Calderdale Metropolitan Borough Council

CALDERDALE LOCAL PLAN TRANSPORT EVIDENCE BASE

Technical Note 13: Assessment of Cumulative Impact – 2020

CUMULATIVEIMPACT_7.0
JULY 2020

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QUALITY CONTROL

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1. INTRODUCTION

1.1. PROJECT BACKGROUND

1.1.1. WSP have been appointed by Calderdale Metropolitan Borough Council (CMBC) to provide evidence on transport-related issues in respect of the Local Plan.

1.1.2. WSP previously produced the following transport documentation on behalf of CMBC to support the draft Local Plan consultation in 2017 and the Examination in Public which began in 2019. These demonstrate the implications that site allocations may have and have been used to inform the policies within the Plan.

- Technical Note 1: Future Network Baseline [TN1] (June 2016);
- Technical Note 2: Implications of Settlement Growth [TN2] (July 2016);
- Technical Note 3: Preferred Spatial Strategy [TN3] (April 2017);
- Technical Note 4: Assessment of Cumulative Impact [TN4] (May 2017);
- Technical Note 5: Hipperholme Sensitivity Test [TN5] (March 2017);
- Technical Note 6: Site Apportionment [TN6] (July 2017);
- Technical Note 7: Air Quality Constraints Assessment [TN7] (August 2016); and
- Technical Note 8: Strategic Vision for South East Calderdale [TN8] (October 2016).
- Technical Note 9: Assessment of Cumulative Impact [TN9] (July 2018)
- Technical Note 10: Review of Previous Local Plan Evidence Base [TN10] (May 2018)
- Technical Note 11: Cross Boundary Impacts [TN11] (January 2019)
- Technical Note 12: Response to comments made by Highways England [TN12] (June 2019)

1.1.3. The documents listed above were based upon assessment of the evolving Local Plan site allocations. Following consultation by CMBC, further reviews of the sites to be allocated have taken place to refine the proposals and some recalculation of the housing numbers to be planned for has been necessary following revised central government guidance.

1.1.4. The set of sites to be allocated has required re-assessment following first stage of the Examination in Public, with the examiner requesting an increase in overall housing numbersLocal Plan. Therefore, there is a need to refresh the traffic modelling and analysis of impacts based upon the latest information and comments received on the previous methodology. It should be noted that previous modelling as documented in Technical Note 9 used higher levels of growth than eventually submitted as part of the draft Local Plan that underwent examination, and as such the change is expected to be small.

1.1.5. The revised set of sites modelled for this exercise is a ‘worst – case’ scenario that has included sites beyond the scale requested by the inspector in order to cover a potential further request for additional sites to be added.

1.2. THIS DOCUMENT

1.2.1. This document is split into the following sections:

- Methodology for modelling
- Modelling results for Do Minimum and Do Something
- Summary

2. METHODOLOGY

2.1. INTRODUCTION

2.1.1. This section of the report describes the modelling carried out to analyse the cumulative impact of the preferred set of development sites to be carried forward into the Local Plan submission draft. Refinements have been made to the information and methodology used compared to the previous assessment of the Local Plan consultation draft

2.1.2. Traffic modelling has been carried out using both a do-minimum highway network, with fully committed schemes only, and a do-something network with schemes included that are progressing as part of the West Yorkshire Plus Transport Fund.

2.1.3. The demand for travel has been calculated using the preferred set of allocated housing and employment sites provided by CMBC in January 2020, alongside historic information regarding sites recorded as built, under construction or with live planning permissions between 2014 and 2019.

2.1.4. The Local Plan sites that have been modelled represent a ‘maximum growth scenario' for the network in which all development comes forward by the end of the plan period. This is modelled under conditions that can be described as "business as usual", with only limited highway improvements and no changes in demand that represent significant shift away from use of the private car or reduced levels of travel. For example, rapidly changing travel and lifestyle trends such as increased home-working and online shopping are not represented.

2.2. HOUSING

2.2.1. The methodology used for modelling Calderdale Local Plan growth in the pre-consultation stage has been updated with new information received, including updating model matrices to reflect predicted traffic increases across the modelled area. All housing developments have been included for modelling the Local Plan.

2.2.2. The Local Plan period starts in 2012 while the Calderdale Strategic Transport Model base year is 2014. The development growth which makes up part of the plan, but delivered between 2012 and 2014, was already included within the base model. Updated information provided by CMBC as of January 2020 includes developments that are built, in construction and with planning permission between 2014-2019 and proposed developments for the remaining duration of the Local Plan totalling 18,675 units to be incorporated into the revised model. The breakdown between built and allocated sites is shown in Table 1 below.

Table 1 - Modelled growth in residential sites 2014-2032

Type	Residential Units
Built	5,854
Allocated	12,821

2.2.3. The list of sites includes 1,538 individual sites, 1,262 of which are less than 10 units while 12 are greater than 200 units.

2.2.4. The log of Calderdale housing sites used can be found in Appendix ALocal Plan.

2.2.5. Outside Calderdale, specific developments have only been included for Kirklees and Bradford sites within a 2km buffer of the border with Calderdale as these are felt to be most influential on the Calderdale network. Other areas of Kirklees and Bradford are not represented in enough detail in the model to apply specific development growth. All other areas have used the NTEM v7.2 dataset to apply an appropriate factored growth in demand.

2.3. LOCAL PLANEMPLOYMENT

2.3.1. Similar to housing, the methodology for representing employment sites has changed since the previous model run for the pre-consultation stage. An updated list of Local Plan sites has been made available following the Employment Land Study undertaken on behalf of CMBC. The sites used make up the total employment growth between 2016 and 2032.

2.3.2. The log of Calderdale employment sites (including the employment portion of mixed use sites) modelled can be found in Appendix B.

2.3.3. Outside Calderdale, employment growth has been modelled using NTEM v7.2 data except for Kirklees and Bradford where sites within 2km of the authority boundary have been specifically modelled. These sites have been included as they will show the most interaction with the Calderdale network and the model is detailed enough in this area to model sites specifically.

2.4. LOCAL PLANGROWTH CAP

2.4.1. In model forecasting the overall cap on growth of housing and employment (which subsequently informs the growth in modelled traffic) is usually based on the national trip end model (NTEM). This is a standard way of capping growth when forecasting. The 2014 to 2032 growth figures from NTEM v7.2, equivalent to the Local Plan period modelled, are shown in Table 2 below.

Table 2 - NTEM Forecast Growth in Housing and Employment for Calderdale district

	NTEM v7.2 Growth 2014-2032
Households	14,390
Jobs	7,190

2.4.2. The NTEM version 7.2 figures are significantly lower than the Local Plan target for housing of 18,675 units (2014-2032) which if applied would give a reduction in the modelled quantum of growth across the district and would not fully represent the delivery of the Local Plan. As mentioned in 2.1.4 above, the Local Plan assumes that all development sites will be built out by the end of the plan period which could be viewed as optimistic, whereas NTEM could be seen as a more realistic forecast.

2.4.3. Employment land allocated by CMBC as of January 2020 assumes a target increase of 8,295 jobs (net) in the district. An additional allowance is made for employment land lost as well as a flexibility

margin which allows a choice of sites for businesses to locate in. The total allocation of land for employment (B-type only) use is 97ha, of which approximately 84ha is considered developable.

2.4.4. Assumptions about expected plot-ratios for these sites were applied by CMBC in the calculation of site area for B-uses provided to WSP. A flexibility margin of 8.7ha was incorporated by CMBC into the calculation of the total 97ha allocation, and in order to model a 'worst case' scenario this was considered fully adopted by the end of the plan period. Conversion to total jobs assumed the same proportion as the land area for the target jobs. This brings the net jobs modelled to 11,030 which, whilst above the predicted NTEM growth seems reasonable given the ambitions of the Local Plan and the need for this model to test a plausible maximum growth scenario. The remaining land allocated is assumed to correspond to displacement from other areas of the district.

2.4.5. It is inappropriate to use the NTEM v7.2 forecast for growth in households as a cap, as it would mean that areas of the model without specific development sites would compensate by seeing a large reduction in growth which is not expected. Therefore, a cap has been set that matches the total households for the Local Plan.

2.5. TRIP CALCULATIONS

2.5.1. Developments have been attributed a trip rate depending on site use by taking the total multi-modal trip rate and applying a local vehicle class proportion to derive the car trip rate. Individual trip rates, based on prior modelling work, have been applied to the two Garden Suburbs and the Clifton Business Park development. More detailed site assessments have been undertaken for these sites and these therefore represent a more accurate source of trip rate information.

2.5.2. Trip rates for developments within Calderdale and a 2km buffer of the borders with Bradford and Kirklees have been calculated for each site. The total multi-modal trip rate for each development type has been collected from TRICS data and the proportion travelling by car was calculated based on 2011 Census Journey to Work data[1].

2.5.3. For residential sites, multi-modal trip rates were extracted for privately owned and affordable local authority houses and flats and the weighted average trip rate for residential land use was calculated based on an 83/17% split of houses to flats. This multi-modal trip rate was then converted into the car trip rate for residential sites by taking the MSOA that the development was in and using the proportion of journey to work trips originating in that MSOA that were made by car. Car usage for travel from residential sites ranges from 49% to 82% with an average of 64%.

2.5.4. For employment trips, three land use types have been used: B1 (Business), B2 (General Industrial) and B8 (Storage and Distribution). B1trip rates have been calculated using an average of Office and Business Park TRICS classifications, B2 from Industrial Unit and Industrial Estate and B8 from Warehouse (Commercial) and Self-Storage. The multi-modal trip rates were converted into car trip rates for employment sites by taking the MSOA that the development was in and using the

[1] Census 2011: WU03EW - Location of usual residence and place of work by method of travel to work

proportion of journey to work trips arriving in that MSOA that were made by car. Car usage for travel to employment ranges from 56% to 81% with an average of 66%.

2.5.5. The multi-modal trip rates used are shown in Table 3 and Table 4.

Table 3 – Multi-Modal Residential Trip Rates (per dwelling)

	AM Arrival	AM Departure	IP Arrival	IP Departure	PM Arrival	PM Departure
	0.187	0.705	0.244	0.232	0.524	0.268

Table 4 – Multi-Modal Employment Trip Rates (per 100 sqm GFA)

Land Use by Car Split	AM Arrival	AM Departure	IP Arrival	IP Departure	PM Arrival	PM Departure
B1 – Business	1.958	0.241	0.497	0.536	0.179	1.623
B2 – Industrial	1.271	0.252	0.306	0.319	0.107	1.036
B8 – Storage & Distribution	0.110	0.070	0.094	0.097	0.055	0.102

2.5.6. Individual trip rates have been calculated for the Clifton Business Park site and garden suburbs. More detailed site assessments have been undertaken for these sites and these therefore represent a more accurate source of trip rate information. The trip rates used for these sites are shown in Table 5 and Table 6.

Table 5 - Garden Suburbs Residential Trip Rates

	AM Arrival	AM Departure	IP Arrival	IP Departure	PM Arrival	PM Departure
Trips per Dwelling	0.159	0.589	0.227	0.198	0.417	0.257

Table 6 - Clifton Employment Site Trip Rates (Per 100sqm GFA)

	AM Arrival	AM Departure	IP Arrival	IP Departure	PM Arrival	PM Departure
B2	0.4828	0.2556	0.2858	0.28826	0.2769	0.4047
B8	0.3266	0.0355	0.035	0.04118	0.2556	0.213

2.5.7. Previously, a factor of 0.4 was applied to all employment sites to calculate the floor area from the site area (for use with trip rates). In the updated set of data received from CMBC, values for floor area have been provided based on their knowledge of the individual sites.

2.6. GROWTH OUTSIDE CALDERDALE

2.6.1. For areas outside Calderdale, future growth has been based on national forecasts. Given the close interaction with Kirklees and Bradford, more detailed site specifics have been modelled in the same way as detailed above. The overall housing and employment growth applied for Kirklees and Bradford is shown in Table 7 below.

Table 7 - NTEM Growth in Kirklees and Bradford

	NTEM v7.2 Growth 2012-2032 Kirklees	NTEM v7.2 Growth 2012-2032 Bradford
Households	25,606	31,486
Jobs	16,483	21,008

2.6.2. The NTEM figures for residential growth in Kirklees are broadly similar to those set out in the council's Local Planplan. Therefore, they have been deemed suitable for use in assessing the impact of neighbouring growth on the Calderdale road network. The provision of jobs aspired to in the Kirklees Local Plan greatly exceeds the NTEM forecast at 23,000 jobs. To reflect the impact of the high growth aspirations of Kirklees upon Calderdale, the employment sites within a 2km buffer of the Calderdale boundary have been included explicitly, but the growth for the zones in the rest of the district have factors applied such that the district as a whole is constrained to the NTEM forecast demand shown above. The growth in Bradford was similarly modelled with explicit development close to Calderdale and a constraint to NTEM district growth.

2.6.3. Remaining areas outside Calderdale, Kirklees and Bradford have used 2018 National Road Traffic Forecast figures (NRTF) to inform the forecast growth in travel. This has been decided as the external areas of the model are not detailed enough for NTEM to be used. Where the detailed model network area ends, NRTF growth Figures between 2014 and 2032 have been used; therefore, neighbouring authorities (not explicitly modelled) and the rest of England have used NRTF. The NRTF growth factors used are shown in Table 8 below.

Table 8 - NRTF 2018 Traffic Growth (2014-2032)

	Cars	Light Goods Vehicles	Heavy Goods Vehicles
NRTF	1.20	1.29	1.00

3. MODELLING RESULTS

3.1. INTRODUCTION

3.1.1. This section of the report outlines the results based on the model runs as described above. This discussion helps to summarise the nature of predicted congestion on the network, and informs the associated infrastructure requirements and recommendations to be considered alongside the Local Plan.

3.1.2. Two model runs have been undertaken with the same development demand but differing networks. A do-minimum network has been used, which only incorporates committed schemes, and a do-something network that also includes the A629 Phases 1a and 1b given the developed stage these improvements are at in the West Yorkshire + Transport Fund (WY+TF) process. Additionally, the do-something network includes Clifton Link Road, which has now received central government funding, that connects the A643 and A644 through Clifton Business Park.

3.1.3. The do-something network has not included other proposed WY+TF schemes such as the later phases of the A629 scheme and improvements to the A641 corridor as although they are progressing they have not been developed sufficiently to be coded into the model network at this time. There is also less certainty over their delivery within the plan period given the early stage of development and design which these schemes are currently at.

3.1.4. The analysis has focussed on the impacts seen at a number of key locations identified in previous reporting and any new sites that have emerged. The plots showing the change in modelled delay between the base model of 2014 and the 2032 model are included as an appendix to this report.

3.1.5. Appendix D and E show the AM and PM delays respectively.

3.1.6. Appendix F shows the comparison between 2032 and 2014 delay.

3.2. DO-MINIMUM MODELS

3.2.1. The Do-Minimum modelling shows levels of congestion that would be unacceptable without further intervention. The do-minimum scenario has only a small number of committed highway improvements included within the network.

3.2.2. The do-minimum models show that current areas of constraint are inevitably worsened as a result of the planned level of growth associated with the Local Plan (given the “business as usual” nature of the methodology).

3.3. IMPACT OF DO-SOMETHING SCHEMES

3.3.1. As described above, the modelling of the Local Plan sites has been undertaken with a “do-minimum” network as well as a “do-something” network with highway improvements which although not strictly committed are progressed enough that they have a reasonable level of certainty to their implementation.

3.3.2. The demand for the do something model remains the same as the do-minimum scenario, therefore giving a direct like-for-like comparison between the two.

The overall impact on traffic flows with the introduction of the A629 phases 1a and 1b and Clifton link road in the “do-something” scenario is shown below in Figure 1 and Figure 2.

Figure 1 - Modelled Traffic Flow Differences DM Model against DS Model, AM

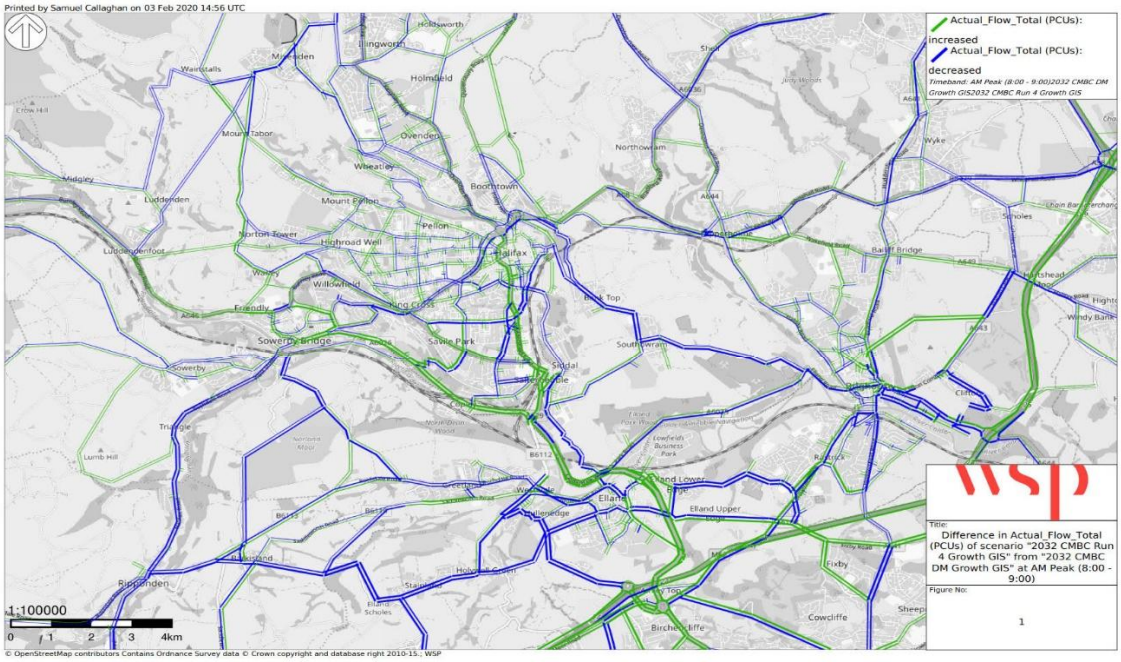
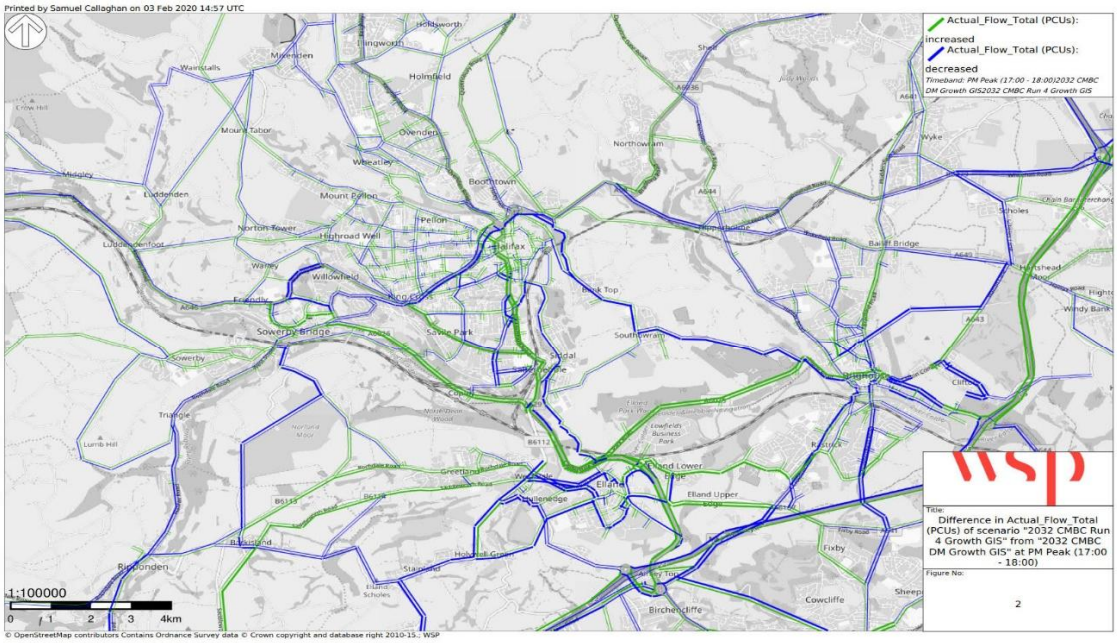


Figure 2 - Modelled Traffic Flow Differences DM Model against DS Model, PM



3.3.3. It can be seen that the improvements along the A629 draw additional traffic along the route from the M62 and in turn reduce traffic westbound through Brighouse, Southowram and also parts of Elland. This gives a benefit to some areas that were highlighted as issues in previous reports.

