

**Bradley Villa Farm, Huddersfield
Proposed Residential Development
Transport Assessment Addendum**

October 2021 (Initial Issue)

Prepared on behalf of
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Quality Management

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1. Introduction

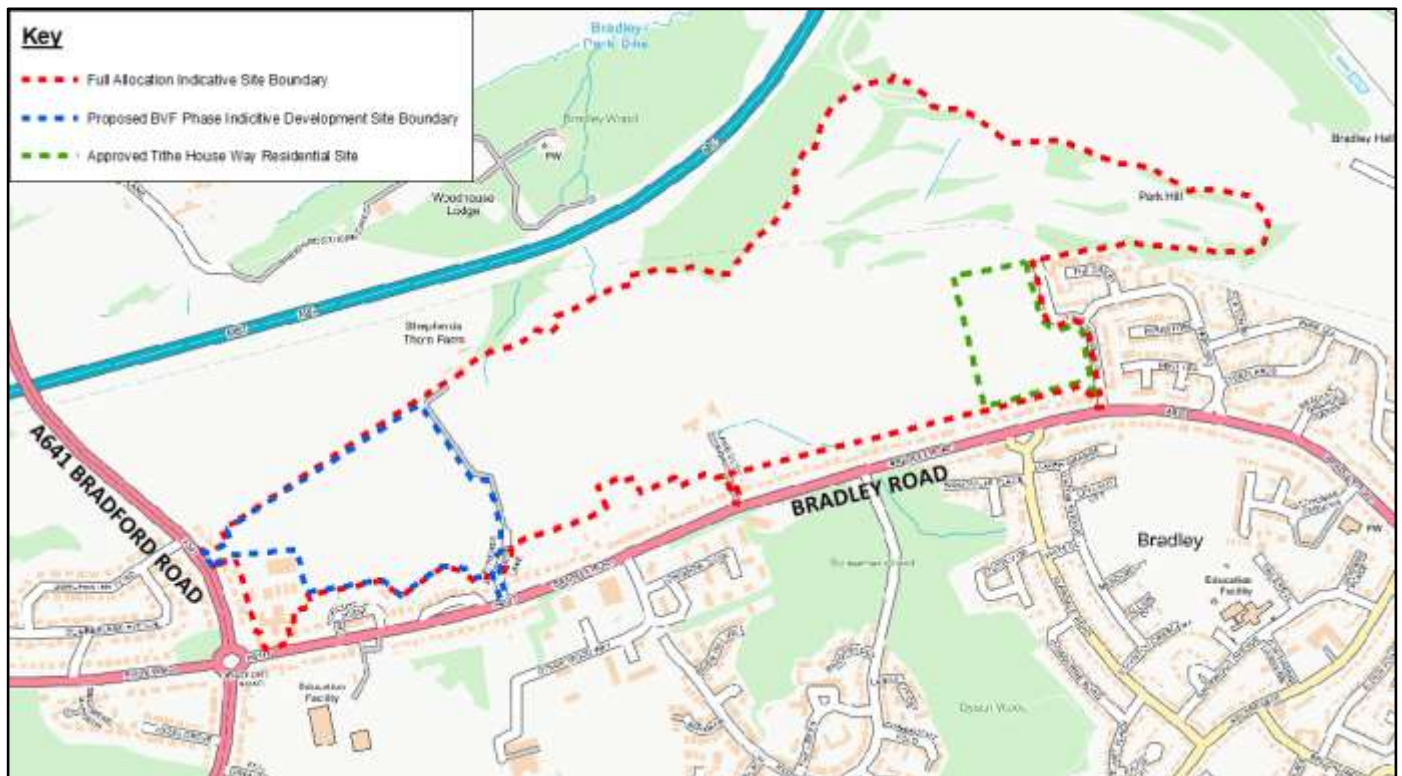
1.1.1 Optima prepared a Transport Assessment (TA) dated March 2021 in support of a proposed residential-led development on land to the north of Bradley Road, Huddersfield.

