10 trips) to this arm but are located too far away to be reasonably linked to this junction.

2.3.4 The below images highlights the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-12 - Node 3247 – Local Plan Sites

Figure 2-13 - Node 3253 – Elland Riorges Link East

HUDDERSFIELD ROAD/SOUTH LANE (ELLAND), NODE 3376

Table 2-8 - Node 3376 – Development Plan Site Summary

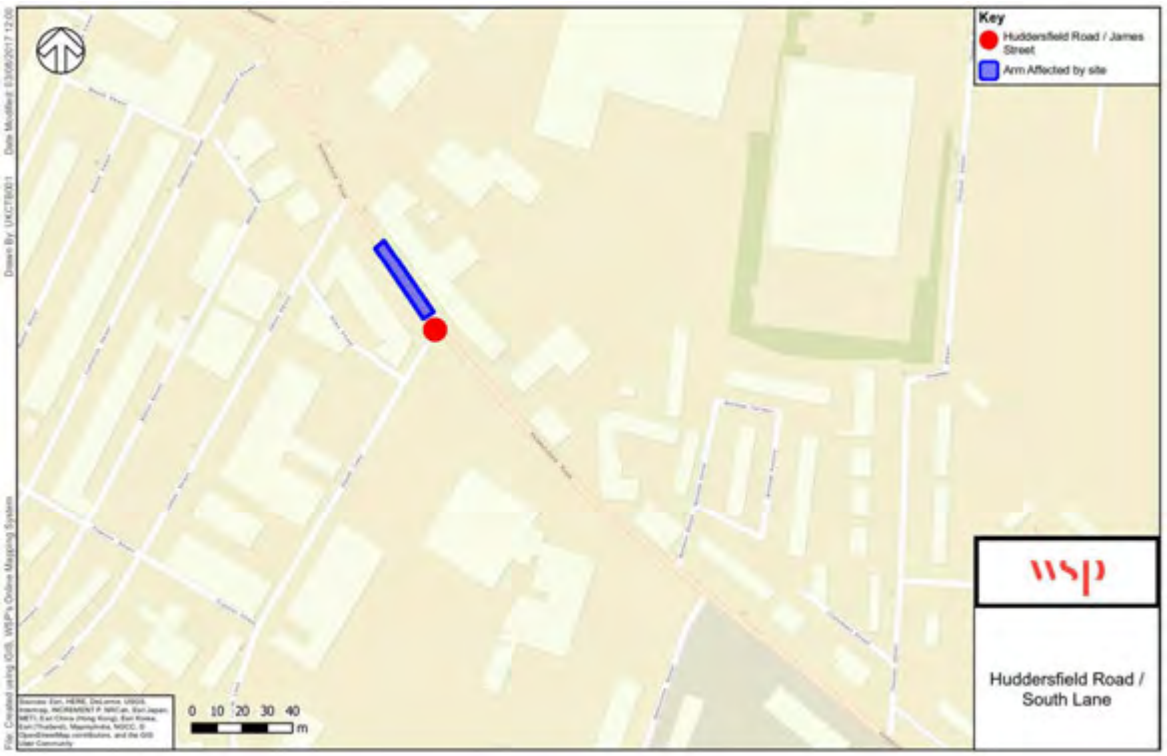
SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
893	Boothroyd farm Boothroyd lane	225	67	Huddersfield Road North	1.6	3913_3376	511	694	36%
1078	land between Dewsbury road and new hay road	275	17	Huddersfield Road North	1.4	3913_3376	511	694	36%

2.3.5 The above table shows a total increase of 36% on Huddersfield Road north. This increase is 16% from the development sites and the remainder 20% from background growth. Local Plan sites 225 and 275 will contribute 84 trips of 183 trips (total growth) on Huddersfield Road (north).

2.3.6 The below images highlights the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-14 - Node 3376 – Local Plan Sites

Figure 2-15 - Node 3376 – Huddersfield Road / South Lane



R43/CHURCH STREET/OGDEN LANE (RASTRICK) NODE 3916

Table 2-9 - Node 3916 – Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
1451	Land between Bradley Wood and Woodhouse Lane	1223	108	Ogden Lane	0.7	3124_3916	237	384	62%

2.3.7 The above table shows a total traffic increase of 62% on Ogden Lane. This increase is 46% from the development sites and the remainder 16% from background growth. As noted in the above table, site 1451 will contribute 108 trips of 147 (total growth) on Ogden Lane. It should however be noted that the modelling of this large site has not included any associated infrastructure which potentially would reduce the impact on this junction.

2.3.8 The below images highlights the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-16 - Node 3376 – Local Plan Sites

Figure 2-17 - Node 3916 – Ogden Lane

A641/A649 (BAILIFF BRIDGE) NODE 3932

Table 2-10 - Node 3932 – Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
1095	Halifax Road	154	11	A641 South	1.8	4334_3932	655	1022	56%
174	End of Wilton Street	87	11	A641 South	2.2	4334_3932	655	1022	56%
1463	Land between Highmoor Lane and Bradford Road	1926	188	A649 East	1.3	3082_3932	334	550	65%

2.3.9 The above table shows a total traffic increase of 56% on the A641 south and an increase of 65% on the A649 east. This increase is 3% from the development sites and the remainder 53% from background growth on the A641 South. The A649 east experiences 57% from the development traffic leaving 8% as background growth. As noted in the above table sites 1095 and 174 contribute 22 trips of 367 (total growth) on the A641 (south). On this arm, four further sites have a significant impact (over 10 trips) but are too far away to be reasonably attributed to the problem at this location. Site 1463 will contribute approximately 188 trips of 216 trips (total growth) on the A649 (east).