3.4. IDENTIFYING SIGNIFICANT IMPACTS

3.4.1. In order to identify the areas in the DS model with significant congestion, the output from the modelling has been examined in terms of the ratio of volume over capacity (V/C). This compares the modelled traffic flow over an hour to the modelled capacity for an hour. The junctions with at least one arm showing a V/C ratio of greater than 85% (which is generally accepted as the point where congestion begins) and traffic flow of greater than 350 passenger car units (PCU) were identified (thereby excluding points where negligible flows are modelled).

3.4.2. The subsequent analysis of these points on the model network, alongside local knowledge gave rise to the specific locations described below which show worsened congestion as a result of the CMBC Local Plan growth.

3.5. OVERALL CONGESTION

3.5.1. The significantly congested points of the district have been identified in the model outputs using the method described in Section 3.3.

3.5.2. The areas of significant congestion are identified below in Figure 3 and Figure 4 for AM and PM, and are discussed in detail in the remainder of this report. Key locations of significant congestion, where a number of points are clustered, can be seen in Brighouse, Hipperholme, Stump Cross, Ainley Top, Sowerby Bridge and in Copley.

Figure 3 - Worst Congested Nodes AM, only nodes with V/C > 85% plotted

Figure 4 - Worst Congested Nodes PM, only nodes with V/C > 85% plotted

3.5.3. The following sections of this report show links with high V/C percentage in the locations identified above (indicated by side of the road travelled by vehicles). This output shows the overall constraint of the link in terms of capacity, which is typically a result of the downstream junction.

3.5.4. It should be noted that the length of the link is purely a result of the network coding used rather than showing queue length.

3.6. LOCAL PLANBRIGHOUSE

3.6.1. Brighouse has had a large level of development included within the settlement, with significant additional housing and employment included with the Garden Suburbs and the Clifton Business Park site.

3.6.2. The key impacts seen in Brighouse are listed below:

- The western Ludenscheid Link roundabout experiences southbound and northbound movements that are over capacity.

- The traffic related to the large Thornhills housing site has a major impact on congestion and delays at the junction of the A644 and A643.
- The Thornhills site also produces an impact as a result of additional traffic using inappropriate links in the network, e.g. Thornhills Beck Lane.
- Existing congestion is worsened through the centre of Brighouse on the A641. The model showing an increase in delay of 2 minutes northbound in the AM peak and PM Peak.

3.6.3. Junction 25 of the M62 shows links at the junction to be close to capacity. These are shown on the roundabout itself rather than the A644 or the M62.

3.6.4. The links on the network with a V/C ratio of greater than 90% in the AM are shown in Figure 5 below. These generally show the constraint of downstream junctions at:

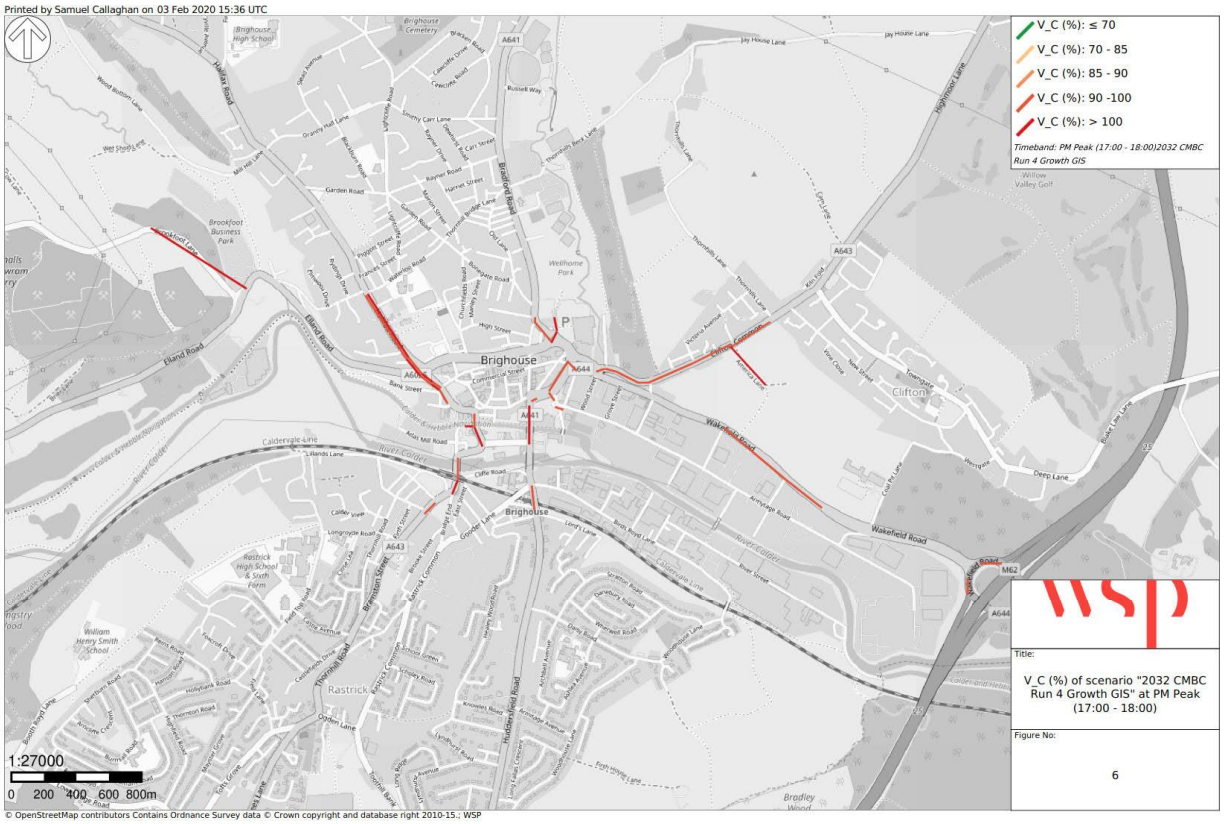
- Ludenscheid Link western roundabout (A6025/A644/A643)
- Wakefield Road/Clifton Road roundabout (A644/A643)
- Ludenscheid Link eastern roundabout (A641/A643)
- Huddersfield Road/Clifton Road (A641/A643)
- Brookfoot Lane/Elland Road (A6025)
- A641/Mill Royd Street

3.6.5. Other links showing V/C which indicate problematic congestion are shown on the A643 northbound (south of the town centre). In these locations the link capacity causes a constraint rather than a downstream junction.

Figure 5 – Brighouse Links Greater than 90% V/C, AM

3.6.6. The same areas are shown as capacity constraints in the PM peak hour, as shown in Figure 6.

Figure 6 - Brighouse Links Greater than 90% V/C, PM



3.6.7. The key capacity constraints that show unacceptable levels of congestion in Brighouse are the worsening of existing issues, however these appear to be resolvable. The problem locations align with the proposed A641 corridor WY+TF scheme, which is currently at Strategic Outline Case stage and therefore can be tailored to suit the impacts of the Local Plan, and the significant transport infrastructure that will form part of the master planning of the Thornhills and Woodhouse garden suburb housing sites and Clifton employment site.

3.7. ELLAND

3.7.1. Elland as modelled shows the impact of large housing sites on the land to the north of Elland on the opposite side to the A629, and the sites on Saddleworth Road.

3.7.2. As in the base model, the most significant congestion is shown at the two junctions at West Vale which is worsened via the Local Plan growth. There is an increase in delay of around 2 minutes for the eastbound arms at both junctions with the Local Plan traffic. All other increases in delay seen in Elland are less than 40 seconds.

3.7.3. The links on the network with a V/C ratio of greater than 90% in the AM are shown in Figure 7 below. These show a mixture of constraint from downstream junctions and link capacity. However,

where the delays are observed at a junction, the constraint issues are generally only seen on a single arm. The key locations in Elland with greater than 90% V/C are:

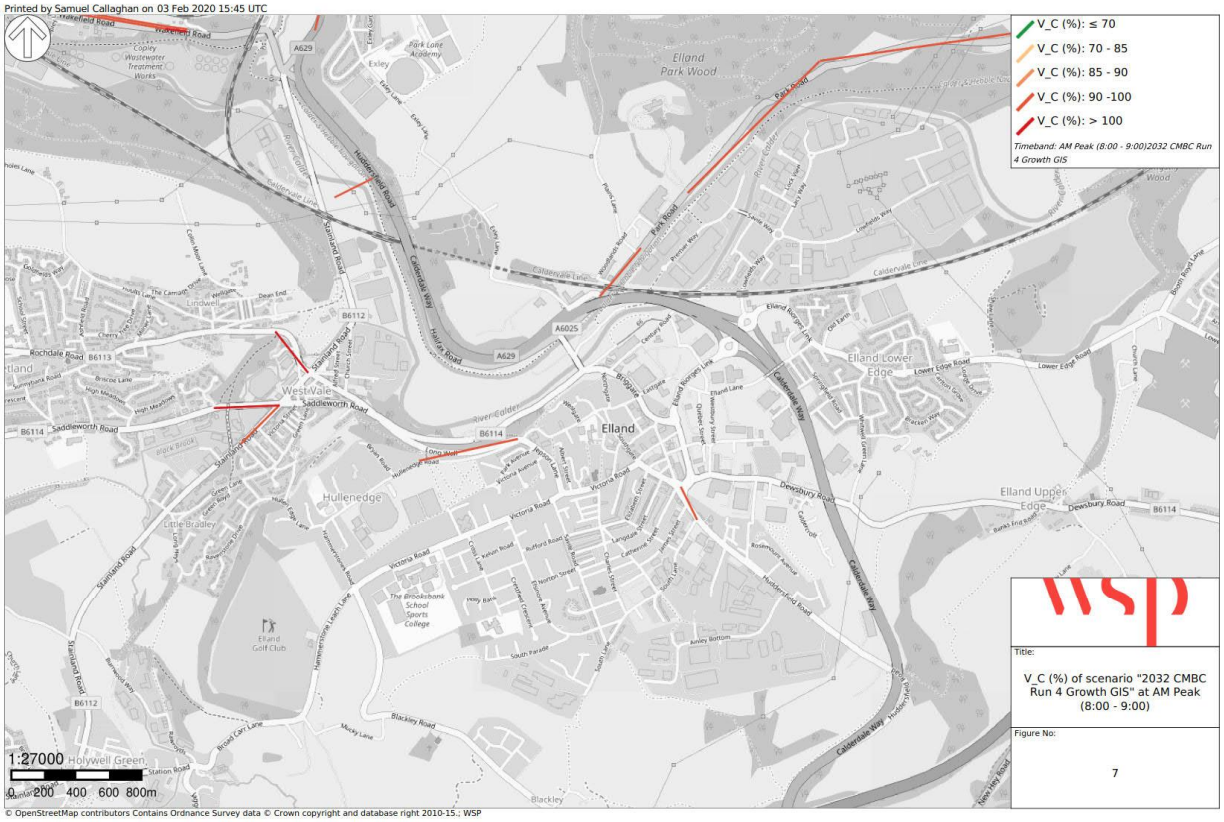
- Rochdale Road/Stainland Road (Junction capacity).
- Saddleworth Road/Stainland Road (Junction capacity).
- Hullenedge Road/Long Wall/Jepson Lane (Junction capacity).
- Park Road (A6025) Northbound (Link capacity).
- Huddersfield Road/South Lane Southbound (link capacity).

3.7.4. An issue is also seen on the new link formed between Stainland Road and the A629 as part of the A629 Phase 1b. However, this scheme has not been modelled in detail for the Local Plan assessment.Local Plan The impact of Phase 1b is discussed in more detail below.

3.7.5. It should also be noted that stage 4 of the A629 scheme has not been modelled, as the scope is not yet confirmed, which is expected to benefit the centre of Elland and will contribute to mitigating the issues seen below.

3.7.6. The AM worst congested junctions are shown in Figure 7 below.

Figure 7 - Elland Links Greater than 90% V/C, AM



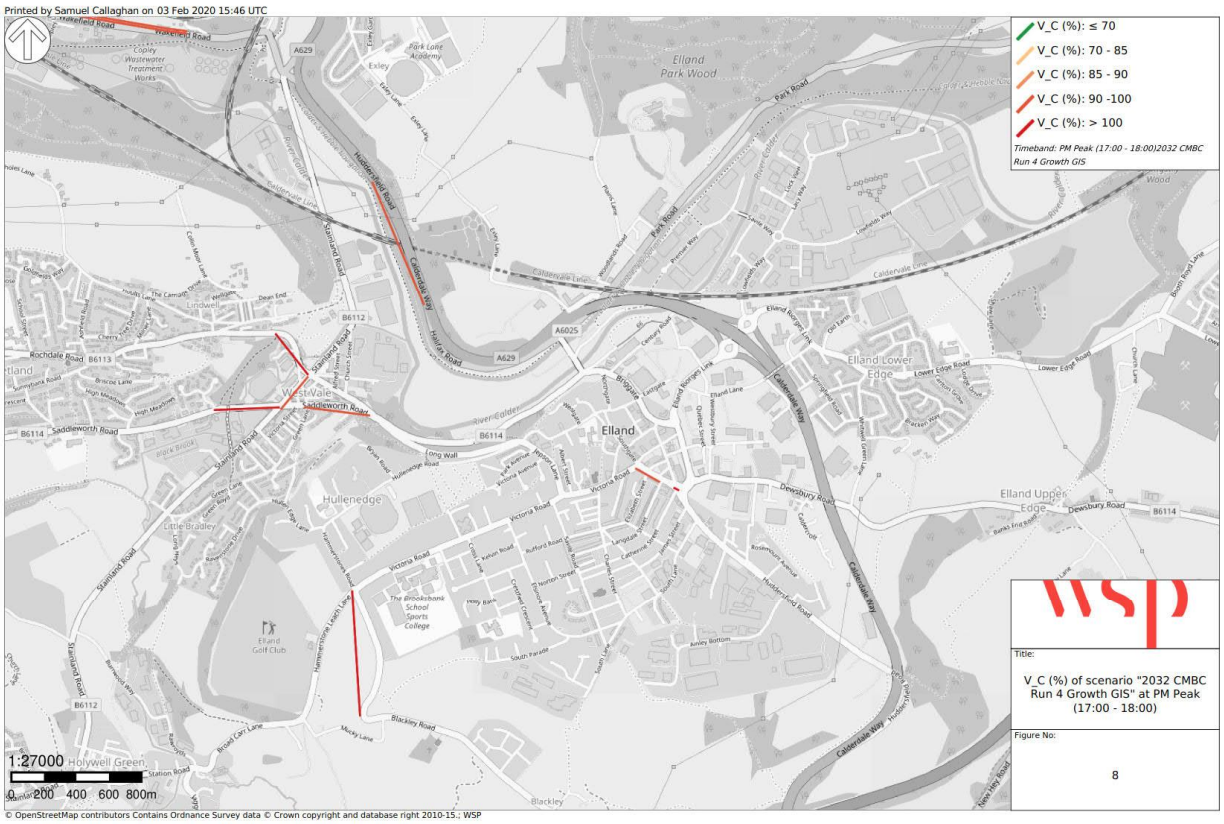
3.7.7. Elland shows a similar trend of capacity constraint in the PM peak, with the most significant congestion occurring at:

- West Vale junctions.
- Dewsbury Road/Southgate/Huddersfield Road junction.
- A629 Northbound.
- Blackley Road/Victoria Road Northbound.
- Southgate/Victoria Road Westbound.

3.7.8. As in the AM peak, the only significant additional delay (more than 1minute) is seen at the West Vale junctions. Additional delay of around 40 seconds is seen southbound on Stainland Road and Rochdale Road eastbound sees 2 minutes of additional delay.

3.7.9. Figure 8 shows the congestion modelled in Elland for the PM peak.

Figure 8 - Elland Links Greater than 90% V/C, PM



3.7.10. The issues raised in Elland are generally localised in nature and appear to be resolvable with limited traffic management measures and minor junction improvements. The later stages of the A629 corridor improvements will also bring relief to the town centre.

3.7.11. Detailed modelling (separate to the Local Plan cumulative impact) has been carried out for the design and appraisal of the A629 Phase 1b. This shows that the improvements at the Salterhebble junction reduces demand for travel through West Vale as the A629 principal route retains more

through traffic. As such, the A629 improvement which is expected to open in 2021, relieves the issues shown at the two West Vale junctions as shown in the cumulative assessment. Reductions in traffic flow into the Saddleworth Road / Rochdale Road junction for the opening year of 2021 and design year of 2036 are shown below:

Table 9 - A629 Phase 1b Impact - 2021

2021	AM	PM
Stainland Road (north)	+1%	-26%
Sadleworth Road (east)	+12%	-27%
Stainland Road (south)	-21%	-20%
Sadleworth Road (west)	+17%	+22%

Table 10 - A629 Phase 1b Impact - 2036

2036	AM	PM
Stainland Road (north)	+5%	+4%
Sadleworth Road (east)	-10%	-27%
Stainland Road (south)	-9%	-7%
Sadleworth Road (west)	+3%	+18%

3.7.12. The two West Vale junctions need to be treated as a whole when looking at interventions as there will likely be a need to rationalise traffic movements and apply area wide traffic management. The A629 Phase 4 scheme will look to improve the efficiency of the junctions further by utilising signal optimisation technology such as Microprocessor Optimised Vehicle Actuation (MOVA). When introduced at similar congested urban junctions, MOVA typically increases capacity by around 5% and can reduce delays by a greater extent. The adoption of this technology also provides greater benefits for the peak shoulder hours thereby encouraging 'peak spreading' for the increasing numbers of commuters who can work flexibly and time journeys outside the traditional peak hours.

3.7.13. In combination, the A629 Phase 1b and Phase 4 works are expected to provide significant mitigation of the Local Plan growth at these two junctions.

3.7.14. In addition to the A629 improvements, the planned new rail station at Elland and the associated access package of cycle routes throughout Elland and specifically the links to West Vale will also encourage mode shift away from the private car and assist in reducing the impacts of the growth planned in this location.

3.8. A58 CORRIDOR

3.8.1. A number of points along this corridor show significant congestion, but again are a worsening of current congestion issues.

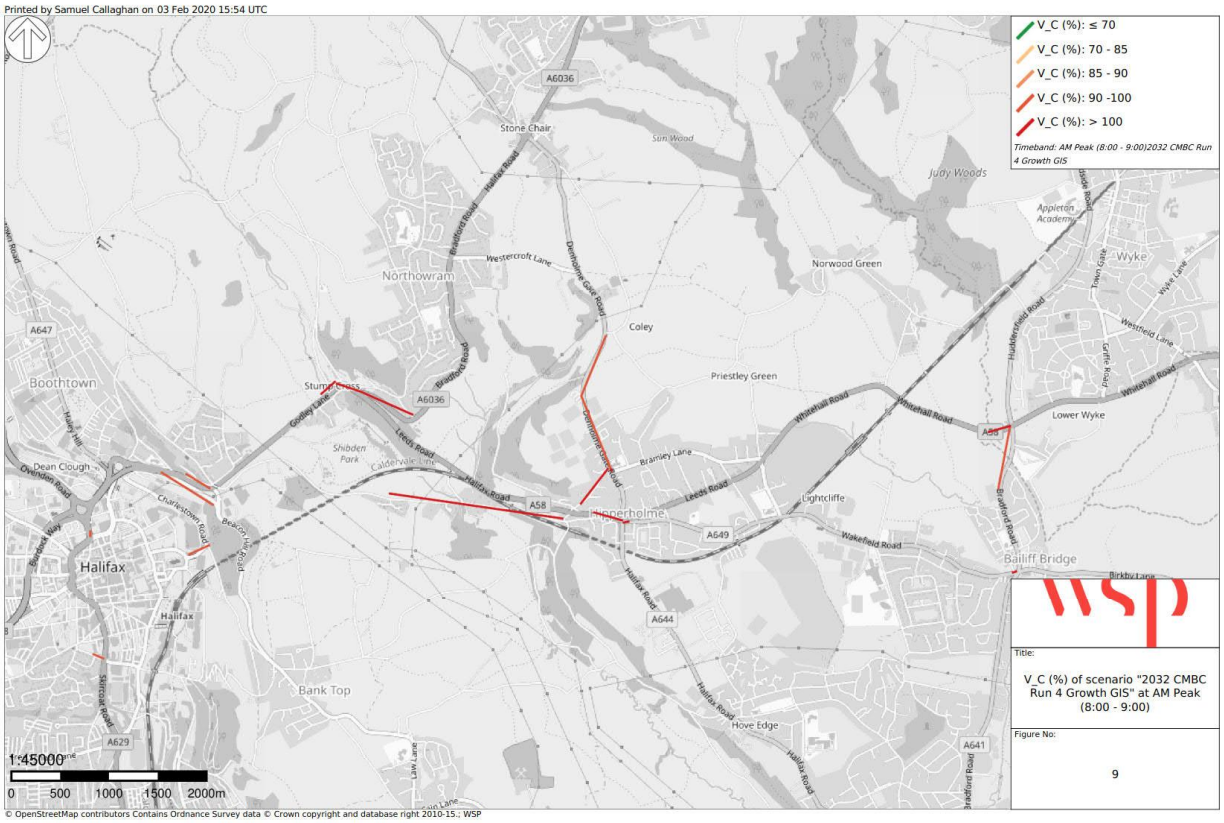
3.8.2. The Wyke Lion junction shows an increase in delay, due to the future traffic growth, for the eastbound movement of over 5 minutes and around 30 seconds for the westbound arm and around 70 seconds for the northbound arm.