1.1.2 The land forms a large 68 hectare housing allocation within the adopted Kirklees Local Plan (Reference Site HS11).

1.1.3 The allocated Site has an overall capacity for 1,958 dwellings, with 1,460 of these programmed to be delivered before the end of the plan period (2031) and the remaining 498 units provided beyond the plan period. The allocation policy also refers to the provision of a primary school and public open space on the Site as well as the creation of a potential local centre incorporating community uses, retail and a health facility. The Site boundary is indicated on Image 1.1.

1.1.4 Kirklees Council has recently granted planning permission (in September 2020) for 105 dwellings on land adjacent to Tithe House Way (Ref: 2018/93965) which forms part of the overall HS11 allocation site. The location of this approved site is indicated on Image 1.1.

Image 1.1 Indicative Site Boundary



1.1.5 The first significant phase of development for 275 dwellings, referred to as the Bradley Villa Farm (BVF) Phase in this report, is to be provided on the western side of the allocation Site with access taken from the A641 Bradford Road. The indicative boundary for the BVF Phase development is also shown on Image 1.1. The March 2021 TA was prepared to support a full planning application by Redrow Homes for this first phase of development (275 units).

1.1.6 The March 2021 TA assessed both the impact of the proposed BVF Phase development (275 dwellings) but also considers the effect of the overall HS11 Allocation Site (1,958 dwellings).



1.1.7 A summary of the scope of the March 2021 TA is provided in Table 1.1 and further details of the development proposals are provided in Chapter 3 of the TA.

Table 1.1 TA Scope Summary

	Proposed BVF Phase Development	Overall HS11 Allocation
No. Dwellings	275	1,958*
Planning Permission Sought	Yes (by Redrow Homes)	No
TA Scope	Development impact fully assessed in TA to support planning application	Development impact has been assessed in the TA for the purposes of informing the Environmental Statement only

* includes 275 units in the BVF Phase

1.1.8 Following the submission of planning application (Ref: 2021/62/92086/W) and the associated March 2021 Transport Assessment, Kirklees Council (KC) have provided comments dated 12th July 2021 - a copy of which is attached at Appendix A. In addition JSJV, acting on behalf of Highways England (HE), produced a consultation response dated 23rd June 2021, a copy of which is attached at Appendix B.

1.1.9 This TA Addendum (TAA) has been prepared to address the comments raised by both Kirklees Council and HE/JSJV with regards to the proposed Bradley Villa Farm application.



2. Kirklees Council Comments

2.1 INTRODUCTION

2.1.1 This chapter addresses the comments raised by Kirklees Council (KC) in their consultation response dated 12th July 2021 – a copy of which is provided in Appendix A.

2.2 PROPOSED SITE ACCESS ARRANGEMENTS (BVF PHASE)

Proposed A641 Bradford Road/Site Access Junction

2.2.1 The BVF Phase development will be served by a priority junction onto the A641 Bradford Road, situated at an existing access point between residential dwellings, some 170m north of the Bradley Bar roundabout. The junction permits left-in and left-out movements from the dual carriageway as well as a right-turn in through the creation of a gap in the central reserve. It is proposed that right turn movements out of the Site are not permitted and drivers wishing to travel northbound on Bradford Road towards Brighouse will be required to turn left and U-turn at the Bradley Bar roundabout which is a short 150m away. In summary the proposed junction comprises:

- 6.75m carriageway on Site Access;
- 2.0m footway to southern side of the Site Access;
- 3.0m shared footway/cycleway to northern side of the Site Access;
- 3.0m right turning lane on Bradford Road; and
- 6.7m to 6.5m northbound and southbound through lanes on Bradford Road.