2.3.10 The below images highlight the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-18 - Node 3932 – Local Plan Sites

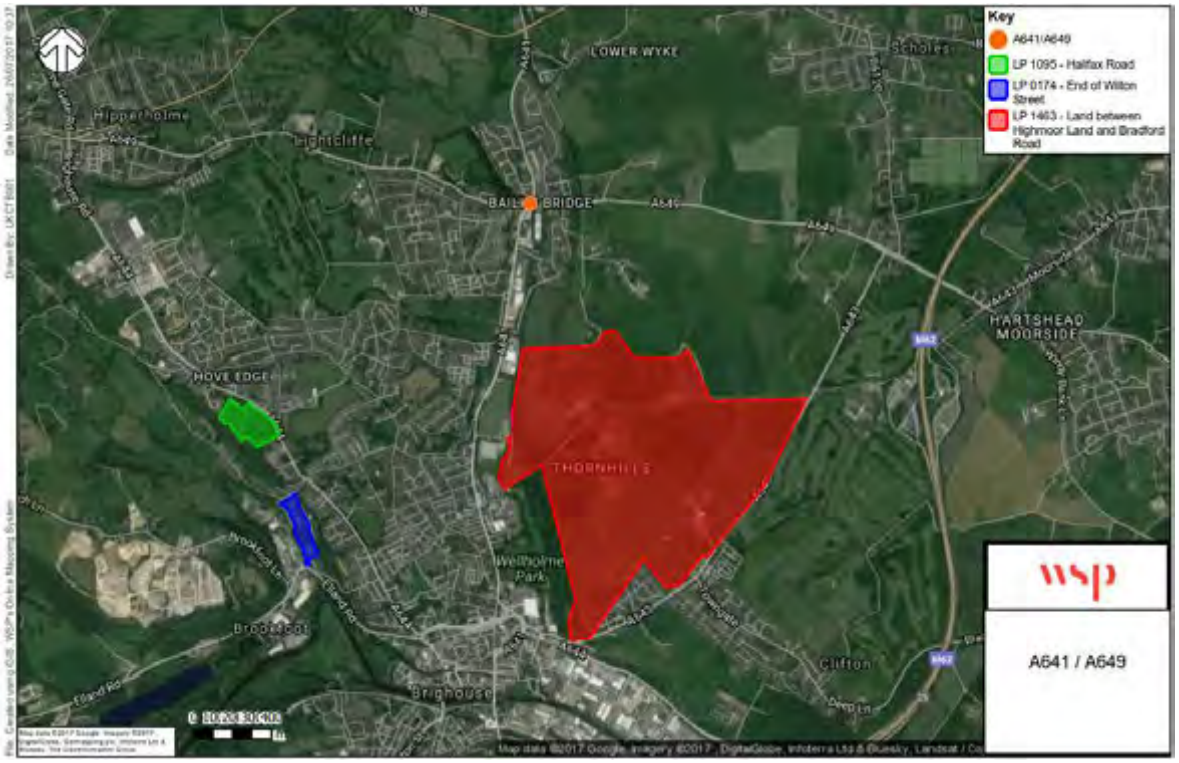


Figure 2-19 - Node 3932 – A641 South & A649 East

A58/A641 (WYKE) NODE 3993

Table 2-11 - Node 3997– Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
1541	Land off Wakefield Road	80	14	A641 South	1	3195_3933	784	1011	29%

2.3.11 The above table shows a total traffic increase of 29% on the A641 south arm of this junction. This increase is 2% from the development sites and the remainder 27% from background growth. As noted in the above table site 1541 contributes 14 trips of 227 (total growth) on the A641 (south). At this junction, five further sites have a significant impact (over 10 trips) but are too far away to be reasonably attributed to the problem at this location.

2.3.12 The below images highlights the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-20 - Node 3993 – Local Plan Sites

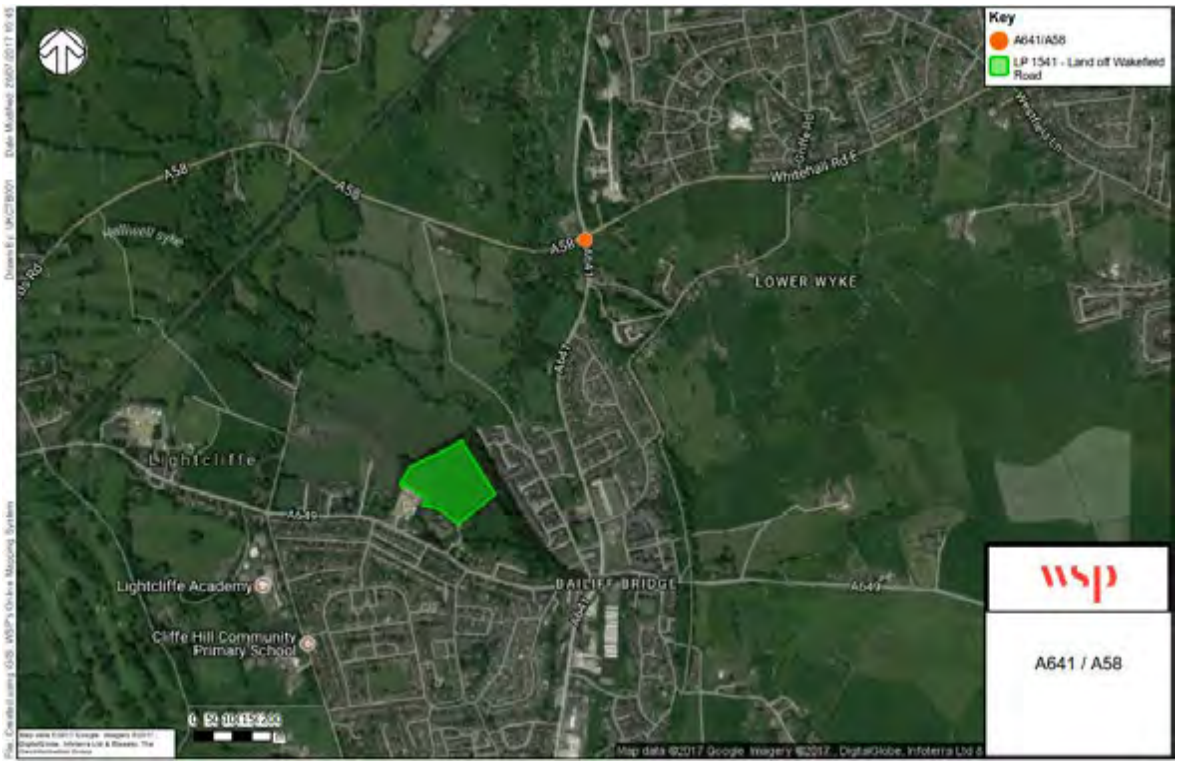


Figure 2-21 - Node 3993 – A641 South

WHITE GATE/MILL LANE (MIXENDEN) NODE 3997

Table 2-12 - Node 3997– Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
234	Swinton Hays Lane	75	16	Mill Lane	0.4	3996_3997	432	490	14%