3.8.3. There are several developments in the Hipperholme area in the forecast models which result in increases in delay on roads in the village. There are delay increases seen between 2014 and 2032 of over 3 minutes on Denholme Gate (A644) and 3 minutes on Leeds Road (A58). Tanhouse Hill shows a high V/C ratio, with additional delays of 2½ minutes eastbound.

3.8.4. There is also a point of significant congestion seen at Stump Cross with almost 2½ minutes additional delay for the Bradford Road arm (A6036).

3.8.5. The modelled congestion along the A58 corridor in the AM is shown in Figure 9 below.

Figure 9 - A58 Corridor Links Greater than 90% V/C, AM



3.8.6. In the PM peak the signalised junction at Wyke Lion shows capacity issues for the east/west movements, with around 2½ minutes additional delay westbound and 2 minutes eastbound. The north and south movements show additional delay of less than 1 minute each.

3.8.7. Hipperholme cross roads follows a similar trend to the AM peak with the existing issues being worsened.

- The northbound A644 arm is over capacity at 105% V/C, which results in additional delays of over 1 minute.
- The westbound arm of the A58 is at 98% in the base, and moves to 107% in the future year. This results in an increase in delay of around 2 minutes.
- Wakefield Road sees additional delay of over 2 minutes in the PM peak.

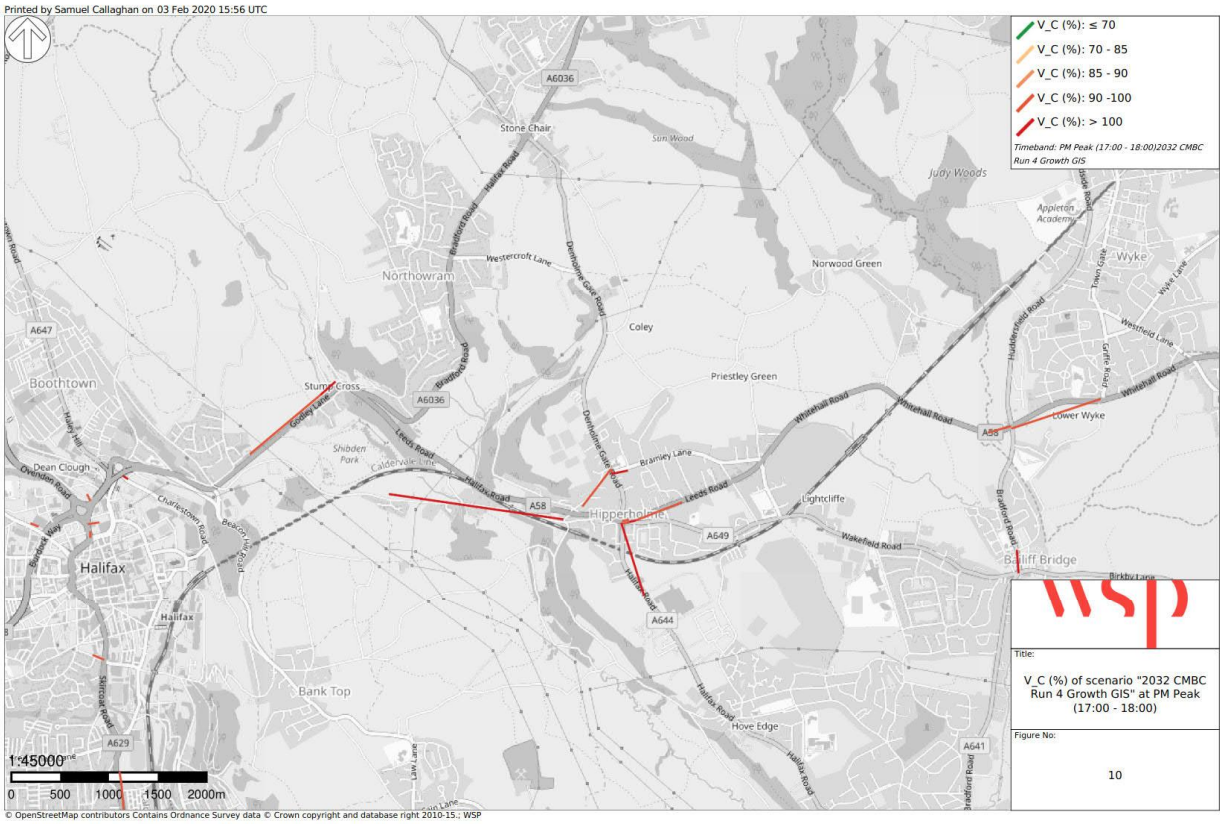
3.8.8. Away from the cross roads the effect of re-routing is seen at Bramley Lane / Denholme Gate Road which shows a large increase in V/C from 88% in the base to 105% in the future year. This leads to around 2 minutes of additional delay for this movement from the A58 East to the A644 North.

3.8.9. Again, the movement eastbound on Halifax Old Road shows a high V/C ratio and this gives increased delay of around 1 minute.

3.8.10. Stump Cross is also congested in the PM peak as a result of the tidal traffic flow from Halifax. The A58 movement from Halifax sees additional delay of 1½ minutes.

3.8.11. The PM congestion on the A58 corridor is shown in Figure 10.

Figure 10 - A58 Corridor Links Greater than 90% V/C, PM



3.8.12. From the analysis above there are significant issues shown at both Wyke Lion, for A58 traffic, and at Stump Cross, for A6036 traffic. There are increases in delays at Hipperholme Crossroads that add to the already significant issues currently seen at this junction. Calderdale Council has engaged consultants to develop a range of interventions to support economic and housing growth across North East Calderdale by addressing highway congestion, improving public transport connectivity, promoting active travel corridors and enhancing the built and natural environment. A number of options have been developed including new highway alignments and junction improvements, bus priority and network development, potential rail station and rail park-and-ride and on- and off-highway cycle routes. The study includes assessment of potential funding streams. A Strategic Outline Case promoting a package of preferred options will be submitted to West Yorkshire Combined Authority during 2020/21.It is expected that a comprehensive corridor study for the A58 will address the issues in this area in a holistic manner and is also likely to incorporate the A6036 within its scope.

3.9. BAILIFF BRIDGE

3.9.1. Although Bailiff Bridge and Wyke don't have any significant development modelled explicitly, they are affected by the traffic demands from the wider area.

3.9.2. Significant additional traffic uses the junction at Bailiff Bridge in the AM peak, showing an increase in V/C to 106% on the eastbound approach. This gives a 2 minute increase in delays over the base year situation.

3.9.3. In the PM, Bailiff Bridge shows the southbound arm of the A641 Bradford Road close to capacity in the base year, which then moves to over capacity at 104% in 2032. This leads to an increase in delay of over 1 minute. On all other arms there are smaller increases in delay of less than a minute.

3.9.4. The A641 corridor is being addressed as part of a future WY+TF scheme which will take into account the impacts of the Local Plan. Given the level of additional delay modelled at Bailiff Bridge it is reasonable to expect the scheme to be able to mitigate this worsening through a junction re-modelling.

3.10. A629 AND A6026 CORRIDORS

3.10.1. The A629 has been modelled with both the Phase1a scheme and the Phase 1b scheme given the greater level of detail known and the stage in the funding approvals process each is currently at. As shown previously, this has a significant impact on improving the flow of traffic through the corridor and relieves the majority of congestion, however with the growth in traffic as a result of the Local Plan developments some points of congestion still remain.

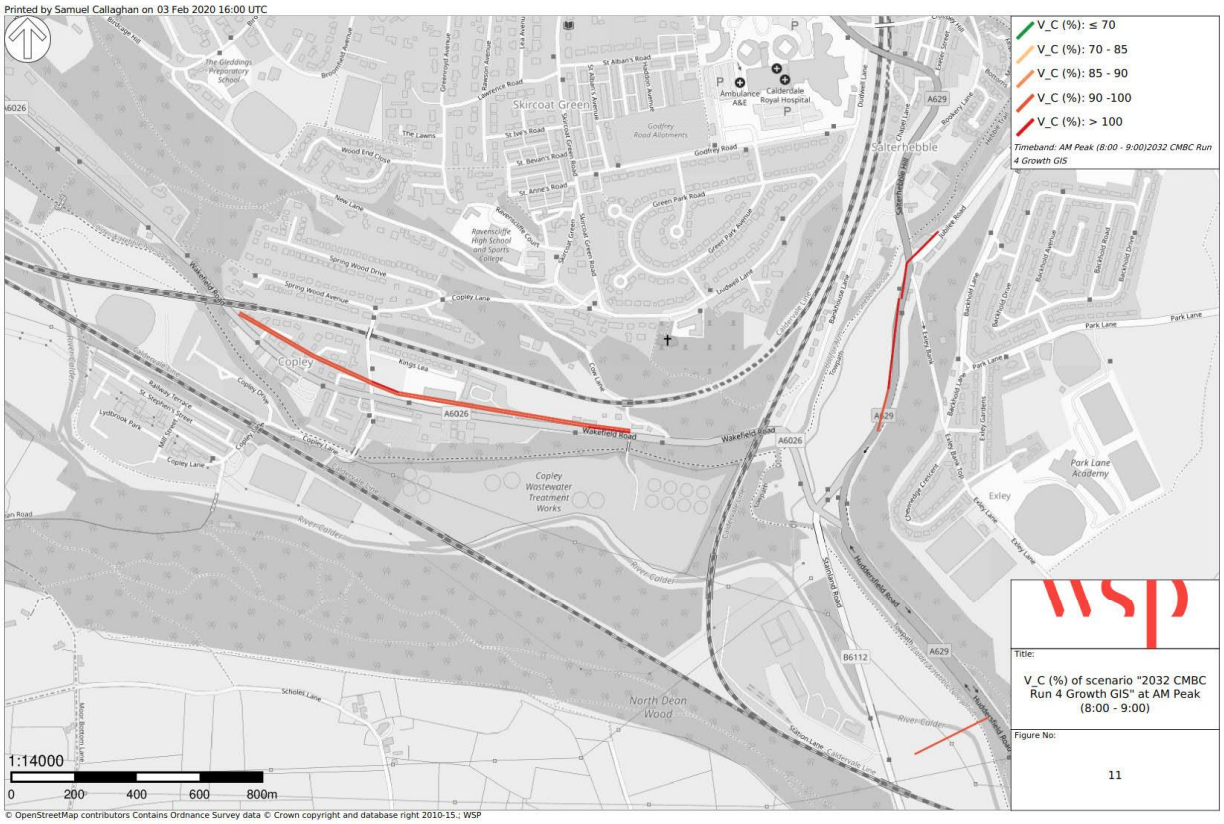
3.10.2. Jubilee Road and the merging of the two lanes between Phase 1a and 1b are shown to be over capacity due to the movements along the corridor. This is as a result of the additional traffic attracted to the A629 in both the northbound and southbound directions. There is an increase in delay of around 5 minutes shown at this point, however there is a greater improvement in delay shown upstream at the Calder & Hebble junction which compensates for this.

3.10.3. Although not modelled at this stage due to lack of clarity on the detail, the Phase 1b scheme will include an improvement scheme at Jubilee Road, with the aim of carrying two lanes through northbound on the A629 corridor between the Phase 1a and Phase 1b scheme.

3.10.4. The A6026 shows issues with both the junction with Copley Lane and the capacity of the A6026 itself at this point as a result of additional demand for travel and the improvements made at the Calder & Hebble junction on the A629. This gives an increase in delay of around 1½ minutes westbound. This would need to be addressed separately to the A629 schemes and may be a relatively simple improvement to the operation of the signals at this point.

3.10.5. The modelled points of significant congestion on the A629 in the AM peak are shown below in Figure 11.

Figure 11 - A629/A6026 Corridor Links Greater than 90% V/C, AM



3.10.6. Ainley Top Junction (Junction 24 of the M62) shows a number of points of high V/C as shown in Figure 12. However, these are mostly current issues that are worsened, with significant increases in delay seen at:

- The westbound off slip from the M62 (2½ minute delay increase).
- Blackley Road entry to the northern roundabout (over 6 minutes delay increase).
- Link capacity issues eastbound on slip to the M62 (nearly 6 minute delay increase).
- Link capacity issues on Lindley Moor Road (A643) (1minute increase in the eastbound direction).

Figure 12 - Ainley Top Links Greater than 90% V/C, AM

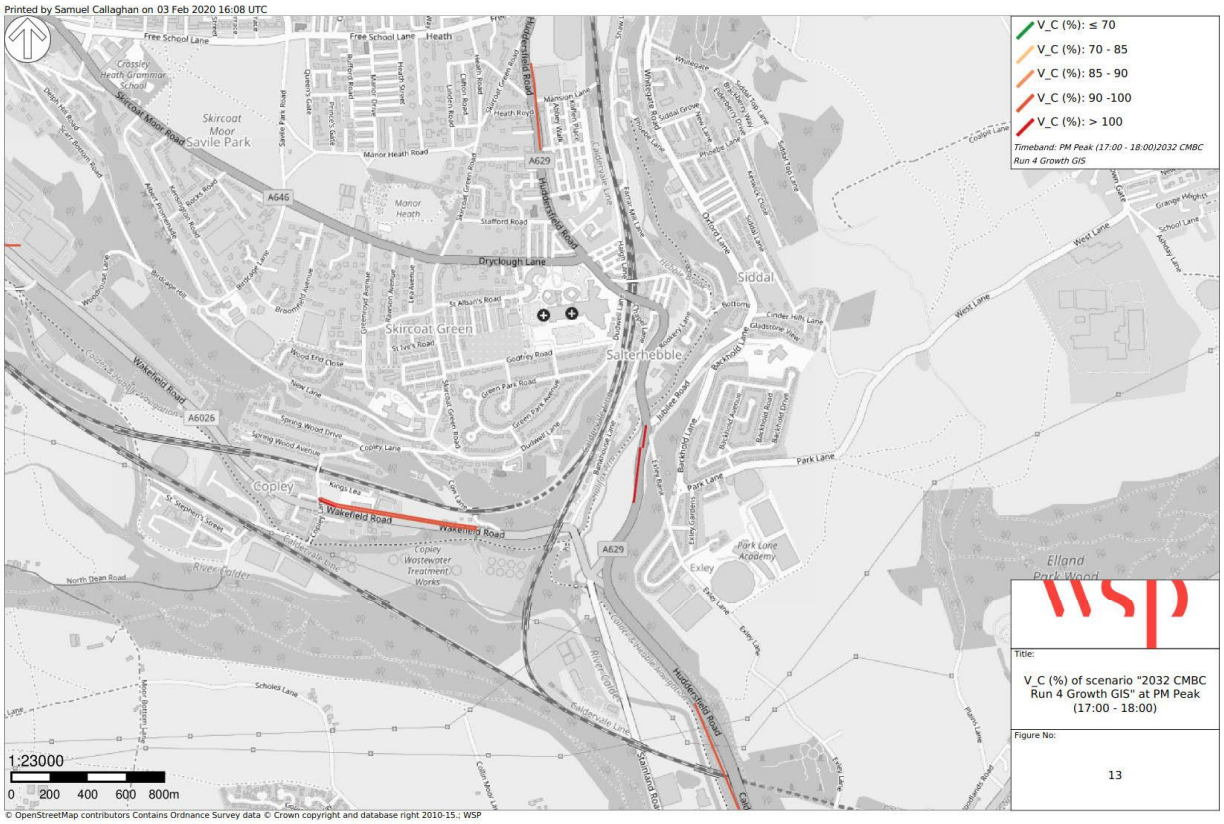
3.10.7. Due to the location of Ainley Top, these points of additional congestion are significantly impacted by growth outside Calderdale, which will need to be considered when thinking about the need for intervention. However, there appears to be significant scope for the A629 Phase 4 scheme to address the more minor impacts and a need to engage with Highways England to understand their aspirations for capacity improvements to the slip roads and the impact of a possible Junction 24a which will take traffic away from Ainley Top.

3.10.8. The A629 shows a similar trend in the PM peak to the AM, with only the Jubilee Road junction and lane narrowing creating additional delay. However, this is significantly lower than in the AM.

3.10.9. On the A6026, the Copley Lane junction is again a pinch point for westbound traffic but causes less than 2 minutes additional delay.

3.10.10. These areas on the A629 are shown in Figure 13 below.

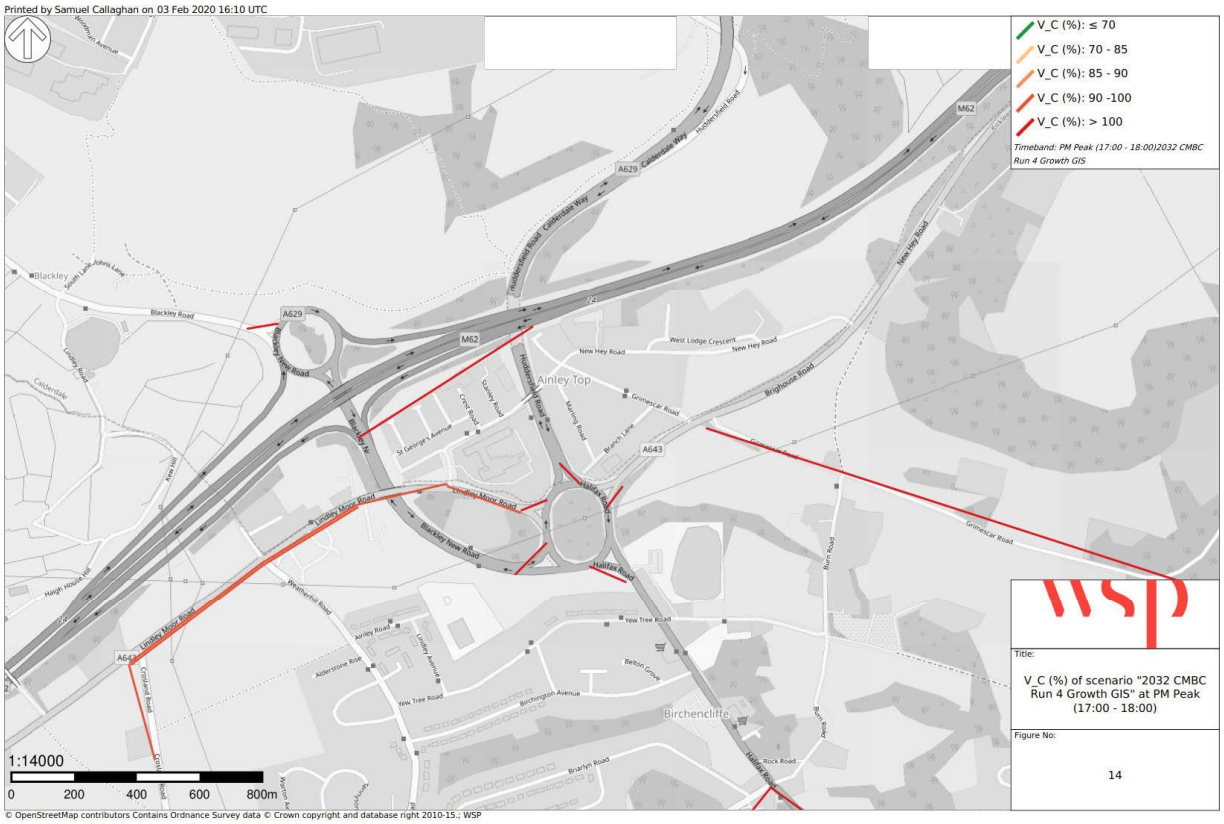
Figure 13 - A629/A6026 Corridor Links Greater than 90% V/C, PM



3.10.11. Ainley Top in the PM peak has many links with high V/C, as demonstrated in Figure 14. Locations with significant increases in delay are:

- The westbound off slip from the M62 (2 minute delay increase).
- Blackley Road entry to the northern roundabout (2 minute delay increase).
- Southern roundabout shows increased delay of 1-2 minutes for the eastern and western arms and 3-4 minutes for the northern and southern arms.

Figure 14 - Ainley Top Links Greater than 90% V/C, PM



3.10.12. The A629 corridor has been modelled with the earliest phases of the improvement scheme included. It can be seen that points of congestion remain which match with the future phases which are still in development. The scale of the additional delay predicted is generally of a level where it is expected that this could be addressed by the wider A629 scheme. Additionally there is a need to consider some intervention on the A6026.