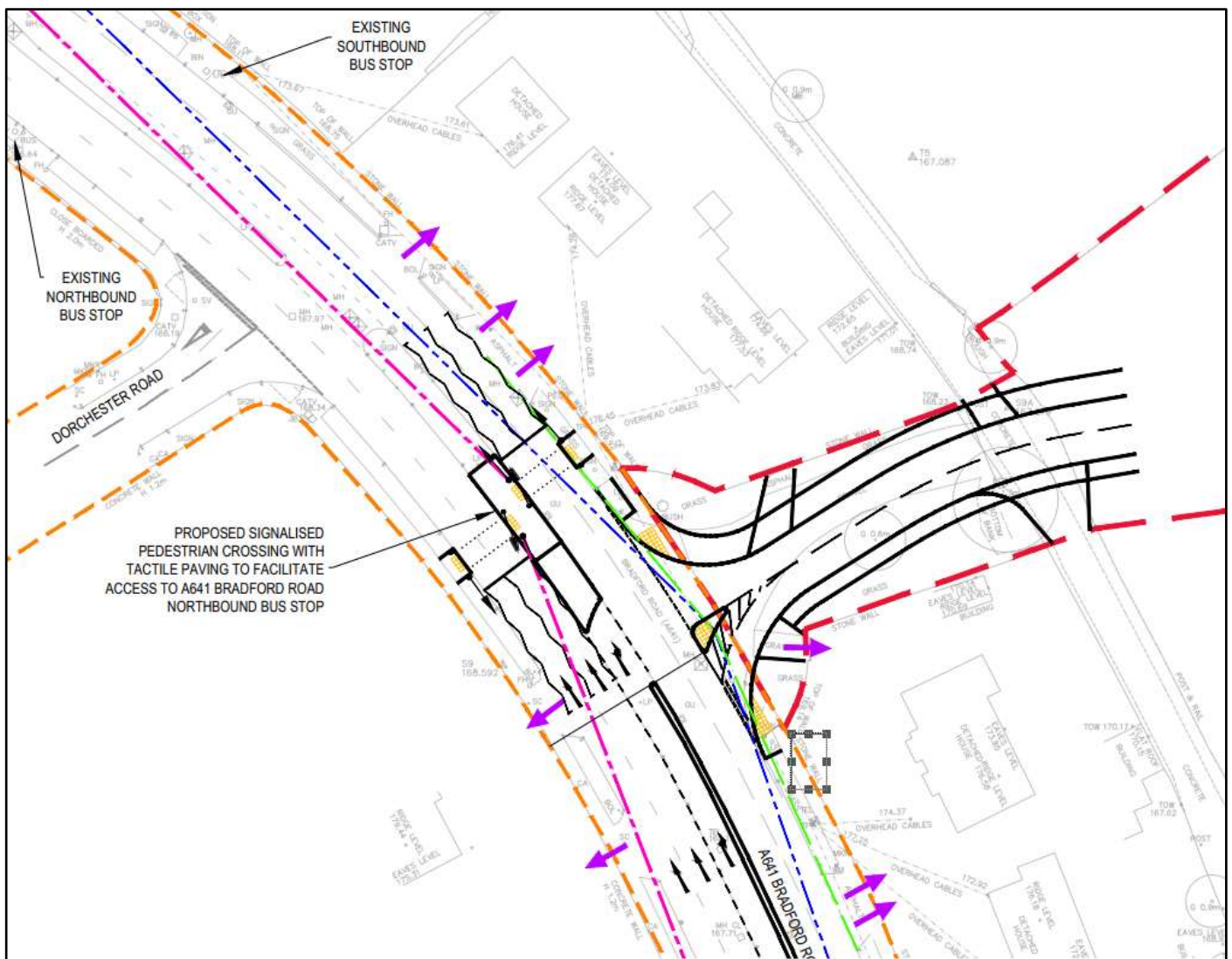
2.2.2 In order for residents of the development Site to satisfactorily access both existing bus stops on Bradford Road the original layout included a staggered, uncontrolled pedestrian crossing (comprising dropped kerbing and tactile paving) between the Site Access and Dorchester Road. In their consultation response the Council raise concerns regarding the provision of an uncontrolled facility and request that *“the application team explores the provision of a signal-controlled pedestrian crossing at a suitable location that facilitates a pedestrian desire line between the site access and the north-bound Bradford Road bus stop”*.