2.3.13 The above table shows a total increase of 14% on Mill Lane. This increase is 4% from the development sites and the remainder 10% from background growth. As noted in the above table, site 234 will contribute approximately 16 trips of 59 (total growth) on Mill Lane.

2.3.14 The below images highlights the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-22 - Node 3997 – Local Plan Sites

Figure 2-23 - Node 3997 – Mill Lane

A58/WAKEFIELD ROAD (HIPPERHOLME) NODE 4430

Table 2-13 - Node 3997– Development Plan Site Summary

SITE NUMBER	SITE NAME	NUMBER OF DWELLINGS	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	%DIFF.
1541	Land off Wakefield Road	80	10	A58 East	1.4	4479_4430	335	404	21%

2.3.15 Although the sites closest to Hipperholme cross-roads have been excluded from the model run, there is still a significant change seen at this already problematic location with a 21% increase in traffic predicted for the A58 East arm. This increase is 3% from the development sites and the remainder 18% from background growth Of the 70 additional trips on this arm, 10 originate from the site on the land off Wakefield Road. The junction and site locations are shown below.

Figure 2-24 - Node 4430 – Local Plan Sites

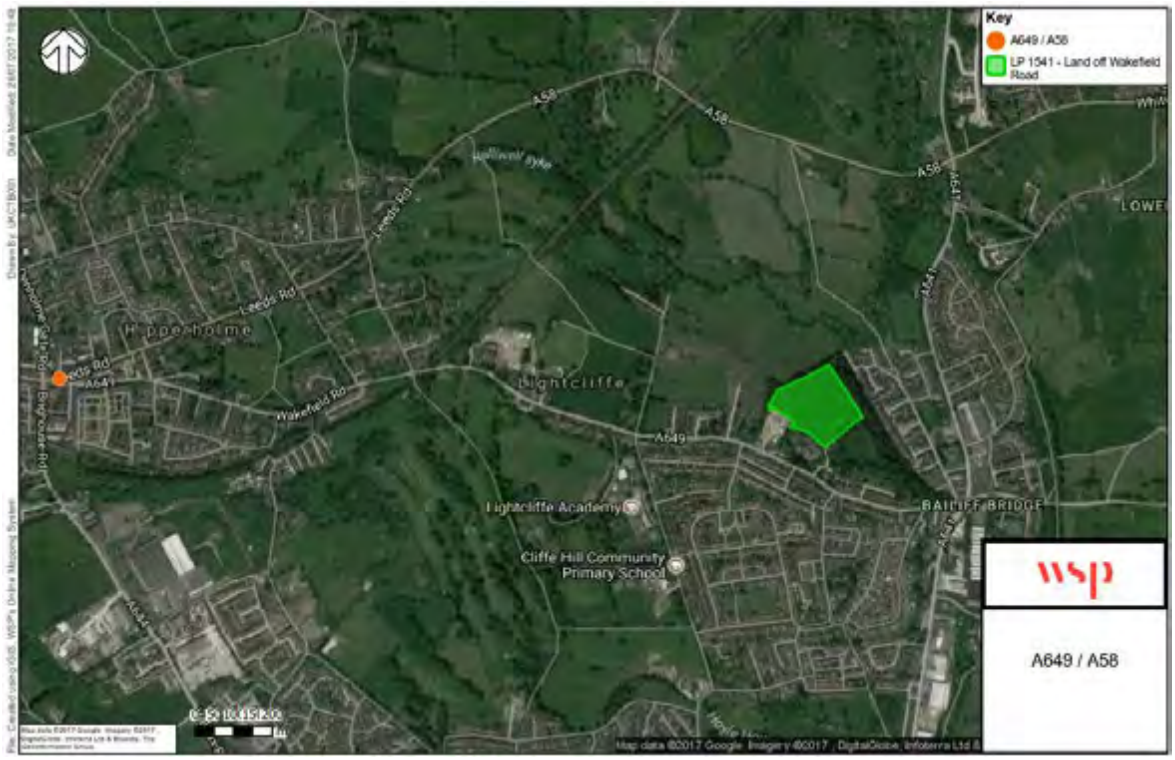


Figure 2-25 - Node 4430 – A58 Leeds Road East

2.4 PREFERRED EMPLOYMENT SITES – JUNCTIONS IMPACTED

2.4.1 An analysis has been conducted to highlight all junctions that will be impacted by the preferred Local employment allocations. Following this analysis, thresholds where used to focus on key junctions where increases and impacts will be most severe.

2.4.2 These thresholds replicate those used for residential sites and include:

- Greater than 10% increase from 2014 to 2032;
- Greater than 10 trips; and
- Local Plan sites must be within 3 miles of impacted junction.

2.4.3 Distances between the Local Plan sites and the impacted junctions were measured using Google Maps shortest distance route planner. Based on satellite imagery, a site access was selected from where to make these distance measurements. A more detailed analysis of site access may be required especially for larger sites. This is in case the selected site access in this methodology could potentially be in a different zone to the Local Plan site in question.

2.4.4 The below analysis details all sites which meet the above thresholds and provides satellite imagery highlighting the affected junction/arm.