3.10.13. The worsening of Ainley top, particularly at the access/egress point of the M62, strengthens the case for relief of this junction via the A629 corridor WY+TF scheme and potential junction 24a which is currently being studied separately to the Local Plan.

3.11. SOWERBY BRIDGE

3.11.1. Within the settlement of Sowerby Bridge, the key points of congestion in the AM peak, which are exacerbations of current issues, are located at:

- Wharf Street (A58)/Tuel Lane (A6139) Eastbound.
- A58/Station Road/Sowerby Street Eastbound.
- Wakefield Road (A6026)/Bolton Brow (A58) Eastbound.

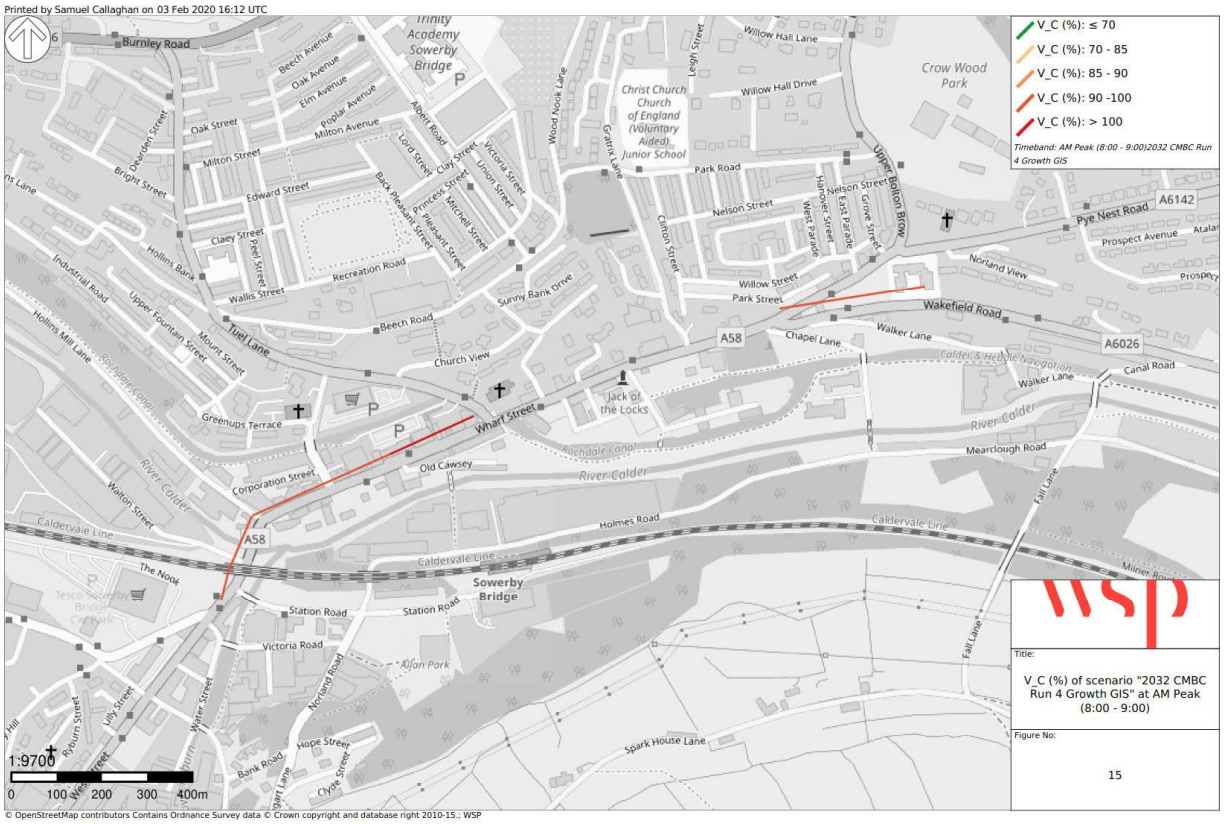
3.11.2. The Wakefield Road and Bolton Brow arms do not see significant changes in delay despite the increase in maximum V/C of turning movements at this junction. The increase in V/C could likely be mitigated through signal optimisation.

3.11.3. The A58 at Tuel Lane is modelled with almost 2 minutes of additional delay in the eastbound direction due to the large increase in flow.

3.11.4. Increase in delay of over a minute is seen eastbound on Sowerby Street.

3.11.5. The congested links in Sowerby Bridge are shown in Figure 15.

Figure 15 – Sowerby Bridge links greater than 90% V/C, AM



3.11.6. Sowerby Bridge shows similar capacity constraints in the PM peak, with the junctions of Tuel Lane and Wharf Street being the main location of capacity constraint. The junction of Station Road/Sowerby Street performs better in the PM peak than in the AM with delay increasing by only 12 seconds in the westbound direction.

3.11.7. The following points of congestion are seen and shown in Figure 16 below:

- Wharf Street (A58)/Tuel Lane (A6139) Eastbound.
- A58/Station Road/Sowerby Street Eastbound.

3.11.8. The A58 at Tuel Lane sees an increase in delay of approximately 2 minutes. Other points on the network see smaller increases in delay of less than 30 seconds.

Figure 16 – Sowerby Bridge links greater than 90% V/C, PM

3.11.9. Although there are currently no specific improvement schemes for the centre of Sowerby Bridge it is an area for improvement through the WY+TF Corridor Improvement Programme (CIP). The modelling shown above indicates that this should be aimed primarily at the Tuel Lane/Wharf Street junction.

3.12. NORTH HALIFAX

3.12.1. The north of Halifax shows an increase in flow over the area, with the developments in Ovenden and Mixenden playing a large part in the increase in traffic heading southbound along the A629 towards Halifax Town Centre.

3.12.2. Although there is an increase in the traffic around Northern Halifax, the V/C's show relatively small changes, giving confidence that the network is performing similarly to the 2014 base, with few areas above this threshold:

- Shay Lane/Keighley Road (A629) sees a junction constraint with an increase of 20% Volume to Capacity ratio, due to the developments in Illingworth and this being the quickest route south to enable use of the A629. The A629 also shows a link capacity issue to the south of Shay Lane, however this is due to a simplification in the model coding at this point and therefore not expected in reality.
- Brackenbed Lane/Pellon Lane shows capacity constraints at the junctions with Long Lane and Pellon New Road.
- Ovenden Way/Ovenden Road (A629) shows a junction constraint for movements heading southbound onto the A629. However, the do something V/C is mostly unaffected, with an increase of 12% Volume to Capacity ratio.

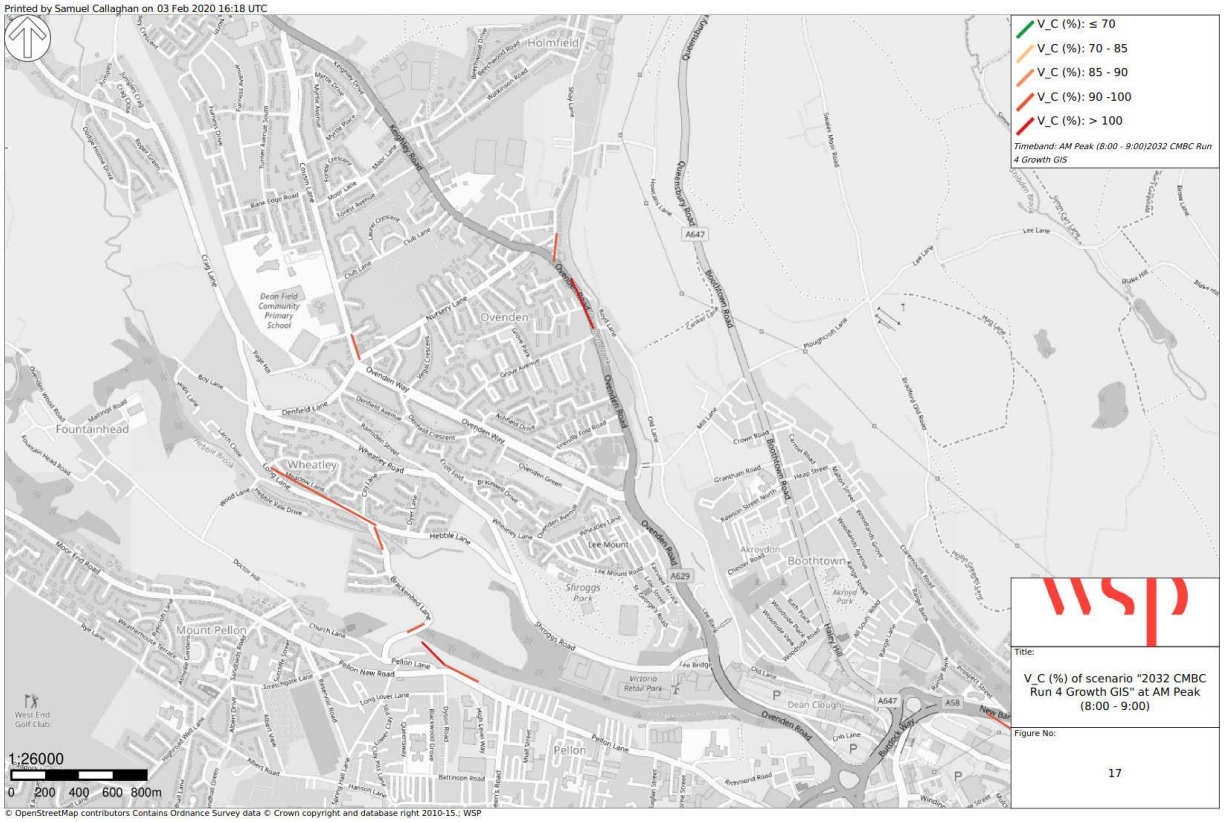
3.12.3. South of Shay Lane to the junction with Ovenden Way there is an increase in delay of around 80 seconds due to the traffic growth of the Local Plan.

3.12.4. The impact on delays northbound on Brackenbed Lane reduces slightly in the DS scenario, however the southbound delay increases by approximately 2 minutes due to capacity constraints at the junction with Pellon New Road. This level of worsening appears to be possible to mitigate through minor improvements.

3.12.5. Delay along Ovenden Way does not change significantly in the westbound direction in the AM. The eastbound movement shows an increase in delay of approximately ½ minute.

3.12.6. The locations in North Halifax that show significant congestion can be seen in Figure 17.

Figure 17 – North Halifax links greater than 90% V/C, AM



3.12.7. Similar to the AM, there is a general uplift in traffic using the A629 north of Halifax. Ovenden Way and Boothtown Road also see an uplift in general traffic usage.

3.12.8. Due to the traffic using the network to the north of Halifax, there are some overcapacity links as follows:

- Shay Lane/Keighley Road (A629) sees a junction constraint.
- Brackenbed Lane/Pellon Lane shows capacity constraints at the junctions with Long Lane and Pellon New Road.

3.12.9. After analysis of the model performance, Shroggs Road is not expected to be an issue and is a result of an overly low capacity which has been coded in the base year model.

3.12.10. Shay Lane sees an increase in delay of around 5 seconds. Brackenbed Lane sees increased delay in the region of 30 seconds. Pellon lane does not see a significant increase in delay.

3.12.11. See Figure 18 below for the PM modelled congestion in North Halifax.

Figure 18 - North Halifax links greater than 90% V/C, PM

3.12.12. With the exception of Shay Lane, the model shows relatively minor impacts in terms of additional delay in this area. The A629 north of Halifax is included in the scope of the potential WY+TF Corridor Improvement Programme and this has the potential to improve the Shay Lane junction and mitigate this impact.

3.13. HEBDEN BRIDGE

3.13.1. Hebden Bridge and the wider Upper Valley experiences a modest increase in traffic on the A646 as very little development is proposed for this area of Calderdale. Over the modelled period of an hour there are no significant points of congestion shown except the junction between Heptonstall Road and the A646 which shows a turning V/C of 94%. This could easily be mitigated by optimising the signal timings at this junction. In reality, there will be peaks of congestion over shorter timescales in the centres of Todmorden, Hebden Bridge and Mytholmroyd. These will be addressed through the improvements planned for the A646 as part of the WY+TF corridor improvement programme.

4. SUMMARY

4.1. METHODOLOGY

4.1.1. The methodology outlined in Section 2 shows detailed information regarding the development sites used alongside other sources of information to give a representative sample of district-wide growth. This was a comprehensive scenario with all proposed allocation sites modelled within Calderdale within the simulation network. Therefore, all impacts can be quantified accordingly and proposals put forward for whether and how they could be addressed via specific interventions.

4.1.2. It should be again noted that the methodology used has taken a worst-case scenario approach. This means that current rates of high car dependency are expected to continue and possible modal shift or reductions in travel demand due to technological and social changes have not been assessed.

4.2. OUTPUTS

4.2.1. The outputs from this set of forecast models have quantified the impact of the Local Plan allocations in terms of the level of additional delays on the network.

4.2.2. In most cases the predicted level of additional delay at a point in the network is relatively minor (less than a minute). These are expected to be mitigated through relatively minor interventions to improve capacity if it is felt to be necessary, but in many cases the additional delay is likely to be acceptable.

4.2.3. Almost all areas have planned improvement schemes, even if they are at an early stage and the outputs of this work can be used to shape those that are less well defined. More significant impacts are seen in the east of the district where development pressure is greatest, but these typically manifest themselves in additional delays of a few minutes and therefore it is expected that they can be significantly mitigated by the scale of intervention that is likely to be acceptable in Calderdale.

4.2.4. Where significant planning and investment will be necessary – for example on the corridors of the A641 and A58 – it is recommended that consideration is made to the wording of policy to ensure that the level of development is phased in line with the delivery timescales for these interventions.

4.3. INTERVENTIONS

4.3.1. Following the assessment of the modelling of the cumulative impact and the subsequent stress on the network, a view on the broad form of infrastructure requirements has been taken. These interventions are required to mitigate the impacts of the growth in travel as a result of the Local Plan developments where this has been modelled to cause significant delays (typically more than 1 minute).

4.3.2. Table 9 below summarises the requirements and possible delivery mechanism for the various locations described in previous sections of the report.

Table 11 - Description of interventions necessary for mitigation of Local Plan impacts shown by modelling

LOCATION	INTERVENTION	POSSIBLE DELIVERY MECHANISM
Wyke Lion, Hipperholme cross roads, Stump Cross	Short term intervention to improve operation of signals at Hipperholme Cross Roads. Longer term need for A58 Corridor package of improvements across all modes of transport.	Developer Contributions. Possibility of a future West Yorkshire + Transport Fund (WY+TF) scheme. Partial improvement as part of A641 WY+TF scheme.
A629 south of Halifax, Ainley Top	Phases 2-4 of WY+TF scheme Improvements to capacity of slip roads on/off the M62	Current scheme as part of A629 WY+TF. Highways England.
Brighouse Town Centre	Master planning of garden suburb sites. A641 WY+TF scheme corridor improvements to facilitate necessary movements, improve mulit-modal accessibility and remove through traffic. TCF scheme to improve cycling and walking connectivity.	Developer contributions. Current scheme as part of A641 WY+TF. Transforming Cities Fund.
West Vale (Elland)	Local traffic management. Part of A629 Phase 4.	Developer contributions. Current scheme as part of A629 WY +TF.
Sowerby Bridge	Local traffic management as part of the A58/A672 corridor improvement programme.	Developer contributions. Current scheme as part of WY+TF
A6026	Local traffic management as part of the A6026 corridor improvement programme.	Developer contributions. Current scheme as part of WY+TF
A629 north of Halifax	Local traffic management. As part of the potential WY+TF corridor improvement programme	Developer contributions. Potential scheme as part of WY+TF. Transforming Cities Fund.

As well as the interventions recommended for mitigation of the most significant effects of the Local Plan growth, other schemes will also assist in supporting the Local Plan aspirations. These are shown in Table 12.

Table 12 - Description of interventions necessary to support the Local Plan

LOCATION	INTERVENTION	POSSIBLE DELIVERY MECHANISM
Halifax Town Centre	Phase 2 of A629 WY+TF scheme and Halifax Station Gateway	Current scheme as part of A629 WY+TF. Transforming Cities Fund.

LOCATION	INTERVENTION	POSSIBLE DELIVERY MECHANISM
Hebden Bridge/Mytholmroyd/Todmorden	Local traffic management as part of the A646 element of the WY+TF corridor improvement scheme.	Current scheme as part of WY+TF
Brighouse, Elland, Halifax, Todmorden, Mytholmroyd, Hebden Bridge, Sowerby Bridge,	Improved multi-modal access and parking at stations (current and proposed)	Current scheme as part of WY+TF. Transforming Cities Fund.
Bradley to Brighouse Cycle route	Creation of cycle route on the Calder and Hebble navigation between Bradley and Brighouse.	City Connect (WY+TF) A641 WY+TF scheme.
Wyke to Brighouse/Clifton Cycle route	Creation of cycle route on former railway line to access Garden Suburbs and Clifton Business Park.	A641 WY+TF scheme.

4.3.3. The current modelling has not assumed any impact from the provision of public transport improvements for example the provision of a new rail station at Elland. These interventions, alongside access improvements, will also form part of the mitigation of the Local Plan in terms of transport demand.

Appendix A

LOG OF CALDERDALE RESIDENTIAL

SITES MODELLED

Appendix A - Table 1 – Calderdale residential developments, including completed sites and residential portion of mixed-use

Site LP0573 has been included in the list of developments but has not been modelled, as it was a late addition.Local Plan

Appendix B

LOG OF CALDERDALE EMPLOYMENT

SITES MODELLED

Appendix B - Table 2 – Calderdale employment developments, including employment portion of mixed-use

LPRef	Property Name	Road Street	Locality	Town Constituency	Local Authority	Total Area	Remaining Size 2017 Ha	Easting	Northing	Use	Status	CSTM Zone
9	Land to the south of premises on	Lowfields Way		Elland	Calderdale	10615	3.03	412117	421772	B1c, B2, B8	LocalPlan	183
21	Land at Ainley Top	Brighouse Road	Ainley Top	Elland	Calderdale	16030	4.58	412037	419773	B1c, B2	LocalPlan	234
25	Land to the south of Dewsbury Road	adj. Copperas Cottages		Elland	Calderdale	5804	1.66	411692	420657	B2, B8	LocalPlan	950
32	Land to the rear of Crosslee PLC	Brighouse Road	Hipperholme	Brighouse	Calderdale	10921	1.94	412858	425042	B1c, B2	LocalPlan	136
59	Land to west of Medical Centre	Stainland Road	West Vale	Elland	Calderdale	1080	0.27	409251	420867	B1	LocalPlan	474
105	Land at	Listers Road	Shibden	Halifax	Calderdale	1038	0.3	410063	425702	B1c, B2	LocalPlan	80
332	Brow Mills Industrial Estate	Brighouse Road	Hipperholme	Brighouse	Calderdale	1836	0.52	412641	424773	B1c, B2	LocalPlan	136
355	Ainleys Industrial Estate	Ainley Bottom		Elland	Calderdale	1156	0.33	411260	420100	B1c, B2, B8	LocalPlan	176
409	Land off	Bob Lane/Hubert Street	Highroad Well	Halifax	Calderdale	2135	0.71	406966	425295	B1c	LocalPlan	67
472	Land off	Lilly Lane		Halifax	Calderdale	2135	0.61	409765	424843	B1c, B2, B8	LocalPlan	117
585	Land west of	Anchor Place		Brighouse	Calderdale	2800	0.8	415807	421853	B1c	LocalPlan	154
805	Holmfield railway line	Holdsworth Road	Holmfield	Halifax	Calderdale	4760	1.36	408671	429129	Unspecified Employment	LocalPlan	70
960	Land off	South Lane		Elland	Calderdale	20511	5.86	410915	420055	B1c, B2, B8	LocalPlan	176
976	Clarence Mill	Pellon lane		Halifax	Calderdale	1506	0.43	408104	425701	B1c, B2	LocalPlan	53
1018	West of Holmfield Industrial Estate	Riley Lane & Holdsworth Road	Holmfield	Halifax	Calderdale	15086	4.31	408214	429352	Mixed B uses	LocalPlan	70
1133	Land off	Sedbergh Road and Siddal New Road		Halifax	Calderdale	5000	2.85	409794	424226	B1, B2	LocalPlan	85
1134	Shaw Lodge Mill Complex	Shaw Lane		Halifax	Calderdale	4938	1.14	409627	424123	B1a, B1c	LocalPlan	85
1203	Star Garage	Wakefield Road	Copley	Halifax	Calderdale	1820	0.52	408998	422492	Any B uses	LocalPlan	90
1217	Land and Premises	Holmfield Industrial Estate	Holmfield	Halifax	Calderdale	4900	1.4	408466	428978	Any B uses	LocalPlan	70
1218	Land to South east of	Holmfield Industrial Estate	Holmfield	Halifax	Calderdale	1680	0.49	408496	428845	Unspecified Employment	LocalPlan	70
1219	North of Holmfield Industrial Estate	Holmfield Industrial Estate		Halifax	Calderdale	21771	6.22	408491	429502	Any B uses	LocalPlan	70
1220	Adjacent Lloyds	Wakefield Road	Copley	Sowerby Bridge	Calderdale	20413	3.55	407510	423712	B1a, B1b, B8	LocalPlan	48
1231		Shay Lane	Ovenden	Halifax	Calderdale	4166	1.19	408036	427869	B2, B8	LocalPlan	243
1232	Land at	Wakefield Road/Clifton Common	Clifton	Brighouse	Calderdale	49177	21.37	415606	422769	Mixed B uses	LocalPlan	240
1433	Land off	Old Lane		Halifax	Calderdale	840	0.24	408454	426690	B1c	LocalPlan	337
1443	Land between	Wistons Lane and Jubilee Way		Elland	Calderdale	1756	0.5	410989	421287	B1a, B1	LocalPlan	481
1618	Land west of	Huddersfield Road		Brighouse	Calderdale	24430	6.98	414350	420864	Mixed B uses	LocalPlan	454
1622	Top Land		Cragg Vale	Mytholmroyd	Calderdale	29330	7.63	401046	425472	Unspecified Employment	LocalPlan	199
1640	Zodian House	Station Road		Sowerby Bridge	Calderdale	4200	1.32	406330	423403	Unspecified Employment	LocalPlan	124