2.2.3 Such a scheme has therefore been explored/designed and a staggered signalised pedestrian crossing is proposed to be provided on Bradford Road between the Site Access and Dorchester Road – as shown on the drawing in Appendix C and the extract in Image 2.1. The location of the crossing facilitates the pedestrian desire line between the northbound bus stop and the Site Access as well as ensuring there is satisfactory visibility of the signalised stoplines for vehicles emerging from Dorchester Road as well as for vehicles travelling northbound and southbound along Bradford Road.

2.2.4 The proposed crossing facilities will also benefit existing pedestrian trips to bus stops, local shops, schools etc.



Image 2.1 Proposed BVF Phase Bradford Road/Site Access (with Signalised Pedestrian Crossing)



2.2.5 In their consultation response Kirklees Council state that they require the proposed Bradford Road/Site Access arrangements (as shown on the drawing in Appendix C) to be secured by a suitable planning condition, alongside a further planning condition requiring a full Road Safety Audit (Stages 1 to 4) as the layout progresses to detailed design and construction. This is a standard requirement and is acceptable.

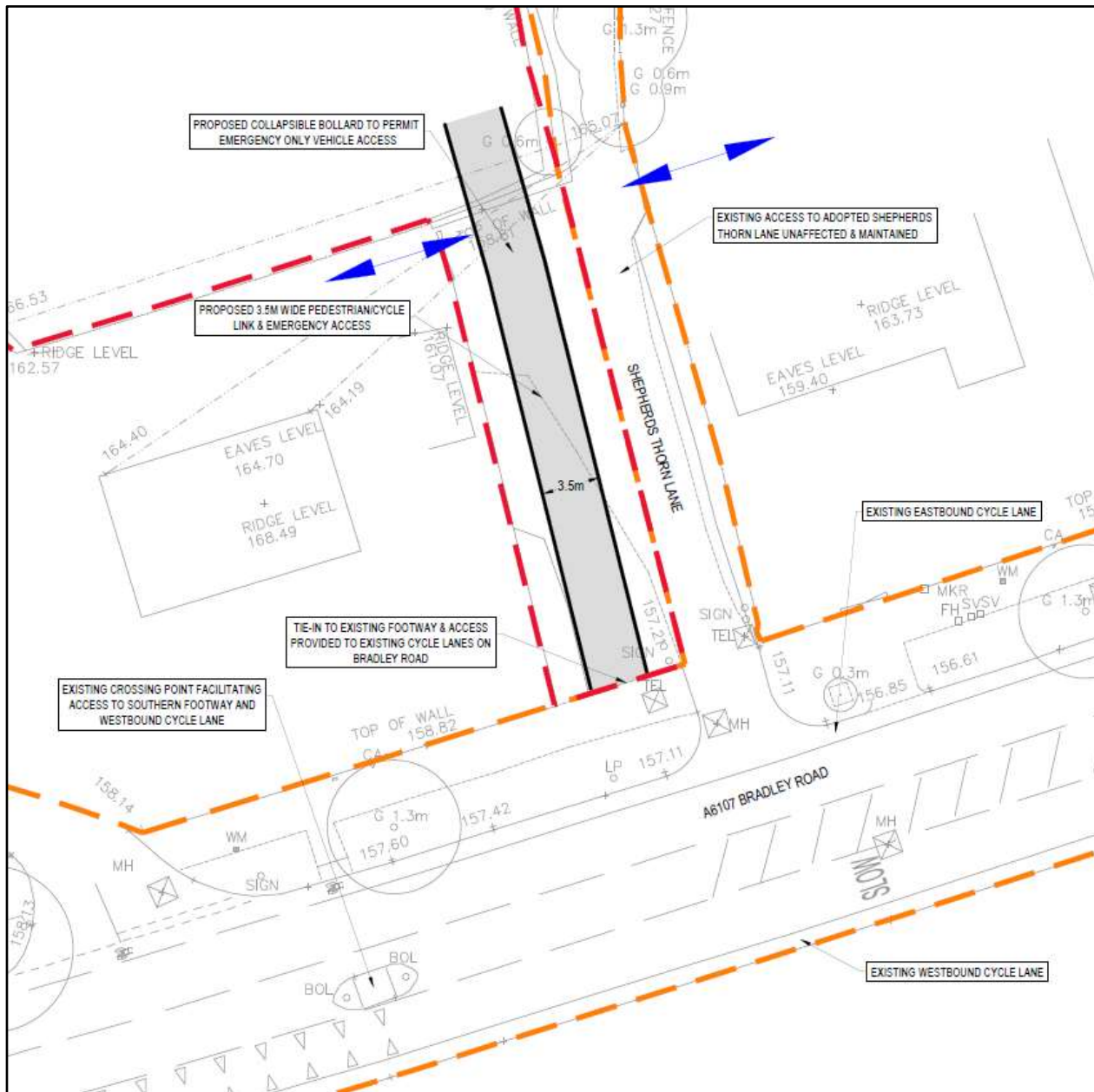
Proposed Emergency/Pedestrian/Cycle Access