A629 AT OLD LANE (OVENDEN) NODE 1143

Table 2-14 - Node 1143– Development Plan Site Summary

SITE NUMBER	SITE NAME	NET AREA (HA) FOR EMPLOYMENT USE	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	% DIFF.
LP1217	Land & Premises Holmfield Industrial Estate	1.25	20	A629 Ovenden Road North	1.2	1132_1143	569	792	39%
LP1219	North of Holmfield Industrial Estate	6.15	97	A629 Ovenden Road North	2.4	1132_1143	569	792	39%

2.4.5 The above table shows a total increase of 39% on A629 Ovenden Road (north). This increase is 21% from the development sites and the remainder 18% from background growth. As noted in the above table, sites 1217 and 1219 will contribute approximately 117 trips of 223 trips (total growth) on A629 Ovenden Road (north).

2.4.6 The below images highlight the location of the affected junction and show the Local Plan sites in relation to the impacted junction.

Figure 2-26 - Node 1143 – Local Plan Sites

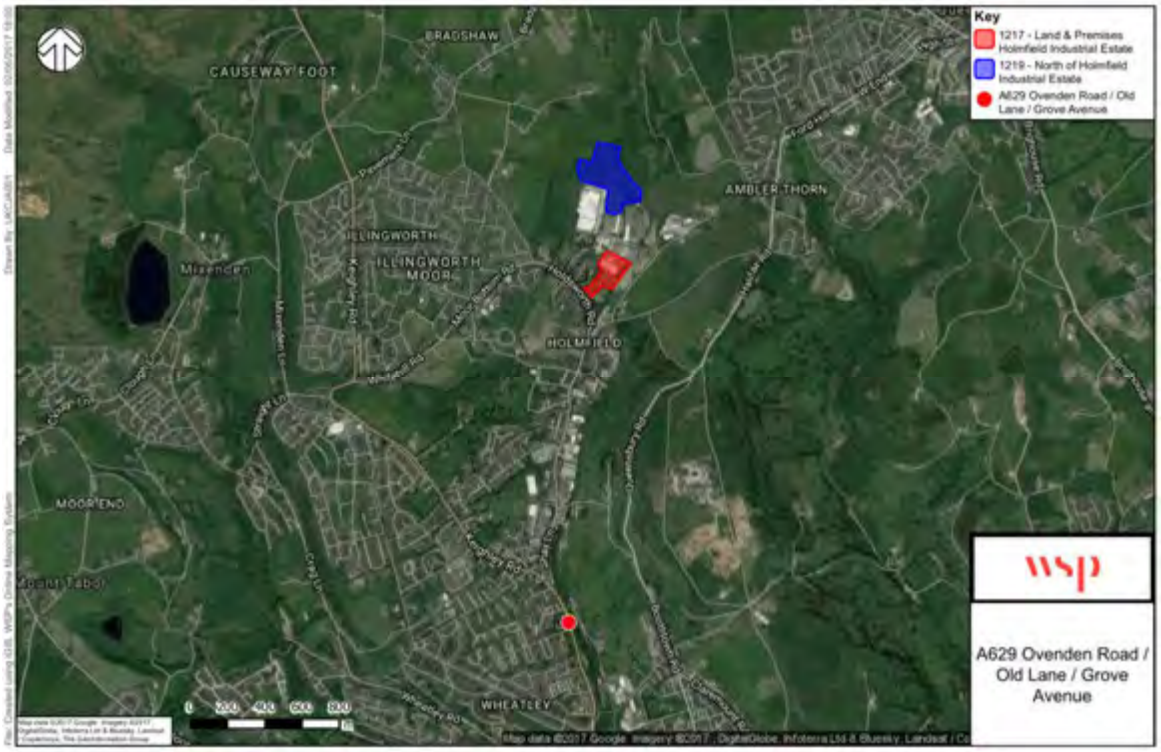


Figure 2-27 - Node 1143 – A629 Ovenden Road North

WAKEFIELD ROAD/COPLEY LANE (COPLEY) NODE 1460

Table 2-15 - Node 1460– Development Plan Site Summary

SITE NUMBER	SITE NAME	NET AREA (HA) FOR EMPLOYMENT USE	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	% DIFF.
LP1220	Adjacent Lloyds, Wakefield Road, Copley, Halifax	3.22	45	A6026 Wakefield Road West	1.4	2268_1460	481	580	21%

2.4.7 The above table shows a difference between base and future networks of roughly 100 trips. This increase of around 21% has a notable impact on the performance of the junction, pushing the junction into the 'congested node' category. This increase is 9% from the development sites and the remainder 12% from background growth. There are 45 trips travelling through this junction originating from the employment site adjacent to the Lloyds data centre in Copley.

2.4.8 The below images show the distance between the site and affected junction, and the arm of the junction of which is under an increased pressure.