1223	Lowfields	Lacy Way		Elland	Calderdale	7911	2.26	411593	421912	Any B uses	LocalPlan	183
264	Car Park Between	Well Lane / King Street		Halifax	Calderdale	3600	0.39	409709	425334	A, B1, C1 C2, C3, C4,D1	LocalPlan	707
289	Land off	King Cross Street		Halifax	Calderdale	2150	0.45	408935	424976	A, B1, C1 C3, C4	LocalPlan	126
370	Land off	Armitage Road	King Cross	Halifax	Calderdale	520	0.26	407742	424245	A, B1a, D1	LocalPlan	103
509	Land and Buildings opposite B & M	Dewsbury Road		Elland	Calderdale	4908	1.9	411105	420825	A, B1, B2, D1	LocalPlan	178
579	126- 128	Bradford Road		Brighouse	Calderdale	2000	0.42	414616	423634	B1, C3,D	LocalPlan	140
1088	West Vale Works	Stainland Road, West Vale	Greetland	Elland	Calderdale	3660	0.47	409491	421077	A, B1, C1, C3, D1	LocalPlan	474
1170		Mulcture Hall Road		Halifax	Calderdale	3000	2.48	409795	425381	A1,A2, B1, C1, C2, C3, C4, D1	LocalPlan	119
1431	Former Mayfield Garage	Queens Road	King Cross	Halifax	Calderdale	3480	0.87	407891	424672	A, B1, B2, C1,C2, C3,C4, D1	LocalPlan	57
1632		New Road		Halifax	Calderdale	4680	1.56	409539	424893	Unspecified Mixed Use	LocalPlan	708

Appendix C

LOG OF BRADFORD & KIRKLEES DEVELOPMENT SITES MODELLED

Appendix C - Table 3 – Bradford and Kirklees residential developments, including completed sites and residential portion of mixed-use

LP_Ref	Road_Street	Locality	Town Constituency	Local Authority	Easting	Northing	2014 to 2032	Status	CSTM Zone
TH/001	Thornton Road		Thornton.	Bradford	408904	432775	31	Built	32
QB/002	Albert Road		Queensbury.	Bradford	409840	430630	40	Pending	801
QB/009	Hazelhurst Quarry	Long Lane	Queensbury.	Bradford	409906	429431	114	Built	801
QB/021	Sandbeds	Back Lyon Street	Queensbury.	Bradford	410652	430359	10	Built	801
DH/015	Halifax Road	Denholme Gate	Denholme.	Bradford	406954	431928	10	Built	802
SW/026	Reevy Road west	Buttershaw	Bradford South West.	Bradford	413447	429738	29	Pending	956
SW/100	Stanbeck Gardens	Buttershaw	Bradford South West.	Bradford	412913	429525	11	Pending	956
SW/122	Church Street	Buttershaw	Bradford South West.	Bradford	413461	429223	5	Pending	956
SE/005	Cleckheaton Road		Bradford South East.	Bradford	416538	428270	16	Pending	957
SE/088	1-2 Sugen Street	Low Moor	Bradford South East.	Bradford	416759	427891	3	Pending	957
SE/038A	St Marys Square	Wyke	Bradford South East.	Bradford	415058	426616	8	Built	959
SE/013	Railway Street		Bradford South East.	Bradford	415214	426829	21	Pending	960
SW/064	Common Road	Low Moor	Bradford South West.	Bradford	415133	428686	57	Pending	960
SW/134	Meadway	Wibsey	Bradford South West.	Bradford	413910	428659	7	Pending	960
SW/062	Royds Hall Lane	Woodside	Bradford South West.	Bradford	414367	428941	97	Built	961
SW/063	Eaglesfield drive	Woodside	Bradford South West.	Bradford	414031	428995	47	Built	961
SW/065	Lingdale Road	Woodside	Bradford South West.	Bradford	414631	428542	25	Pending	961
SW/067	Hallifax Road/Western Way	Woodside	Bradford South West.	Bradford	413941	429079	6	Built	961
SW/091	Trenholme Avenue	Low Moor	Bradford South West.	Bradford	414686	428769	6	Built	961
SW/071	Cooper Lane	Buttershaw	Bradford South West.	Bradford	412794	429827	8	Built	962
SW/116	Polt Farm - Dan Lane/Dunnock Avenue		Bradford South West.	Bradford	412119	430427	12	Pending	962
SW/136	Roy Road	Buttershaw	Bradford South West.	Bradford	412832	430357	5	Built	962
H2652	-	-	-	Kirklees	408830	418116	29	Kirklees Local Plan	903
H738	-	-	-	Kirklees	409041	415992	27	Kirklees Local Plan	903
H116	-	-	-	Kirklees	410280	416731	125	Kirklees Local Plan	904
H303	-	-	-	Kirklees	409518	416246	18	Kirklees Local Plan	904
H779	-	-	-	Kirklees	409861	416396	20	Kirklees Local Plan	904
H276	-	-	-	Kirklees	418069	418576	33	Kirklees Local Plan	908
H121	-	-	-	Kirklees	411167	417658	15	Kirklees Local Plan	913
H202	-	-	-	Kirklees	410666	417785	19	Kirklees Local Plan	913
H292	-	-	-	Kirklees	411207	417270	27	Kirklees Local Plan	913
H789	-	-	-	Kirklees	411372	417431	26	Kirklees Local Plan	913
H1694	-	-	-	Kirklees	411746	418052	20	Kirklees Local Plan	916
H790	-	-	-	Kirklees	411443	418568	29	Kirklees Local Plan	916
H706	-	-	-	Kirklees	412083	418926	392	Kirklees Local Plan	917
H1657	-	-	-	Kirklees	415915	419538	88	Kirklees Local Plan	920
H809	-	-	-	Kirklees	414864	419240	162	Kirklees Local Plan	922
H205	-	-	-	Kirklees	419479	421429	21	Kirklees Local Plan	923

H242	-	-	-	Kirklees	418464	422696	15	Kirklees Local Plan	924
H198	-	-	-	Kirklees	417813	423784	125	Kirklees Local Plan	925
H2584	-	-	-	Kirklees	418616	423960	14	Kirklees Local Plan	925
H2645	-	-	-	Kirklees	418885	425019	48	Kirklees Local Plan	925
H1983	-	-	-	Kirklees	418907	425525	48	Kirklees Local Plan	926
H708	-	-	-	Kirklees	418613	424778	53	Kirklees Local Plan	926
H762	-	-	-	Kirklees	418384	425793	58	Kirklees Local Plan	926
H201	-	-	-	Kirklees	410347	418354	21	Kirklees Local Plan	914
H623	-	-	-	Kirklees	411151	419114	37	Kirklees Local Plan	914
H519	-	-	-	Kirklees	413696	420223	377	Kirklees Local Plan	918
H1656	-	-	-	Kirklees	416873	420491	18	Kirklees Local Plan	919
H1747	-	-	-	Kirklees	415991	420898	1577	Kirklees Local Plan	919
H351	-	-	-	Kirklees	415184	420518	381	Kirklees Local Plan	919
H162	-	-	-	Kirklees	418097	425345	22	Kirklees Local Plan	927
H1704	-	-	-	Kirklees	417072	424630	56	Kirklees Local Plan	927
H2066	-	-	-	Kirklees	417127	424721	17	Kirklees Local Plan	927
H640	-	-	-	Kirklees	418244	425236	24	Kirklees Local Plan	927
H87	-	-	-	Kirklees	417460	420646	30	Kirklees Local Plan	942
H734	-	-	-	Kirklees	414358	419193	68	Kirklees Local Plan	943
H49a	-	-	-	Kirklees	416788	425703	34	Kirklees Local Plan	945
H810	-	-	-	Kirklees	416507	425077	17	Kirklees Local Plan	945
H508	-	-	-	Kirklees	417894	425970	157	Kirklees Local Plan	946
MX1929	-	-	-	Kirklees	419631	421746	166	Kirklees Local Plan	923
MX1911	-	-	-	Kirklees	410707	418701	533	Kirklees Local Plan	914
MX3349	-	-	-	Kirklees	418390	425036	223	Kirklees Local Plan	927

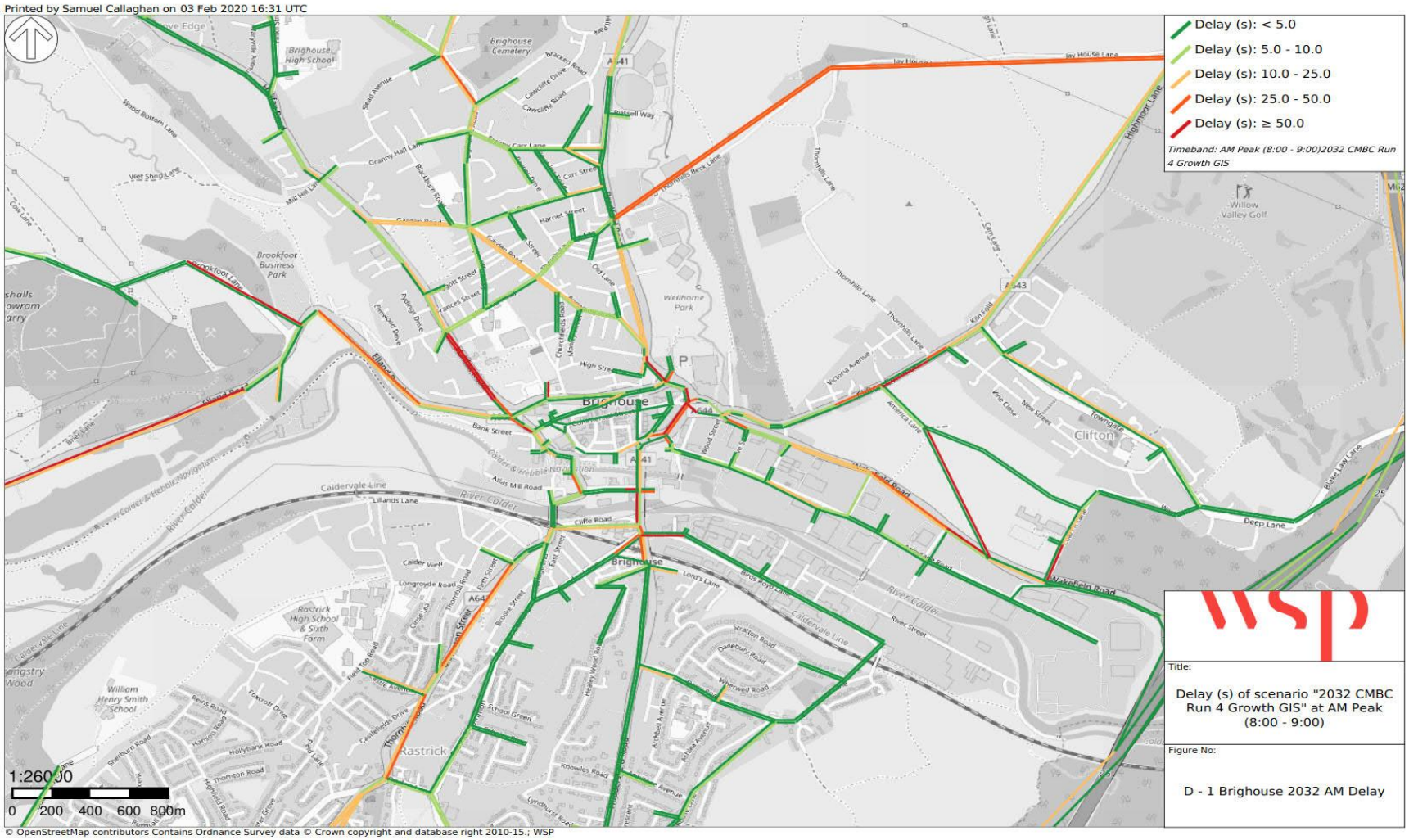
Appendix C - Table 4 – Bradford and Kirklees employment developments, including employment portion of mixed-use

LP_Ref	Property_Name	Road_Street	Locality	Town_Constituency	Local Authority	Total Area	Easting	Northing	Use	Status	CSTM_Zone
TH/021	Former Imperial restaurant	Thornton Road		Thornton	Bradford	0.5	408182	432611	B1, B2, B8	Pending	32
SE/148		Land at NuFarm	Wyke	Bradford South East	Bradford	5.34	416587	427095	B2	Pending	958
E1832c	Employment				Kirklees	14910	418134	421390	B1, B2, B8	Kirklees Local Plan	924
E1836	Employment				Kirklees	15156	415626	420134	B1	Kirklees Local Plan	919
E1831	Employment				Kirklees	41020	417601	426233	B2	Kirklees Local Plan	945
MX1929	MixedUse				Kirklees	21538	419631	421746	B1, B2, B8	Kirklees Local Plan	923
MX1911	MixedUse				Kirklees	43325	410707	418701	B2	Kirklees Local Plan	914
MX3349	MixedUse				Kirklees	1820	418390	425036	B1, B2, B8	Kirklees Local Plan	927