2.2.6 The proposed single point of vehicular access onto Bradford Road can satisfactorily serve the proposed 275 dwellings within the BVF Phase - the Kirklees Highway Design Guide SPD states that it is only “for developments over 300 dwellings” that “at least two points of vehicular entry/exit are preferred”.

2.2.7 Notwithstanding this it is proposed to provide an alternative emergency access which connects to Bradley Road via the existing Shepherds Thorn Lane corridor. A suggested layout for the proposed 3.5m wide emergency access, which also provides a pedestrian/cycle link, is shown on the drawing in Appendix D, as well as on Image 2.1.

2.2.8 The suggested alignment of the link connection to Bradley Road is indicated within the existing green verge but alternatively, in order to reduce the impact on this verge, it may be possible for the link to utilise the initial section of the surfaced Shepherds Thorn Lane which is an adopted highway - this is a matter for detailed design.

Image 2.2 Proposed BVF Phase Emergency/Ped/Cycle Link to Bradley Road



2.2.9 In their consultation response the Council accepts the provision of the proposed emergency access via Shepherds Thorn Lane and requests that this is secured by a suitable planning condition which refers to the drawing in Appendix D.

2.3 TRIP GENERATION AND JUNCTION ASSESSMENTS

2.3.1 The Council confirm in their consultation response that the trip rates/generations were agreed at scoping stage of the TA and are acceptable.



2.4.4 Whilst the 'Cooper Bridge Improvement Scheme' has secured public funding through the West Yorkshire Transport Fund, Kirklees Council have also been collecting private sector contributions in line with their 2007 SPD1 document 'Negotiating Financial Contributions for Transport Improvements (Leeds Road, Huddersfield)'.

2.4.5 In their consultation response Kirklees Council acknowledge the above including the reference to their own 2007 SPD1 document. However, the Council's requested contribution of **£3,064 per unit** which equates to **£827,280** for the initial 275 dwellings proposed, far exceeds and does not align with the figure which is calculated in accordance with the formula in SPD1.

2.4.6 Figures 150 and 152 within the March 2021 TA identify that the proposed BVF Phase (Redrow) development will generate 50 and 48 two-way peak hour trips at the Cooper Bridge junction during the busiest morning and evening peak hours respectively – this is based on a robust assessment of 280 units as opposed to the 275 which have been applied for. The SPD contribution formula requires **£7,876 per trip** and therefore applying the higher 50 development trips in the morning peak hour equates to an anticipated requested contribution of **£393,800**. If the calculation is repeated for 275 dwellings then this would generate 49 trips at Cooper Bridge which equates to a £385,924 contribution.