Figure 2-28 - Node 1460 – Local Plan Sites

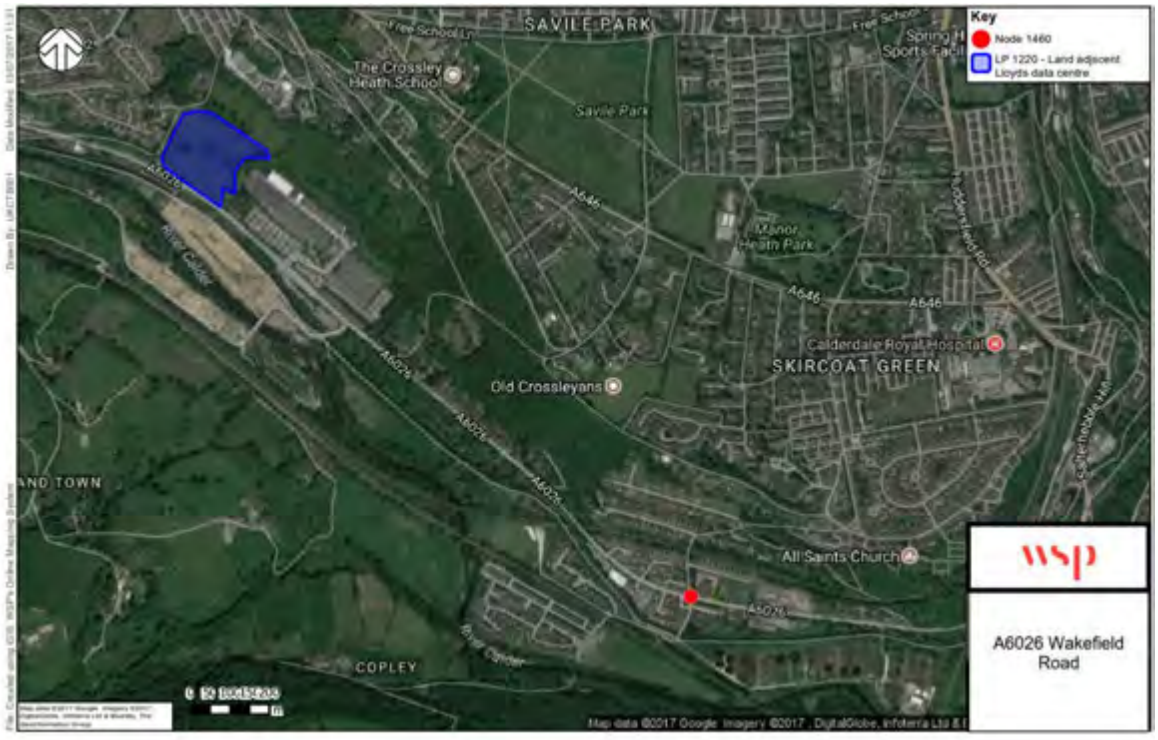


Figure 2-29 - Node 1460 – A6026 Wakefield Road

A643 WALTON LANE/A649 WAKEFIELD ROAD (NODE 3073)

Table 2-16 - Node 3073– Development Plan Site Summary

SITE NUMBER	SITE NAME	NET AREA (HA) FOR EMPLOYMENT USE	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	% DIFF.
LP1232	Land at, Wakefield Rd/Clifton Common, Clifton, Brighouse, HD6	20.46	42	Walton Lane	1.7	3072_3073	420	609	45%

2.4.9 The above table shows that the large employment site within Clifton has a significant impact on the performance of the junction for the A649 Wakefield Road and Walton Lane. This overall increase in trips of around 190 trips, is an increase of 45%. Of this, 42 trips are related to the Clifton site. This increase is 10% from the development sites and the remainder 35% from background growth

2.4.10 The images below show the large Clifton site and the node under strain, and the arm on the junction that is most over capacity from this site.

Figure 2-30 - Node 3073 – Local Plan Sites

Figure 2-31 - Node 3073 – A643 Walton Lane

A6025 PARK ROAD/EXLEY LANE (NODE 3247)

Table 2-17- Node 3274– Development Plan Site Summary

SITE NUMBER	SITE NAME	NET AREA (HA) FOR EMPLOYMENT USE	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	% DIFF.
LP1223	Lowfields, Lacy Way, Elland	2.52	13	A6025 Park Road West	1.2	3248_3247	690	765	11%

2.4.11 The table above shows an11% difference between 2014 and 2032 overall flows at this junction. The site for Lacy Way in Elland contributes 13 of the trips. This increase is 2% from the development sites and the remainder 9% from background growth

2.4.12 The images below show the congested node and the proximity of the Elland Lowfields Site, and the arm on the node junction that is under pressure from traffic associated with the site.

Figure 2-32- Node 3247 – Local Plan Sites

Figure 2-33 - Node 3247 – A6025 Park Road

B6112 STAINLAND ROAD/SADDLEWORTH ROAD (NODE 3948)

Table 2-18 - Node 3948– Development Plan Site Summary

SITE NUMBER	SITE NAME	NET AREA (HA) FOR EMPLOYMENT USE	NUMBER OF TRIPS	ROAD AFFECTED	DISTANCE FROM JUNCTION (MILES)	ROAD AFFECTED NODE NUMBERS	2014 ORIGIN FLOWS	2032 ORIGIN FLOWS	% DIFF.
LP1223	Lowfields, Lacy Way, Elland	2.52	61	B6112 Stainland Road	2.4	3947_3948	458	624	36%

2.4.13 This junction shows an increase of 36% on the Northern arm. 61 of the 160 total trips originate from the Lowfields development site. This increase is 13% from the development sites and the remainder 23% from background growth

2.4.14 The image below shows the distance between the site and the congested node, and the arm of the junction that is put under extra pressure to accommodate traffic that this site generates.

Figure 2-34 - Node 3948 – Local Plan Sites

Figure 2-35 - Node 3948 – A629 Stainland Road

3 PHASING

3.1 INTRODUCTION

3.1.1 The analysis from previous sections has looked at the end of the Plan period in 2032, when it is assumed that the entirety of the Local Plan growth is delivered. To establish the sensitivity of the network to growth, intermediate years have been modelled taking a straight line between 2016 (which is the year in which the latest information on built sites was received) and 2032 in 5 year intervals.

3.1.2 It should be noted that further work on the phasing of the Local Plan may alter the outputs of this work if repeated once that detail has been established.

3.2 ANALYSIS

3.2.1 The two intermediate years of the Local Plan study, 2021 and 2026, have had the same analysis undertaken to establish when the development growth causes a specified junction to become a problem, giving the opportunity to prioritise interventions.

3.2.2 The same analysis as used for 2032 has been applied, with junctions only examined if they have flows of over 300pcu and greater than 85% volume/capacity recorded. The tables below show which junctions become an issue at each intermediate year.