Local Plan

Appendix D

AM 2032 MODELLED DELAYS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Title:
Delay (s) of scenario "2032 CMBC Run 4 Growth GIS" at AM Peak (8:00 - 9:00)
Figure No:
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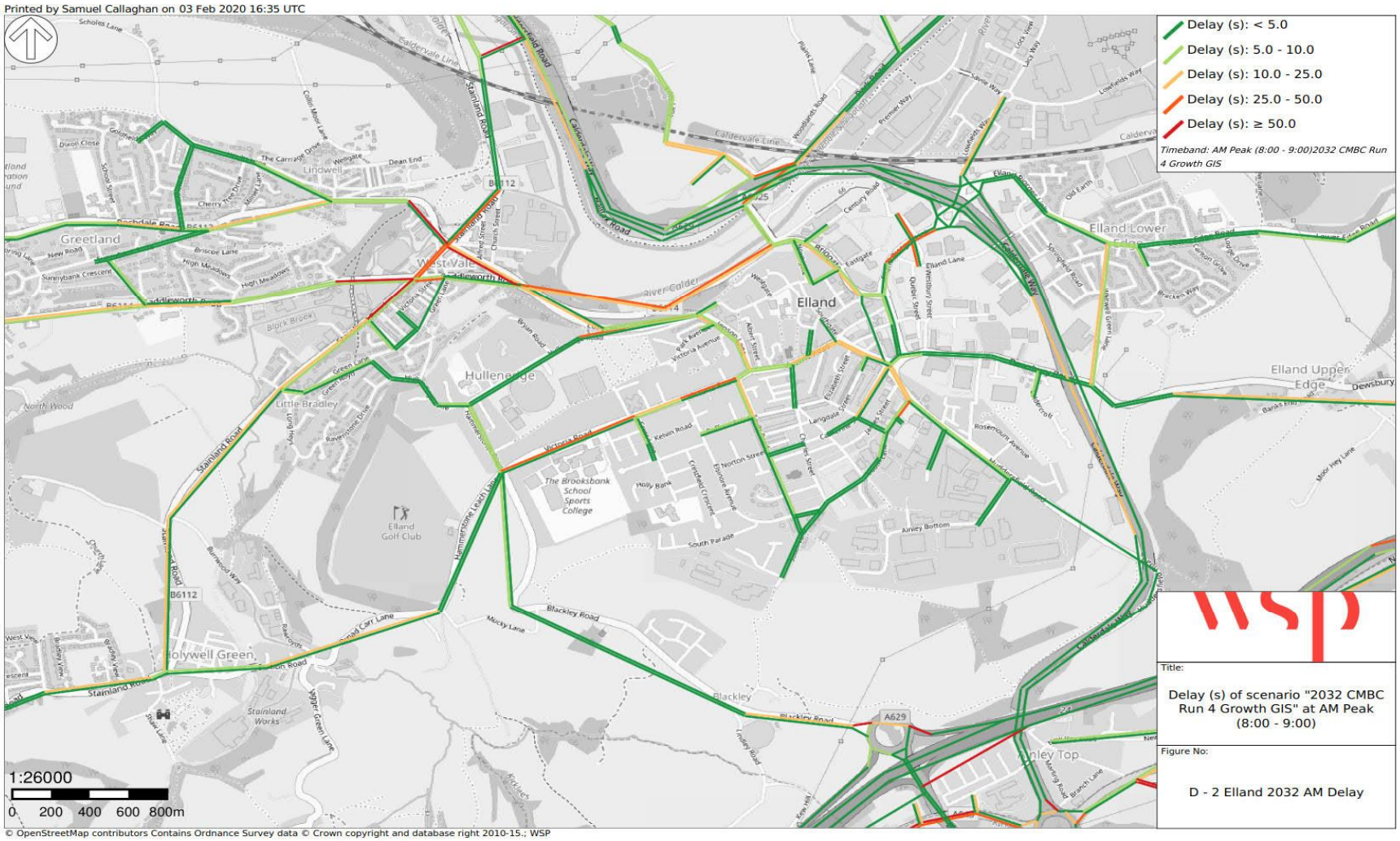
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Title:
Delay (s) of scenario "2032 CMBC Run 4 Growth GIS" at AM Peak (8:00 - 9:00)
Figure No:
D - 2 Elland 2032 AM Delay
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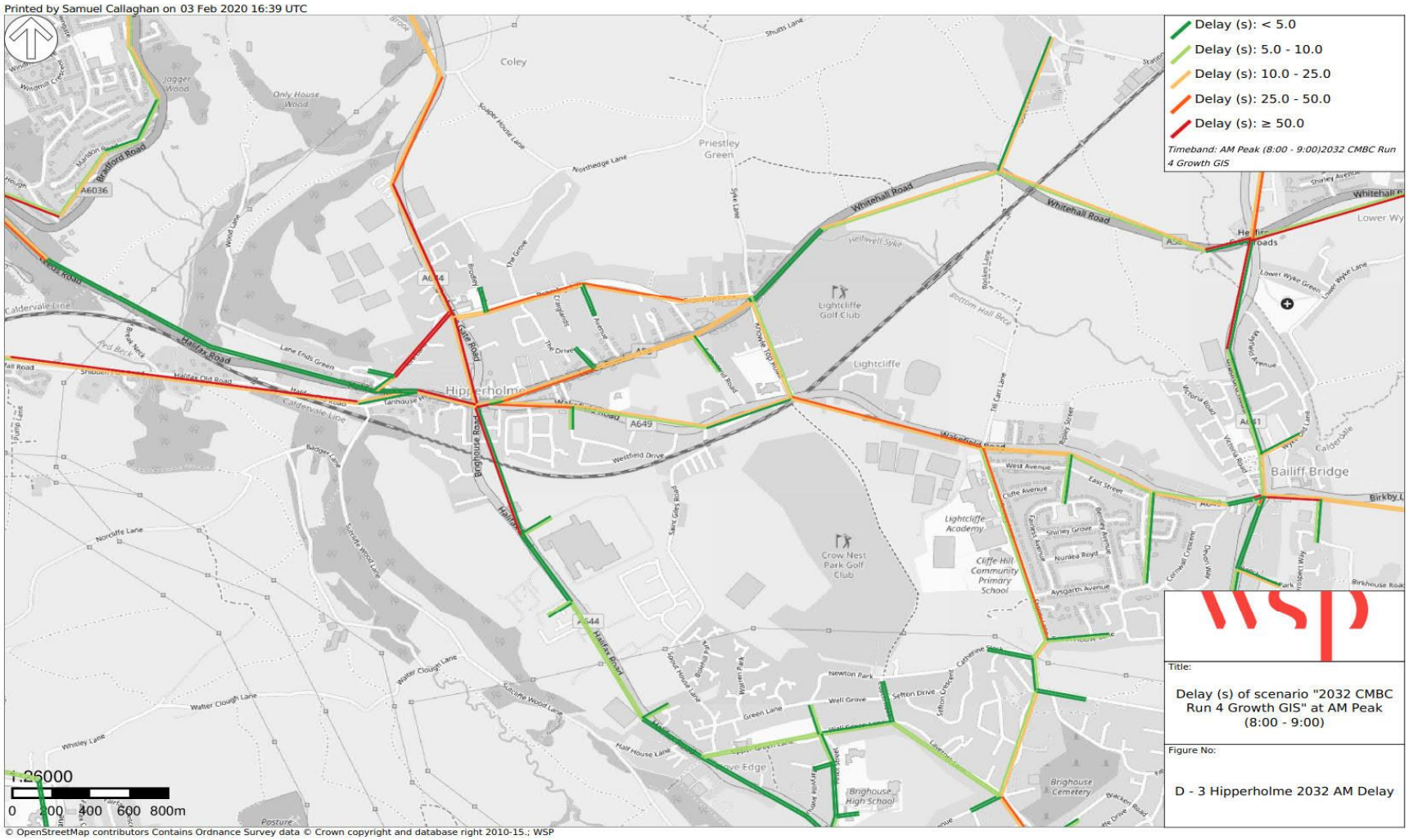
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Title:
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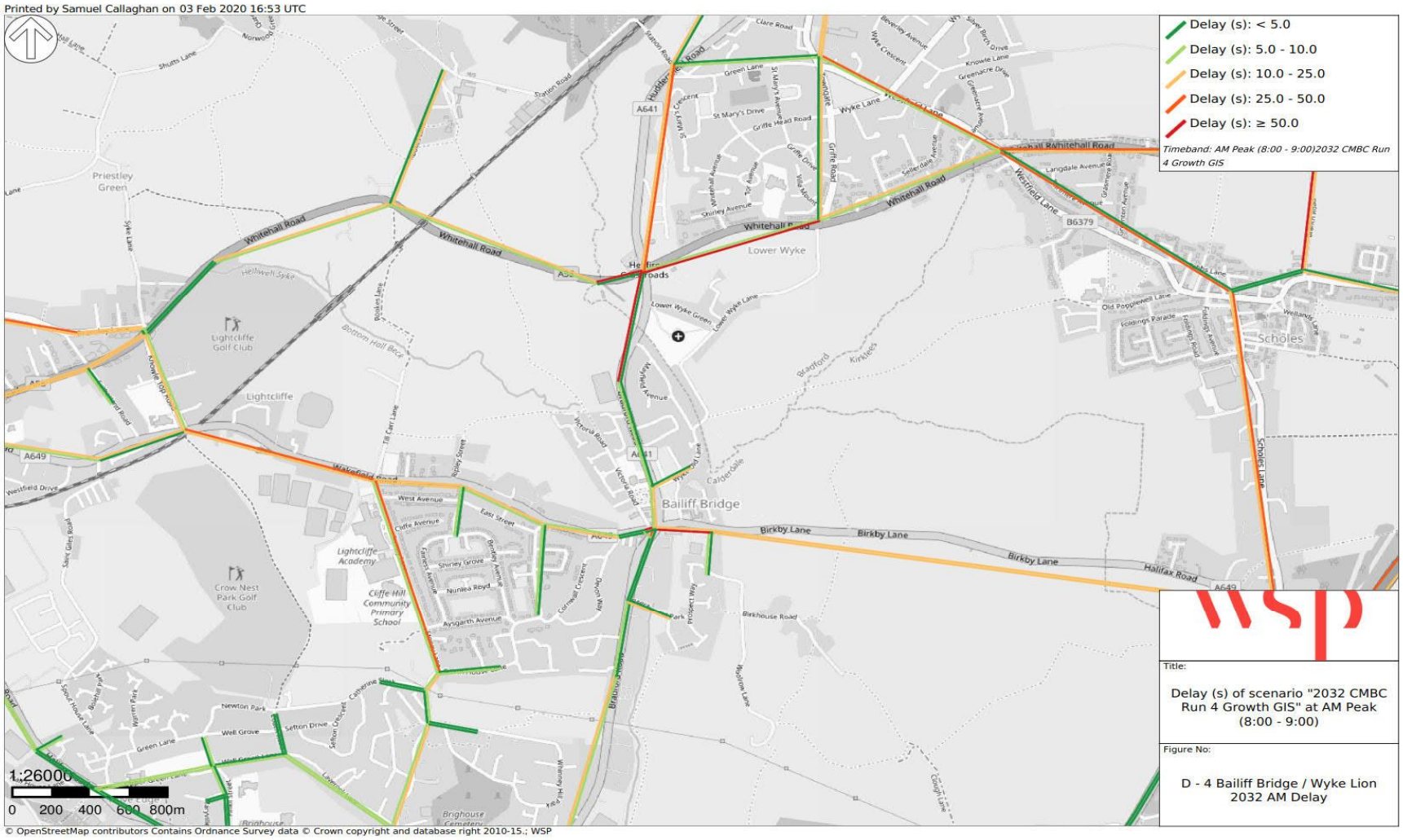
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Title:
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Figure No:
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Bailiff Bridge
Lower Wyke
Scholes
Lightcliffe
Priestley Green
Birkby Lane
Halifax Road
Lightcliffe Golf Club
Crow Nest Park Golf Club
Lightcliffe Academy
Cliffe Hill Community Primary School
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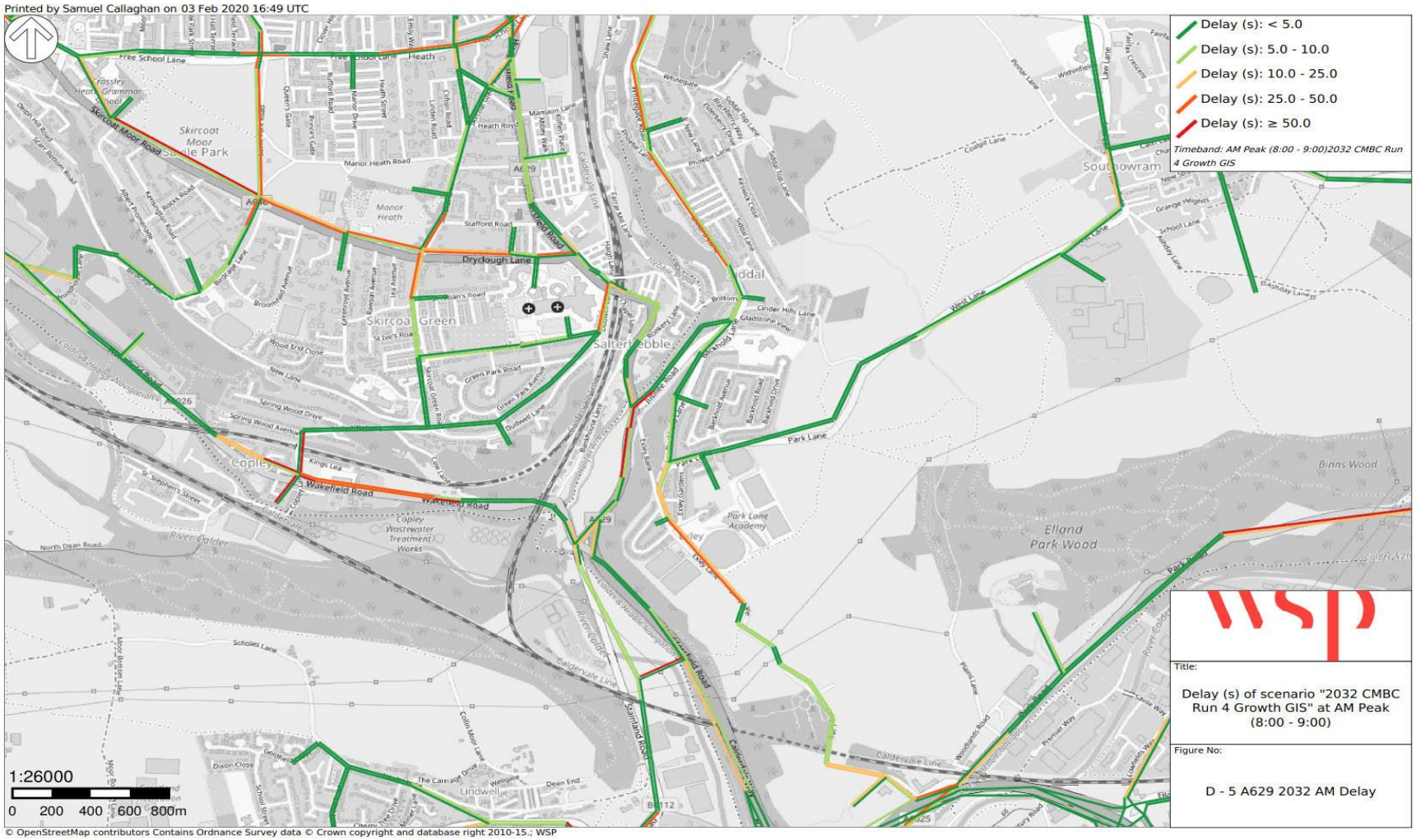
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Title:
Delay (s) of scenario "2032 CMBC Run 4 Growth GIS" at AM Peak (8:00 - 9:00)
Figure No:
D - 5 A629 2032 AM Delay
1:26000
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Appendix E

PM 2032 MODELLED DELAYS

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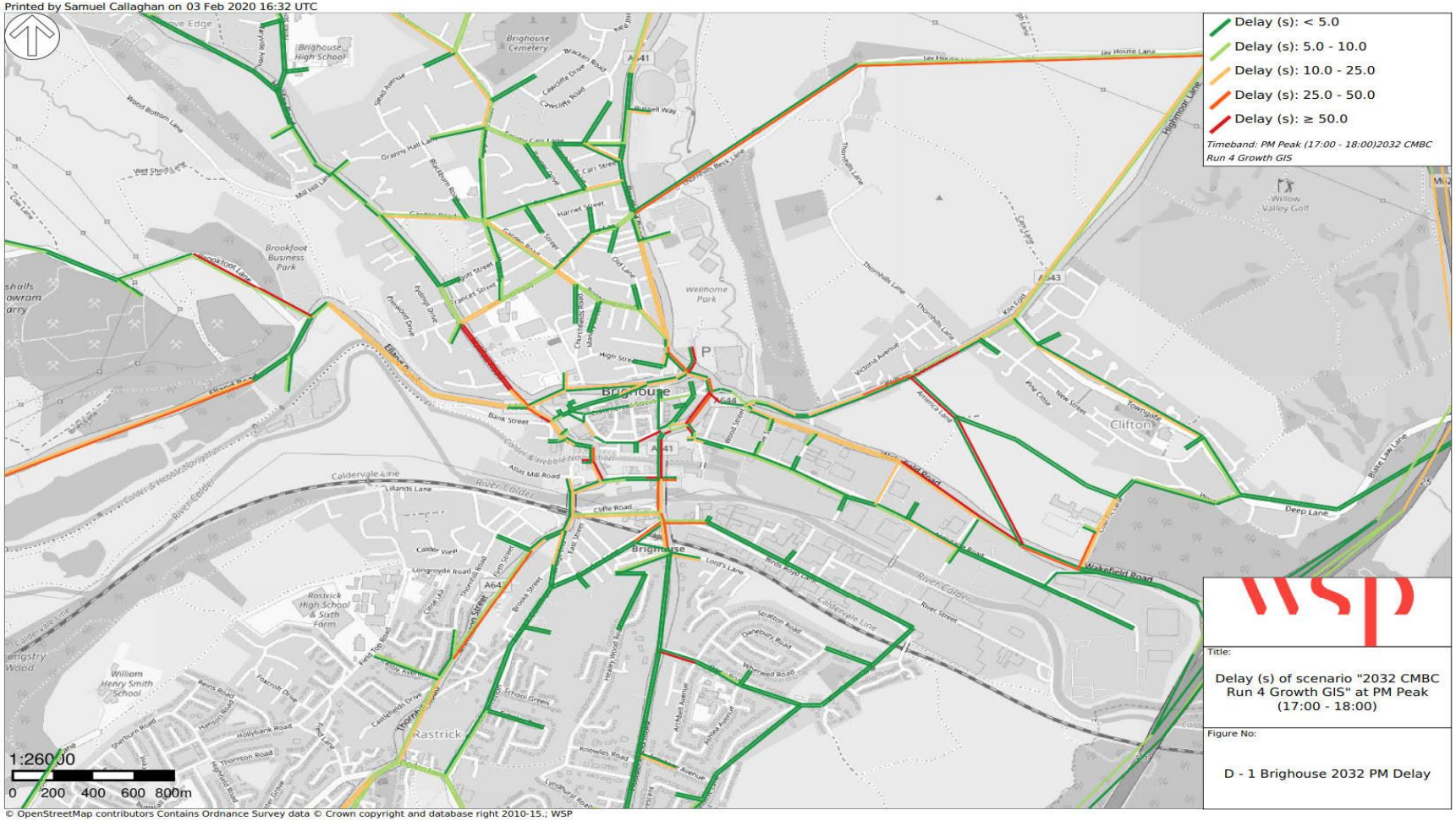