Table 3-1 - 2021 congested junctions

NODE	LOCATION
4430	A58 Leeds Road/A649 Wakefield Road
3948	Stainland Road/Saddleworth Road
3934	A58 Leeds Road/A644 Brighouse Road
3933	A58 Leeds Road/A641 Huddersfield Road
3932	A649 Wakefield Road/A641 Huddersfield Road
3253	Elland Riorges Link/Jubilee Way
1460	A6026 Wakefield Road/Copley Lane
3192	Elland Riorges Link/B6114 Dewsbury Road
1143	A629 Ovenden Road/Grove Avenue
1084	A58 Wharf Street/Tuel Lane
1049	Pellon New Road/Pellon Lane
3073	A649 Halifax Road/A643 Walton Lane

Table 3-2 - Junctions not included in 2021

NODE	LOCATION
3998	White Gate/Field Head Lane
3997	Mixenden Lane/Mill Lane
3916	A643 Church Street/Ogden Lane
3376	Huddersfield Road/South Lane
3247	A6025 Park Road/Exley Lane

3.2.3 Based on the modelling analysis, the 5 sites in Table 3 would not be problematic until the later stages of the plan period.

Table 3-3 -2026 congested junctions

NODE	LOCATION
4430	A58 Leeds Road/A649 Wakefield Road
3997	Mixenden Lane/Mill Lane

Node	Location
3948	Stainland Road/Saddleworth Road
3934	A58 Leeds Road/A644 Brighouse Road
3933	A58 Leeds Road/A641 Huddersfield Road
3932	A649 Wakefield Road/A641 Huddersfield Road
3916	A643 Church Street/Ogden Lane
3376	Huddersfield Road/South Lane
3253	Elland Riorges Link/Jubilee Way
3247	A6025 Park Road/Exley Lane
3192	Elland Riorges Link/B6114 Dewsbury Road
1460	A6026 Wakefield Road/Copley Lane
1143	A629 Ovenden Road/Grove Avenue
1049	Pellon New Road/Pellon Lane
1084	A58 Wharf Street/Tuel Lane
3073	A649 Halifax Road/A643 Walton Lane

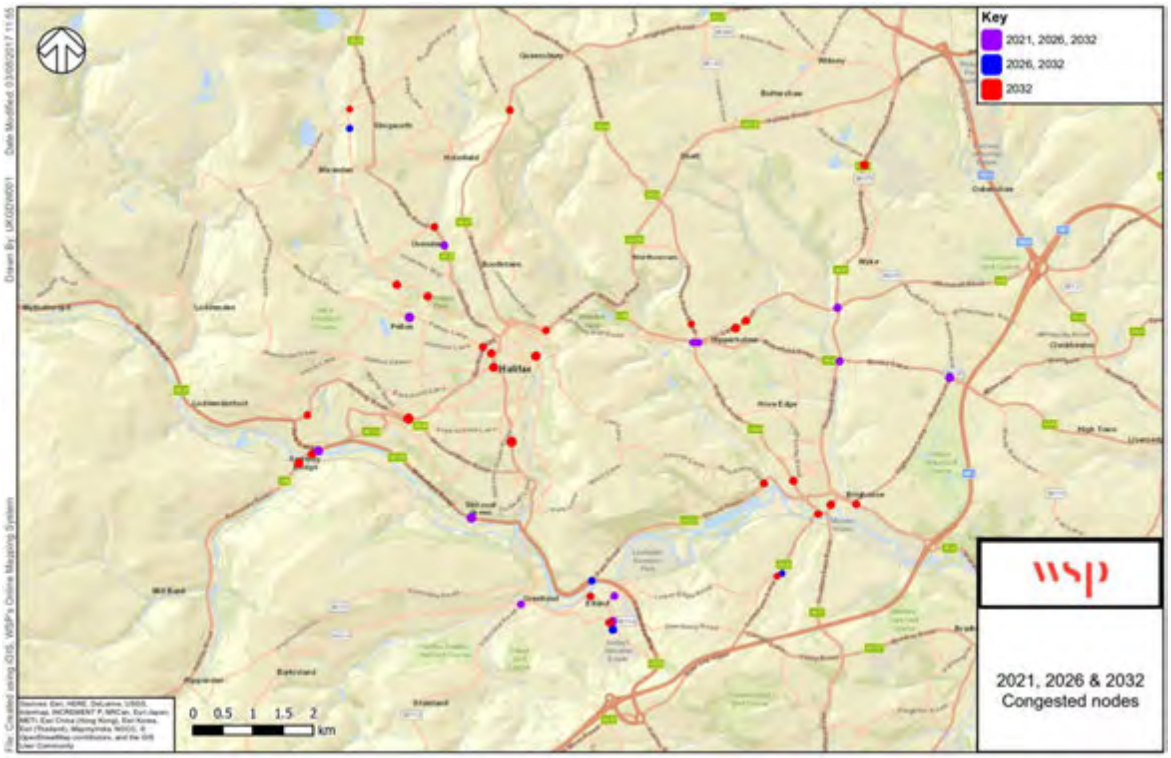
Table 3-4 - Junctions not included in 2026

Node	Location
3998	White Gate/Field Head Lane

3.2.4 It can be seen that the majority of sites that are included in the 2032 model are also seen in 2021 and 2026. However, this analysis shows that some sites will not need attention until later stages of the Plan period.

3.2.5 Figure 3-1 shows the node congestion across the three years.

Figure 3-1 – 2021, 2026 and 2032 congested nodes



4 INFRASTRUCTURE NEED

4.1 INTRODUCTION

4.1.1 The previous sections of this report have detailed the points of pressure that are predicted for the local road network as a result of the Local Plan growth alongside apportionment of the impact to individual sites being allocated as part of the Plan.

4.1.2 The previous Technical Note 4 “Cumulative Impact” also highlighted the broader areas that are predicted to require intervention in order to deliver the level of residential and employment growth in Calderdale.

4.1.3 This section gives additional detail as to the likely form of infrastructure required at these locations. More detailed design work will be needed at a later stage to properly establish the feasibility and cost of these interventions, and enable them to be taken forward as a result of either public or developer funding.

4.1.4 A number of areas identified are already the subject of local or regional studies which are currently identifying proposals to be assessed and appraised for viability.

4.2 INFRASTRUCTURE (INDIVIDUAL LOCATIONS)

4.2.1 The following locations have been identified as congestion hotspots that are worsened by the intended Local Plan growth:

A58/Tuel Lane (Sowerby Bridge)

4.2.2 The modelling assessment shows that the Tuel Lane signalised junction is under pressure, supporting previous evidence from the Sowerby Bridge Transport Study which identified existing issues in this location. An intervention at this location would need to be taken forward as part of a package covering the entire town centre. Given the constraints of this location, an improvement would be in the form of upgrades to the various signalised junctions including better co-ordination between signals to optimise highway efficiency.

4.2.3 The A58 corridor through Sowerby Bridge is currently planned for a series of corridor improvements as part of the West Yorkshire + Transport Fund (WY+TF) Corridor Improvement Programme. It is therefore reasonable to expect that the issues identified in this location will be mitigated through that planned investment, enabling the increased demand from local site allocations to be accommodated without significant detriment to the network.

A629 at Old Lane (Ovenden)

4.2.4 The issue highlighted by the modelling at this location appears to be as a result of the interactions of local traffic, parking and the geometry of side roads that enter the A629. In order to address this problem, the form of intervention would likely be relatively minor in nature such as the rationalisation of parking and the amendment of junction layouts to give increased capacity.

4.2.5 The A629 to the north of Halifax is also part of the WY+TF Corridor Improvement Programme which is looking at a number of interventions of this scale to improve the corridor as a whole. It is therefore reasonable to expect that the issues identified in this location will be mitigated through that planned investment, enabling the increased demand from local site allocations to be accommodated without significant detriment to the network.

Wakefield Rd/Copley Lane (Copley)

4.2.6 At this location the junction is particularly constrained by the surrounding housing, public house and school which offer little room for widening of the carriageway. With this in mind it is expected that an improvement would be in the form of upgrades to the signals that could give additional efficiency in terms of capacity.

4.2.7 Since the majority of future impact at the junction is attributable to a particular Local Plan site allocation, it is reasonable to expect upgrade to this junction to form part of the planning conditions associated that site's future development. Given the relatively limited scale of investment required, such an approach is deemed viable and is unlikely to prevent development of the site allocation coming forward.

Dewsbury Road/Elland Riorges Link (Elland)

4.2.8 Traffic from the Dewsbury Road arm of this junction has difficulty exiting as a result of the increased traffic levels. Currently this is an uncontrolled priority junction; therefore a re-balancing of priorities could be achieved through the addition of signals at this location. Given the proximity to the roundabout to the south, it may be necessary to re-configure this junction in unison.

4.2.9 Currently there are emerging plans for interventions at various locations within Elland as part of Phase 4 of the A629 corridor improvements, to be funded under the WY+TF. Whilst currently at an early stage of development, it is likely that the planned investment will alter flows at this junction and mitigate the issues identified, enabling the increased demand from local site allocations to be accommodated without significant detriment to the network.

A6025/Exley Lane (Elland)

4.2.10 This priority junction is modelled with capacity constraints on both Exley Lane and the western A6025 arm. Given the constraints of the rail and road bridges on either side of the junction, there is little scope for a significant intervention at the junction itself.

4.2.11 As part of pre-feasibility work on the A541 WY+TF scheme, options to alleviate pressure on the A6025 between Brighouse and Elland have been explored. Whilst still at an early stage of development, there is the potential for investment as part of the A641 scheme to reduce demand at the Exley Lane junction, providing greater ability for additional development traffic to be accommodated.

Huddersfield Road/South Lane (Elland)

4.2.12 The highlighted issue from the model at this location is the right turn into South Lane. This is only marginally above the 85% V/C limit and therefore is likely to be solved with a minor change in traffic volumes.

4.2.13 As highlighted above, the planned A629 corridor Phase 4 interventions are expected to benefit Elland by redistributing traffic in the local area. This has the potential to reduce pressure on this junction, increasing the ability for development traffic to be accommodated.

A643/Church Street/Ogden Lane (Rastrick)

4.2.14 The mini-roundabout at this location shows an issue on the A643, however there is little that can be done in terms of widening the approach roads due to the neighbouring housing and school. An improvement could be in the form of signalisation in order to give greater priority to the main movement of the A643.

4.2.15 The issue at this location is exacerbated by the large development at “Land between Bradley Wood and Woodhouse Lane” which has been modelled without any associated infrastructure. Separate studies of the large sites within south east Calderdale have stated the need for a link road between the A644 and A641 which would dissipate the traffic from this development and potentially mitigate the potential issue at the A643/Ogden Lane junction.

A641/Bailiff Bridge

4.2.16 As part of pre-feasibility work on the A641 scheme, the need for improvements at this junction have been identified. Whilst still at an early stage of development, it is likely that issues encountered at Bailiff Bridge will be overcome as part of the A641 investment, thereby enabling development traffic to be accommodated.

A58/A641 (Wyke)

4.2.17 At this junction, there are modelled capacity constraints on all arms given this is the crossroads between two key corridors, therefore there is a need for a significant intervention.

4.2.18 As part of pre-feasibility work on the A641 scheme, the need for improvements at this junction have been identified. Whilst still at an early stage of development, it is likely that issues encountered at Wyke will be overcome as part of the A641 investment, thereby enabling development traffic to be accommodated.

4.2.19 The final preferred scheme at this location needs to be formed in the context of any wider approach for improvement to the A58 corridor between Chain Bar and Halifax in the longer term.

White Gate/Mill Lane (Mixenden)

4.2.20 This junction is rural in nature and therefore the issue shown by the model here can be mitigated by limited improvements to the alignment of this junction and widening to increase capacity.

A58/Wakefield Road (Hipperholme)

4.2.21 In the longer term there is a need to address the issues at this junction as part of a comprehensive improvement for the A58 corridor as a whole. This will potentially require a significant highway intervention alongside improvements for public transport and other modes.