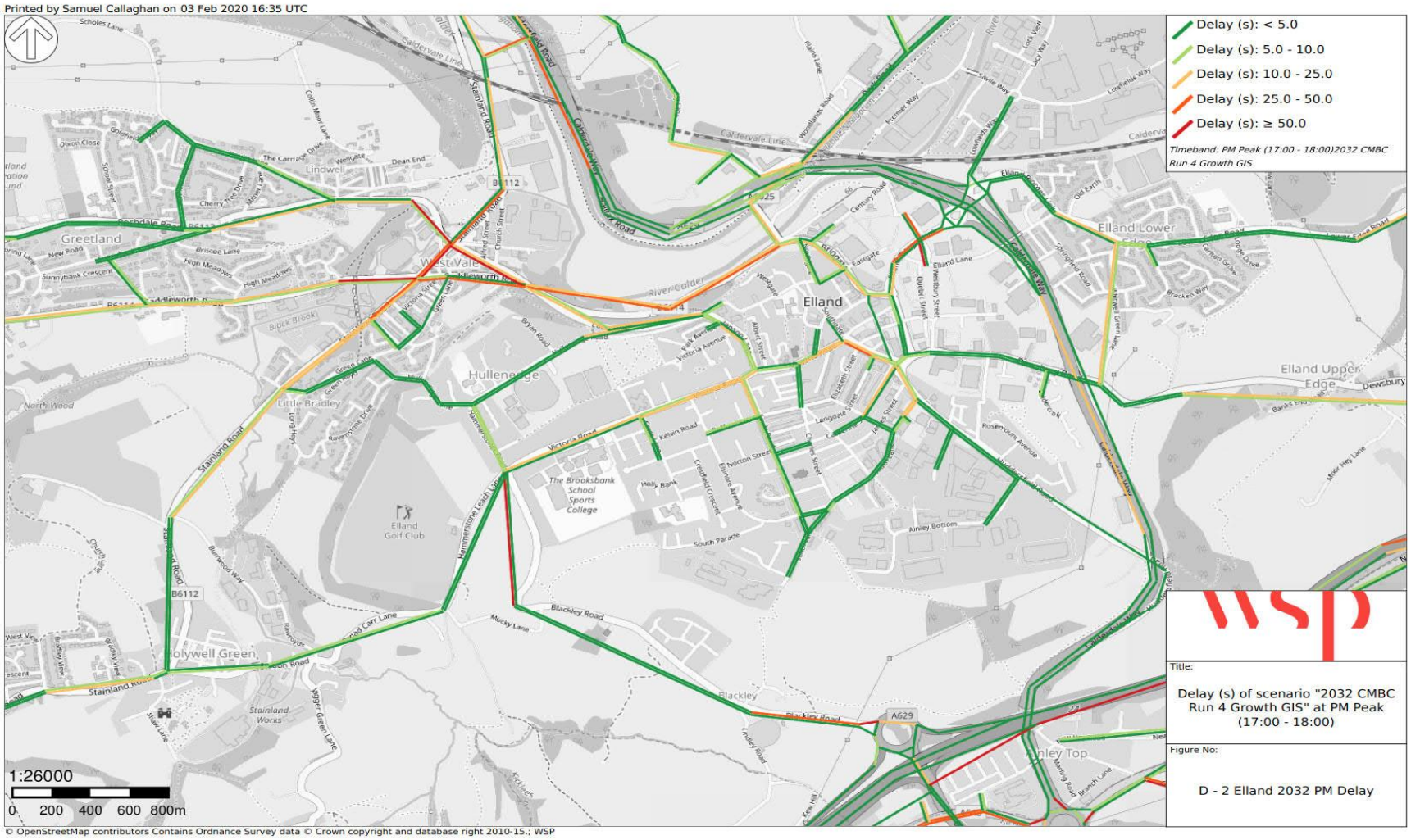
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Delay (s): ≥ 50.0
Timeband: PM Peak (17:00 - 18:00)2032 CMBC Run 4 Growth GIS
Title:
Delay (s) of scenario "2032 CMBC Run 4 Growth GIS" at PM Peak (17:00 - 18:00)
Figure No:
D - 2 Elland 2032 PM Delay
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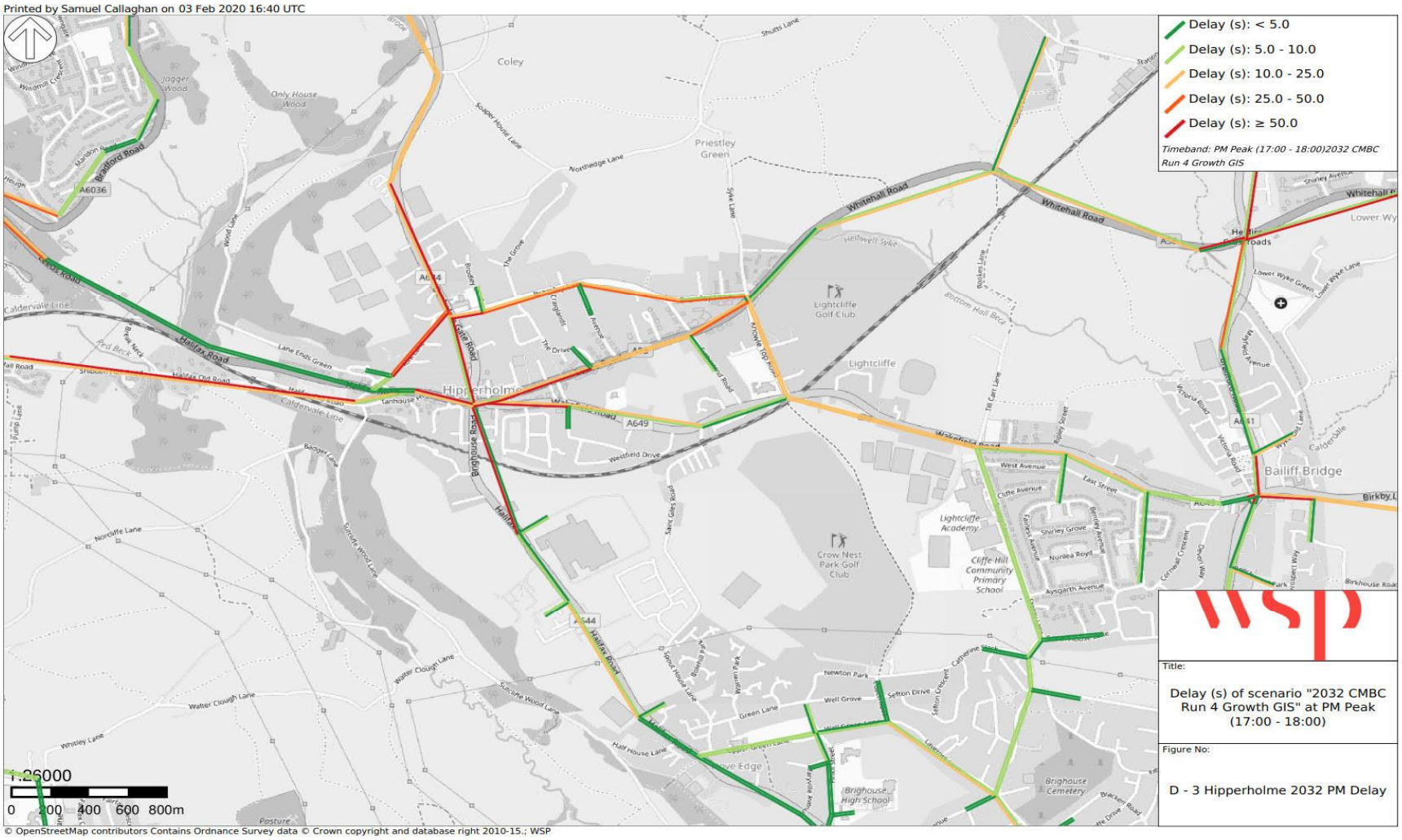
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Delay (s): 25.0 - 50.0
Delay (s): ≥ 50.0
Timeband: PM Peak (17:00 - 18:00)2032 CMBC Run 4 Growth GIS
Title:
Delay (s) of scenario "2032 CMBC Run 4 Growth GIS" at PM Peak (17:00 - 18:00)
Figure No:
D - 3 Hipperholme 2032 PM Delay
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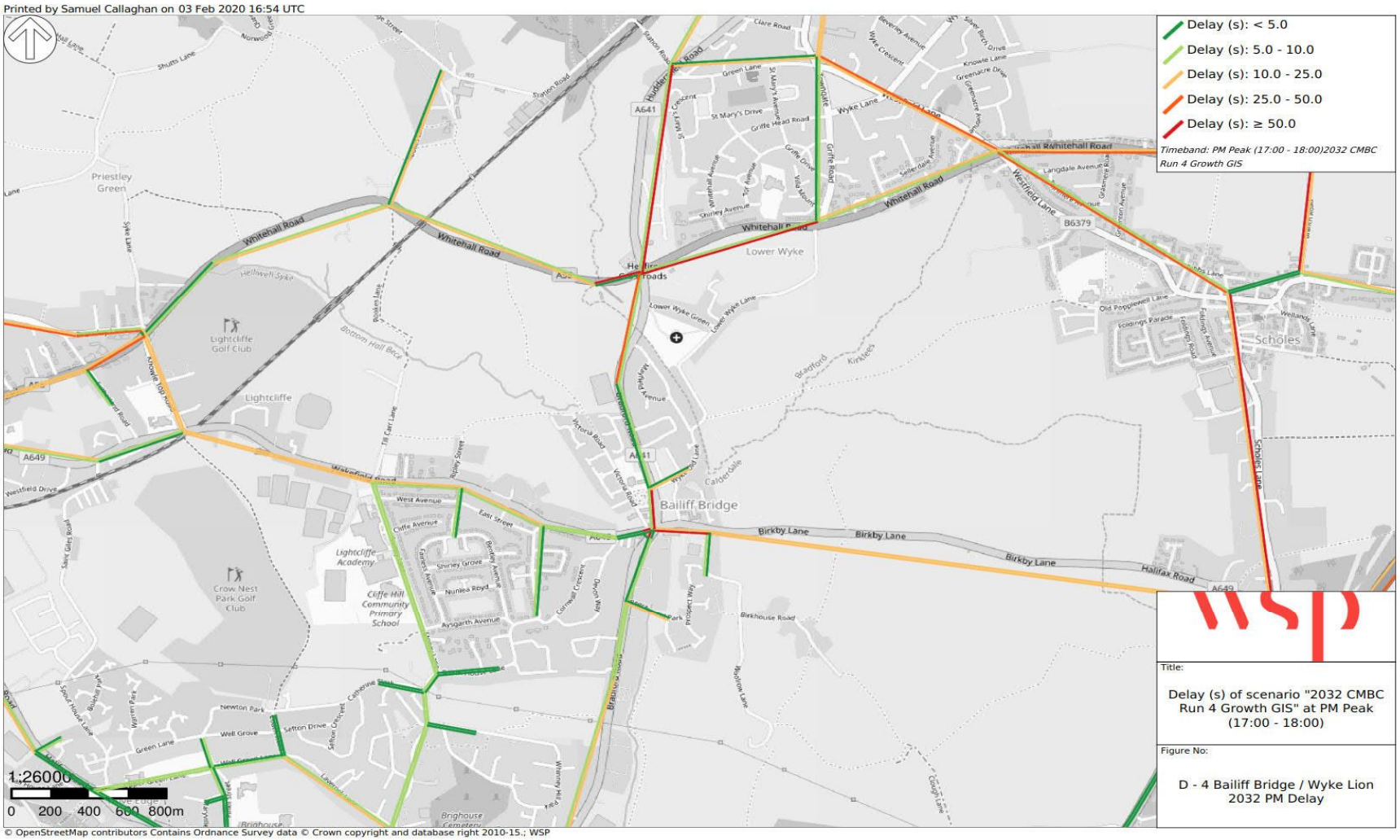
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Delay (s): 25.0 - 50.0
Delay (s): ≥ 50.0
Timeband: PM Peak (17:00 - 18:00)2032 CMBC Run 4 Growth GIS
Title:
Delay (s) of scenario "2032 CMBC Run 4 Growth GIS" at PM Peak (17:00 - 18:00)
Figure No:
D - 4 Bailiff Bridge / Wyke Lion 2032 PM Delay
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Whitehall Road
Bailiff Bridge
Lower Wyke
Scholes
Lightcliffe
Priestley Green
Birkby Lane
Halifax Road
A641
A649
B6379
Lightcliffe Golf Club
Crow Nest Park Golf Club
Lightcliffe Academy
Cliffe Hill Community Primary School
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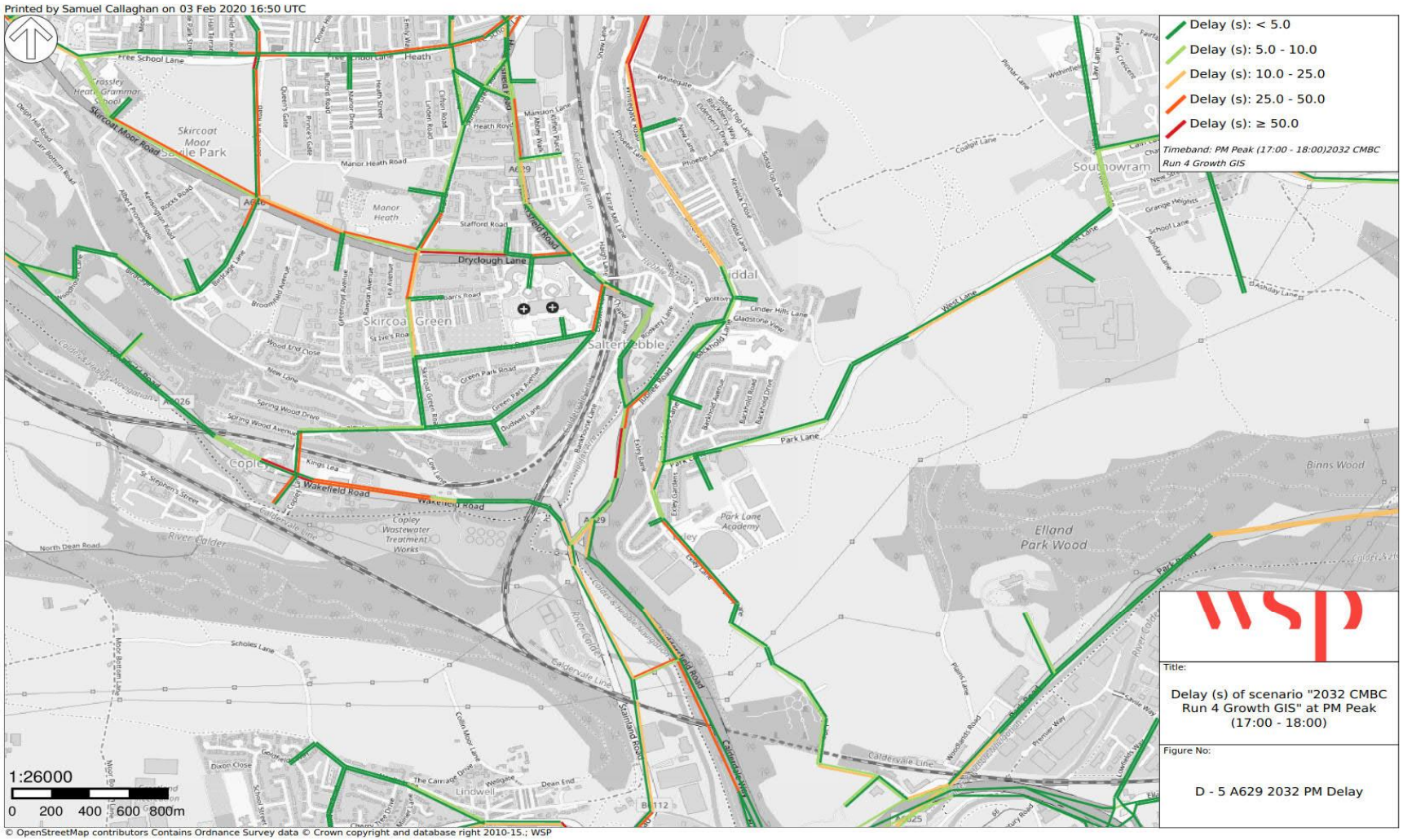
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Title:
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Figure No:
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Free School Lane
Skircoat Moor Road
Dryclough Lane
Wakefield Road
Park Lane
Ward Lane
Calderdale Line
Salterhebble
Skircoat Green
Copley
Elland
Park Wood
Binns Wood
Lindwell
Southowram
River Calder
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Appendix F

CHANGE IN MODELLED DELAY

BETWEEN 2014 AND 2032

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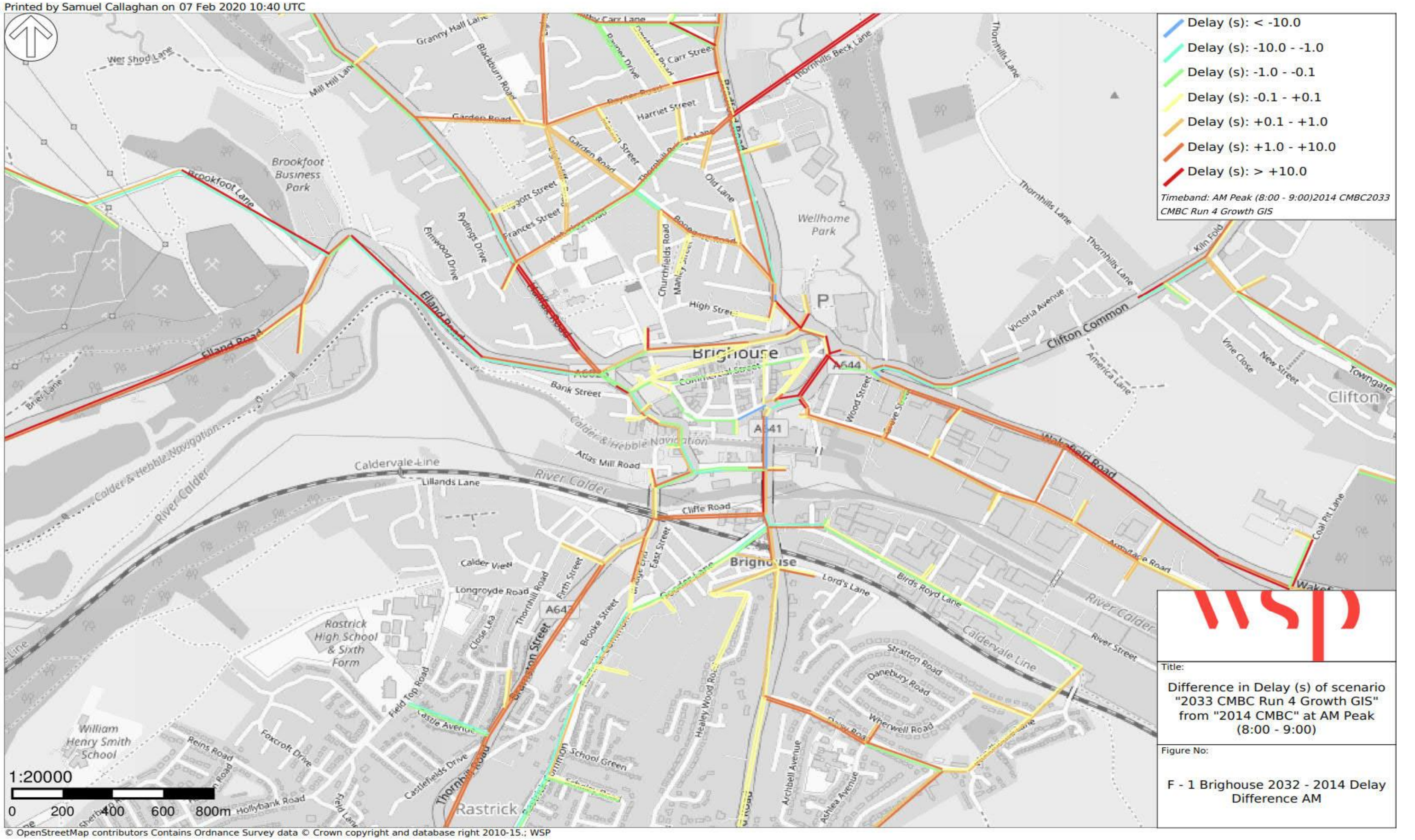