4.2.22 To address the particular issue seen as a result of the Local Plan sites, smaller scale improvements conditioned as part of the planning process are likely to be necessary in the short to medium term.

A643 Walton Lane/A649 Wakefield Road

4.2.23 At this location there is an issue with the right turning traffic from Walton Lane onto the A649. Given that the proportions of this junction are already generous, the provision of signals at this location to rebalance the traffic priorities in favour of the Walton Lane traffic is considered an appropriate step. Given the relatively limited scale of investment required, such an approach is deemed viable and is unlikely to prevent development of the site allocation coming forward.

B6112 Stainland Road/Saddleworth Road

4.2.24 There is a need to provide improvements to the West Vale junctions as a whole given their proximity and interaction. This will likely be in the form of upgrades to the signal operation and localised traffic management such review of waiting restrictions and rationalisation of traffic movements.

4.2.25 Phase 4 of the A629 corridor scheme has identified the need to provide investment in West Vale in order to improve journey times and allow for bus priority. The identified Local Plan impacts should be considered as part of further work on that scheme.

4.3 INFRASTRUCTURE (CORRIDORS)

4.3.1 As highlighted above and in Technical Note 4, there is a need to address the future issues arising from Local Plan growth on a corridor wide level in certain areas. Some of the locations identified from the cumulative site assessment are not captured by the site apportionment process due to the methodology used. These are described below:

4.3.2 The A58 corridor incorporating Wyke Lion, Hipperholme cross-roads and Stump Cross junctions. This should be a multi-modal approach to strategically improve travel across this key corridor rather than a site by site approach to infrastructure improvements.

4.3.3 The A629 corridor improvements are already progressing capturing the issues highlighted on the sections to the south of Halifax. Improvements on the northern side of Halifax are planned as part of the WY+TF Corridor Improvement Programme.

4.3.4 The A641 pre-feasibility study has identified possible improvements for the centre of Brighouse alongside wider improvements for the corridor. These are to be taken forward into more detailed assessment as that scheme progresses.

5 IMPACTS OF NEIGHBOURING DEVELOPMENT SITES

5.1 INTRODUCTION

5.1.1 As described in Technical Note 4, as part of the cumulative assessment of the Local Plan the development plans of neighbouring authorities have been taken into account. At the stage of this work the most detail was available from Kirklees with individual sites within 2km of the Calderdale boundary modelled specifically.

5.1.2 This section of the report details the most significant sites which contribute to the traffic flows crossing into Calderdale. This can be used in assessing the need for interventions depending on the delivery of the Kirklees Local Plan and in duty to co-operate discussions.

5.2 ANALYSIS

5.2.1 The Kirklees development sites that have been included within the Local Plan modelling have come from the Kirklees Local Plan, and have been assessed for their impact on the Calderdale network through the cross boundary movements from the larger sites.

5.2.2 The sites have had the same factoring analysis as the Calderdale sites, with zones that contain multiple sites a percentage split has been applied based on the individual site size.

5.2.3 The analysis for the number of trips from the cross boundary movement has been done with a screen line covering all routes that allow movements into and out of Calderdale to be covered. This has then been output as a matrix to enable extra zone analysis.

5.2.4 The roads that have been used to assess with a screen line are as follows:

- Stainland Road, Outlane
- Lindley Road, South Elland
- A629, South Elland
- A643 New Hey Road, Rastrick
- B6114 Clough Lane, Rastrick
- A641 Huddersfield Road, Bradley Bar
- A644 Wakefield Road, Clifton
- Deep Lane, Clifton
- A649 Wakefield Road, Hartshead Moorside
- B6120 Whitechapel Road, Scholes
- A58 Whitehall Road, Chain Bar

5.2.5 The results of the select link analysis are as below:

Table 5-1 - Housing sites contributing to cross-boundary movements

Site Number	Site Name	District	Site Area (Ha)	Proportion	2032	2014	Difference in growth
H519	Land north and west of Gernhill Avenue. Fixby, Huddersfield	Kirklees District	9.32	100%	314	210	105
H1747	Land north of Bradley Road. Bradley, Huddersfield	Kirklees District	65.82	85%	445	149	297

Site number	Site Name	District	Site Area (ha)	Proportion	2032	2014	Difference in growth
H351	Land north of Bradley Road. Bradley, Huddersfield	Kirklees District	12.07	15%	82	27	54

Table 5-2 - Employment sites contributing to cross-boundary movements

Site number	Site Name	District	Gross site area (ha)	Proportion	2032	2014	Difference in growth
E1831	Land between Whitechapel Road and Whitehall Road Cleckheaton	Kirklees District	24.57	100%	365	106	260
E1832	Site of the former Cooper Bridge Waste Water Treatment Works and land to the west and north of the Three Nuns Pub, Leeds Road, Mirfield	Kirklees District	46.83	100%	200	149	50

5.2.6 This exercise has shown the most important sites which should be considered in future planning of interventions closest to the Kirklees boundary or those that are to be taken forward jointly by both authorities.

6 SUMMARY

6.1.1 WSP have been commissioned by Calderdale Metropolitan Borough Council (CMBC) to prepare an evidence base to inform the decisions made for the Local Plan allocations of development sites and potential mitigation schemes required for the developments to reduce traffic congestion.

6.1.2 This note has described the following aspects:

- Identified congested junctions with the delivery of the full Local Plan growth
- Identified developments that contribute significant traffic to the congested junctions
- Identified which congested junctions can be addressed towards the end of the plan period
- Given further detail as to the likely form of infrastructure improvements to mitigate the Local Plan growth
- Identified the key contributors to Calderdale traffic growth from the Kirklees district

6.1.3 This Technical Note will inform the transport elements of the infrastructure plan which will be developed alongside the draft Local Plan.

6.1.4 The contents of this note should be viewed in combination with the series of accompanying Technical Notes that describe how the predicted transport impacts have been taken into account through the decision making process, enabling the preferred site allocations included within the draft Local Plan to be identified.