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Timeband: PM Peak (17:00 - 18:00)2014
CMBC2033 CMBC Run 4 Growth GIS
Brighouse
Clifton
Rastrick
Brookfoot Business Park
Wellhome Park
Clifton Common
Title:
Difference in Delay (s) of scenario "2033 CMBC Run 4 Growth GIS" from "2014 CMBC" at PM Peak (17:00 - 18:00)
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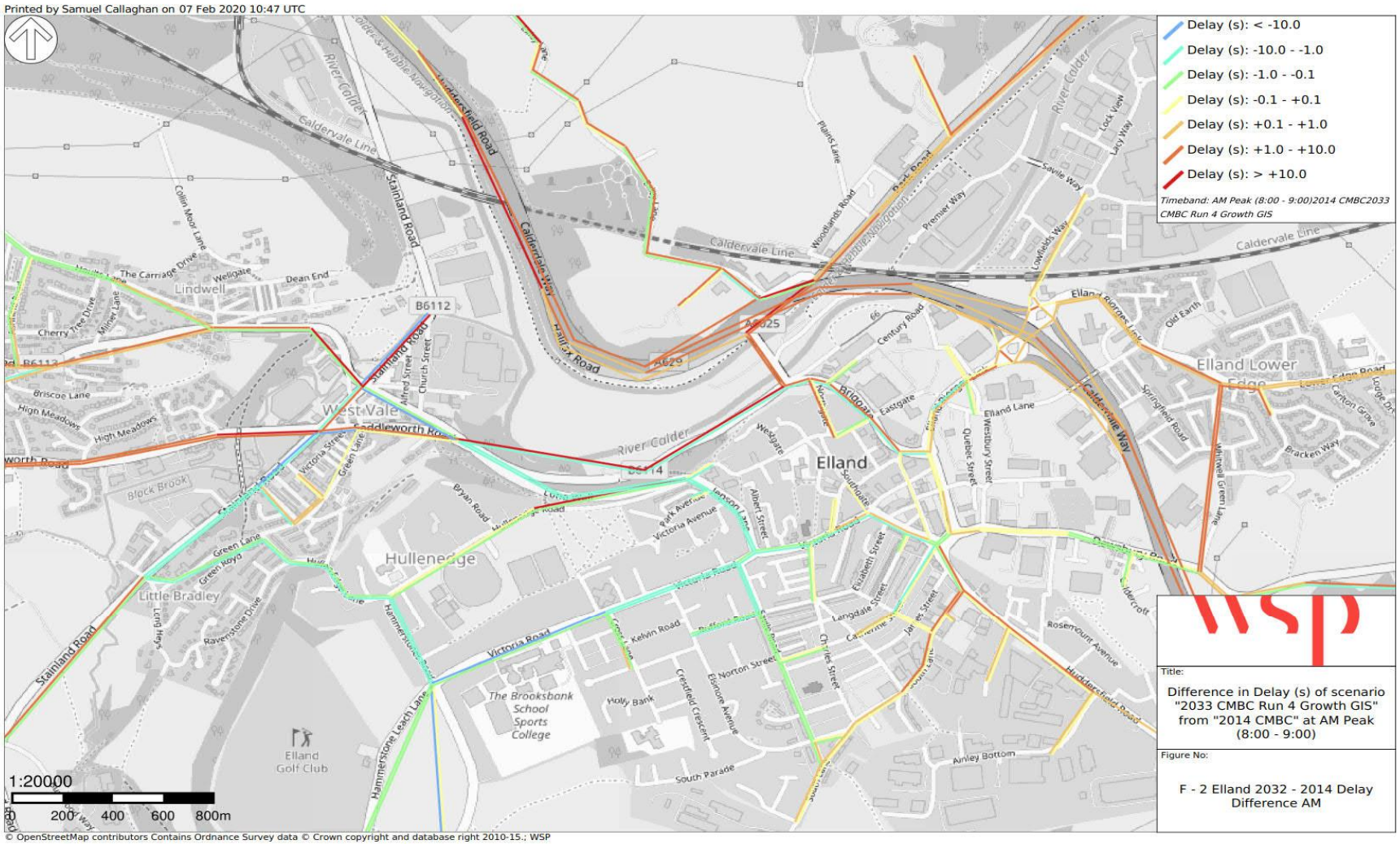
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Figure No:
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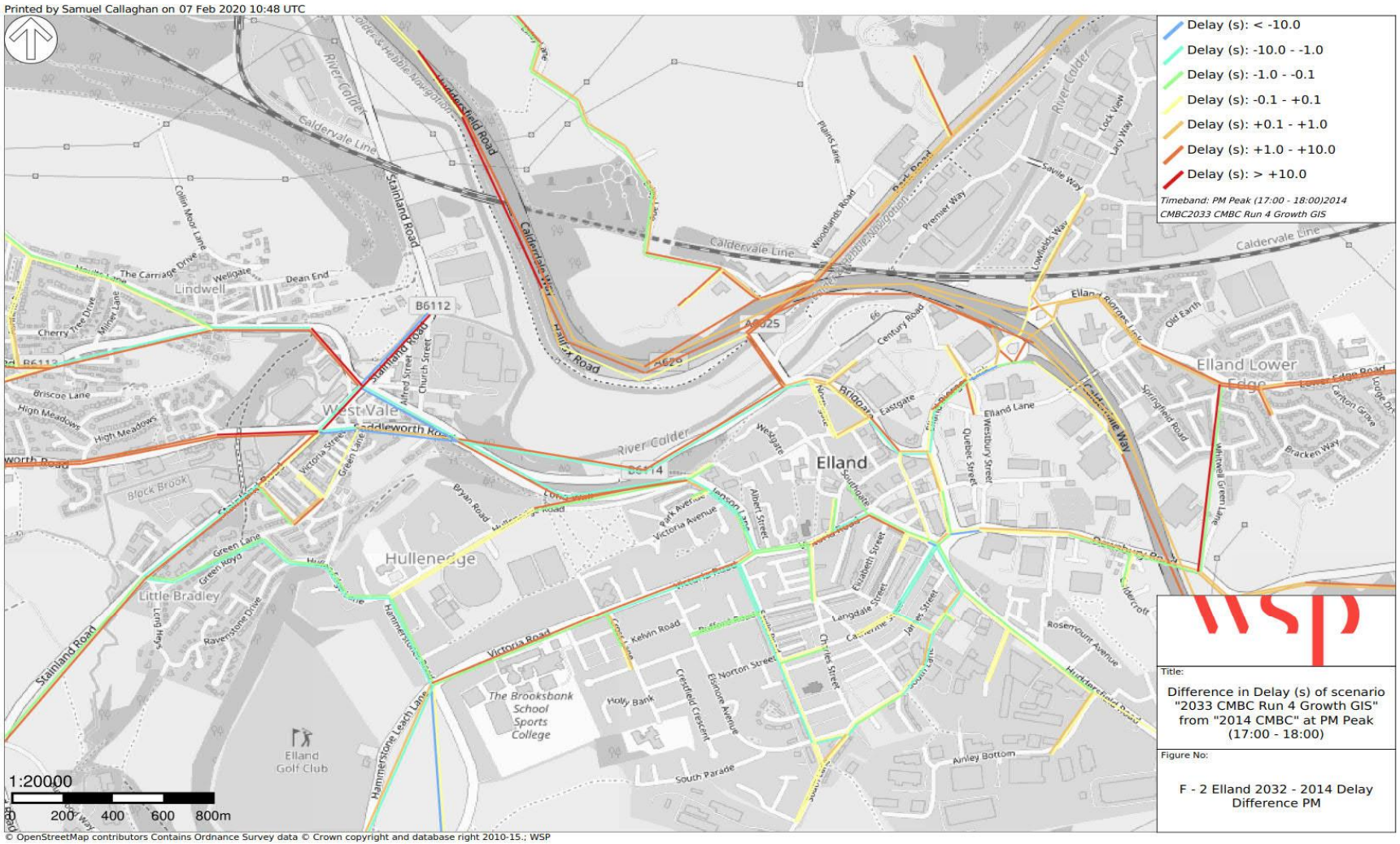
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Delay (s): +1.0 - +10.0
Delay (s): > +10.0
Timeband: PM Peak (17:00 - 18:00)2014
CMBC2033 CMBC Run 4 Growth GIS
Caldervale Line
River Calder
Stainland Road
Calderdale Way
Halifax Road
Huddersfield Road
B6112
A629
A6025
Lindwell
West Vale
Elland
Elland Lower Edge
Hullenedge
Little Bradley
Elland Golf Club
The Brooksbank School Sports College
Victoria Road
Westgate
Eastgate
Elland Lane
Century Road
Bridge Street
Park Avenue
Victoria Avenue
Albert Street
Elizabeth Street
Langdale Street
Rosemount Avenue
Kelvin Road
Holly Bank
Crestfield Crescent
Elsinore Avenue
Norton Street
Chrystes Street
Airley Bottom
South Parade
Hammerstone Leach Lane
Stainland Road
Green Lane
Green Royd
Ravenstone Drive
Long Heys
Briscoe Lane
High Meadows
Block Brook
Bryan Road
Alfred Street
Church Street
Victoria Street
Collin Moor Lane
The Carriage Drive
Wellgate
Dean End
Cherry Tree Drive
Miner Lane
Woodlands Road
Premier Way
Savile Way
Lowfields Way
Lock View
Lacy Way
Old Earth
Springfield Road
Carlton Grove
Bracken Way
Whitwell Green Lane
Quebec Street
Westbury Street
Southgate
Pollis Lane
Title:
Difference in Delay (s) of scenario "2033 CMBC Run 4 Growth GIS" from "2014 CMBC" at PM Peak (17:00 - 18:00)
Figure No:
F - 2 Elland 2032 - 2014 Delay Difference PM
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Delay (s): +1.0 - +10.0
Delay (s): > +10.0
Timeband: AM Peak (8:00 - 9:00)2014 CMBC2033 CMBC Run 4 Growth GIS
Title:
Difference in Delay (s) of scenario "2033 CMBC Run 4 Growth GIS" from "2014 CMBC" at AM Peak (8:00 - 9:00)
Figure No:
F - 3 Hipperholme 2032 - 2014 Delay Difference AM
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Delay (s): > +10.0
Timeband: PM Peak (17:00 - 18:00)2014
CMBC2033 CMBC Run 4 Growth GIS
Title:
Difference in Delay (s) of scenario "2033 CMBC Run 4 Growth GIS" from "2014 CMBC" at PM Peak (17:00 - 18:00)
Figure No:
F - 3 Hipperholme 2032 - 2014 Delay Difference PM
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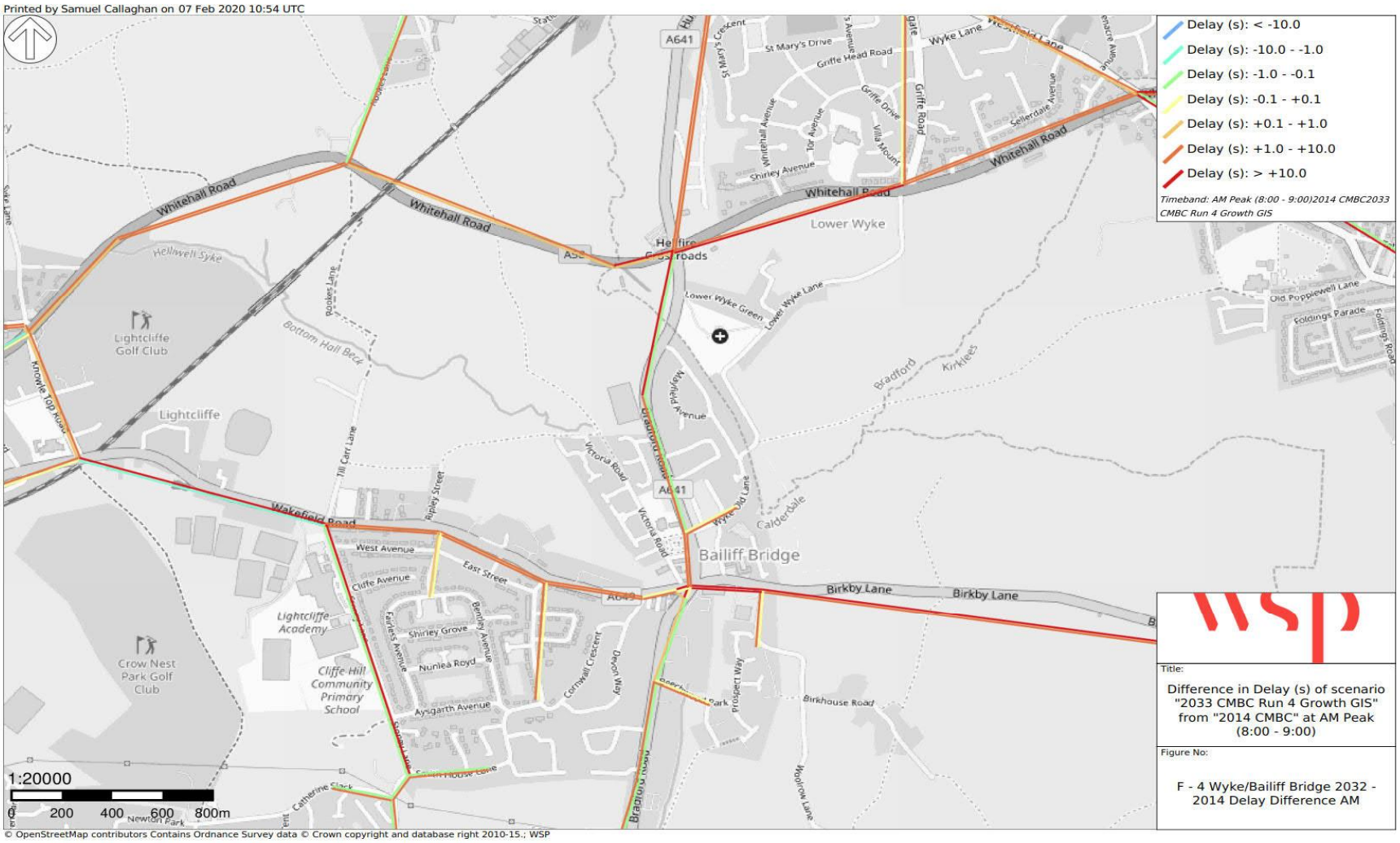
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Timeband: AM Peak (8:00 - 9:00)2014 CMBC2033 CMBC Run 4 Growth GIS
Whitehall Road
A641
Lower Wyke
Lightcliffe Golf Club
Lightcliffe
Bailiff Bridge
Wakefield Road
Birkby Lane
Lightcliffe Academy
Cliffe Hill Community Primary School
Crow Nest Park Golf Club
1:20000
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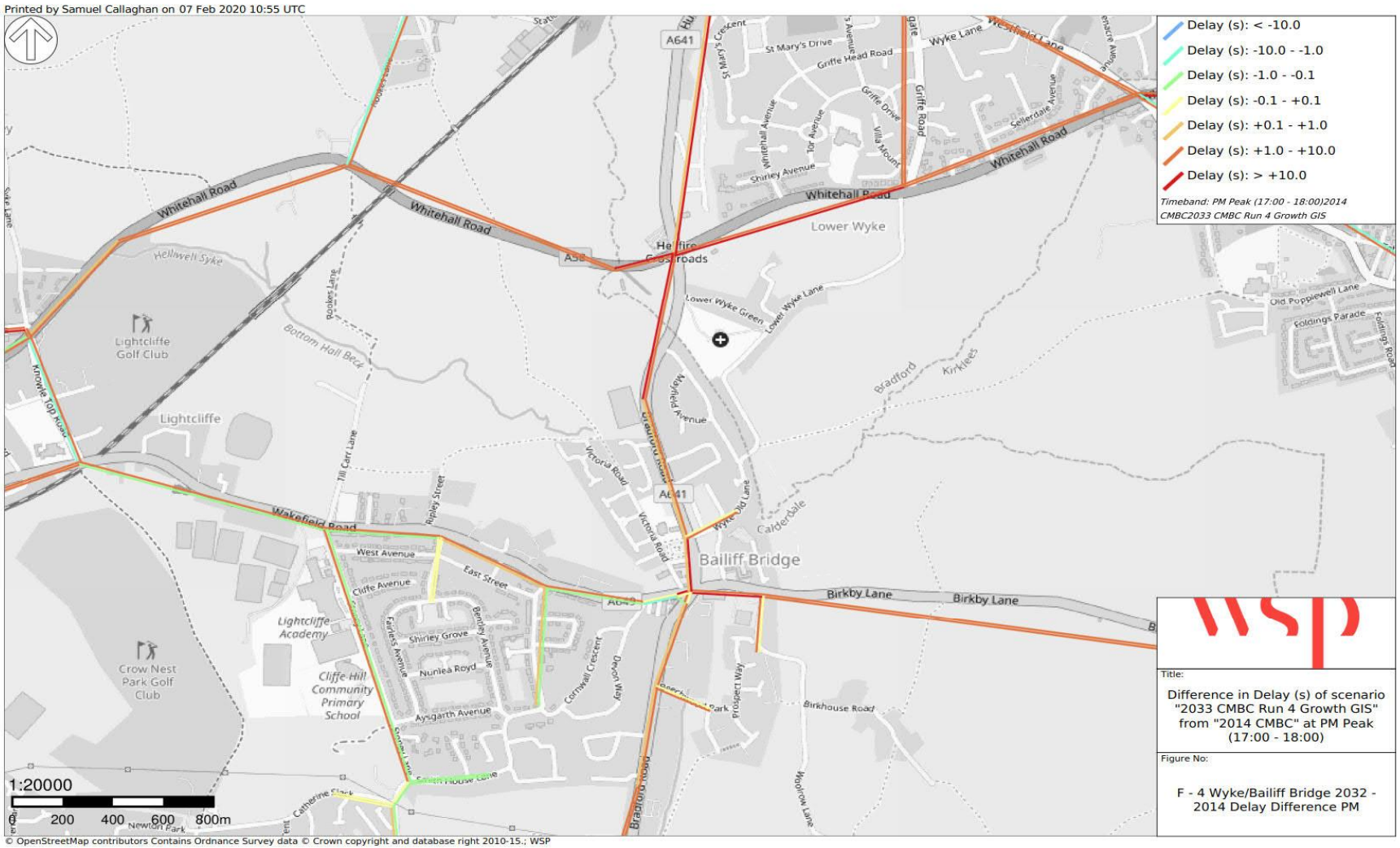
Title:
Difference in Delay (s) of scenario "2033 CMBC Run 4 Growth GIS" from "2014 CMBC" at AM Peak (8:00 - 9:00)
Figure No:
F - 4 Wyke/Bailiff Bridge 2032 - 2014 Delay Difference AM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Delay (s): +1.0 - +10.0
Delay (s): > +10.0
Timeband: PM Peak (17:00 - 18:00)2014
CMBC2033 CMBC Run 4 Growth GIS
Whitehall Road
A641
Lower Wyke
Lightcliffe
Lightcliffe Golf Club
Crow Nest Park Golf Club
Lightcliffe Academy
Cliffe Hill Community Primary School
Bailiff Bridge
Birkby Lane
Wakefield Road
Wyke Lane
Griffe Head Road
St Mary's Drive
Griffe Road
Shirley Avenue
Lower Wyke Green
Lower Wyke Lane
Old Poppiewell Lane
Foldings Parade
Bradford
Kirklees
Calderdale
Victoria Road
Ripley Street
West Avenue
Cliffe Avenue
East Street
Shirley Grove
Nunlea Royd
Aysgarth Avenue
Birkhouse Road
Prospect Way
Hellwell Syke
Bottom Hall Beck
Till Carr Lane
Knowle Top Road
Rooker Lane
1:20000
0 200 400 600 800m
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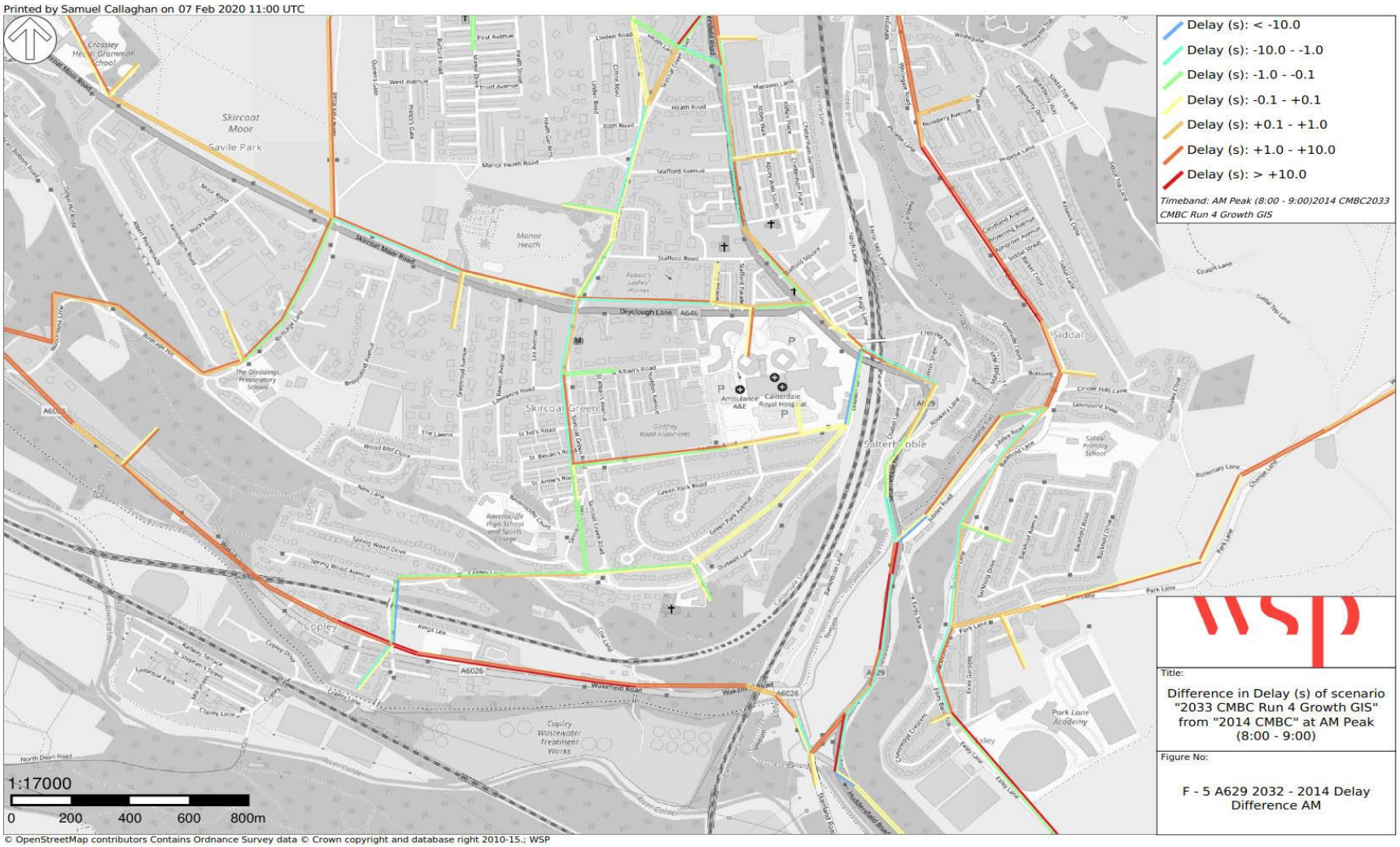
Title:
Difference in Delay (s) of scenario "2033 CMBC Run 4 Growth GIS" from "2014 CMBC" at PM Peak (17:00 - 18:00)
Figure No:
F - 4 Wyke/Bailiff Bridge 2032 - 2014 Delay Difference PM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Delay (s): +0.1 - +1.0
Delay (s): +1.0 - +10.0
Delay (s): > +10.0
Timeband: AM Peak (8:00 - 9:00)2014 CMBC2033 CMBC Run 4 Growth GIS
Title:
Difference in Delay (s) of scenario "2033 CMBC Run 4 Growth GIS" from "2014 CMBC" at AM Peak (8:00 - 9:00)
Figure No:
F - 5 A629 2032 - 2014 Delay Difference AM
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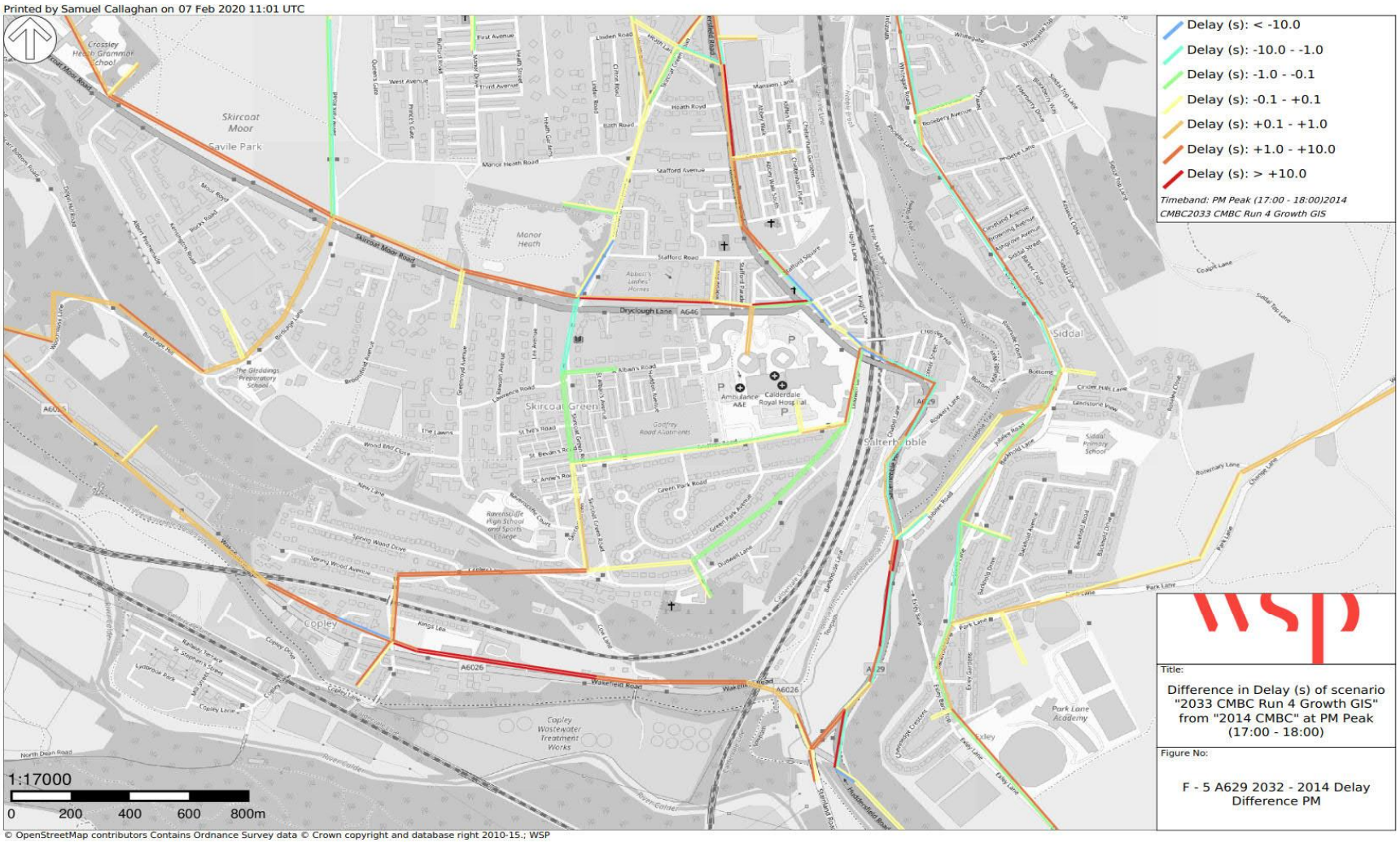
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Delay (s): +0.1 - +1.0
Delay (s): +1.0 - +10.0
Delay (s): > +10.0
Timeband: PM Peak (17:00 - 18:00)2014
CMBC2033 CMBC Run 4 Growth GIS
Title:
Difference in Delay (s) of scenario "2033 CMBC Run 4 Growth GIS" from "2014 CMBC" at PM Peak (17:00 - 18:00)
Figure No:
F - 5 A629 2032 - 2014 Delay Difference PM
1:17000
0 200 400 600 800m
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