2.4.7 Even taking the higher £393,800 figure then the contribution figure required by the Council's own SPD is less than half what the Council are now requesting in their consultation response. The additional sum requested by KC is likely to be associated with future mitigation works that the Council say is required at Bradley Bar roundabout and at the Bradley Road/Tithe House Way junction. It is accepted in the TA that some future improvements will be required at Bradley Bar roundabout (although the works are relatively minor) but no works are proposed at the Bradley Road/Tithe House Way junction. Therefore, the Council's requested £827,280 appears high.

2.5 BUS STOP PROVISION/IMPROVEMENTS

2.5.1 The Council consultation response requests that the existing northbound and southbound bus stops on Bradford Road (just north of Dorchester Road) are improved by providing bus stop clearways, shelters and real time information displays at both (via a S106 contribution). Given the close proximity of the development Site, this is considered to be a reasonable request and is accepted subject to agreeing the financial sums.

2.5.2 KC also request the provision of a single pair of bus stops along the Spine Road within the first BVF Phase of the development. This is accepted and agreed.

2.6 CONSTRUCTION ACCESS STRATEGY

2.6.1 As stated in the TA, during the construction of the BVF Phase a Construction Management Plan (CMP) will be implemented which will address any potential impacts arising from the development and ensure that the Site operates efficiently and safely. For example, the CMP will address construction hours of operation, treatment of delivery vehicles (wheel washing requirements, sheeting etc) and access routes to/from the Site i.e. via the A641, Bradford Road.

2.6.2 The Council has requested that the provision of the CMP is secured by planning condition, which is acceptable.

2.6.3 Kirklees Council has also requested that a pre and post construction condition survey of the existing Site Access carriageway/footway is undertaken – again this is standard practice and is acceptable.



2.7 INTERNAL SITE LAYOUT COMMENTS

2.7.1 Comments on the internal Site layout (provided by the Council's S38 team) have all been considered and appropriate feedback has been relayed to Redrow to incorporate within a revised scheme layout.



3. Highways England/JSJV Comments

3.1 INTRODUCTION

3.1.1 This section of the report addresses the comments raised by Highways England/JSJV in their consultation response dated 23rd June 2021 – a copy of which is provided in Appendix B.

3.2 AGREED ASPECTS OF THE TA

3.2.1 In their consultation response HE/JSJV confirm that the following elements within the March 2021 Transport Assessment are agreed:

- Traffic/Multi Modal trip rates and trip generations;
- Traffic distributions;
- The extent of committed development Sites applied within the assessments;
- Future design years and the level of traffic growth applied to these design years;
- There are no specific accident or highway safety concerns associated with the impact of the development proposals on the highway network; and
- The separately submitted Travel Plan document is satisfactory and fit for purpose.

3.2.2 In summary significant areas of the Transport Assessment are agreed with HE/JSJV but there are a few elements for which some further clarification has been sought – these are set out in the remainder of this chapter.

3.3 MATERIALITY ASSESSMENT

3.3.1 HE/JSJV have queried and sought clarification as to why no capacity modelling was undertaken for the initial BVF (Redrow) Phase for 280 dwellings at Junctions 24 and 25 of the M62.

3.3.2 As advised in the TA the previous national Guidance on Transport Assessment (GTA) document (now withdrawn) suggested that a development traffic generation of 30 trips represented a reasonable threshold figure above which further assessment may be required but below which the impact could be considered non-material. Whilst the Government's current Planning Practice Guidance (PPG) does not specifically refer to 30 trips this remains a starting threshold which is often still generally applied within the industry, including by Local Highway Authorities and Highways England. In the first instance therefore consideration was given to those junctions where development trips exceed 30 on any individual movement - neither Junction 24 or 25 meet this threshold criteria.

3.3.3 To demonstrate this table 6.4 in the March 2021 TA has been extended to include both Junction 24 and Junction 25 of the M62 – as shown in table 3.1 below.

Table 3.1 Materiality Assessment for 2029 Proposed BVF Phase Development

Junction Name	08:00 to 09:00 AM Peak 2029 (Total Junction Approach Flows – Vehicles)*					17:00 to 18:00 PM Peak 2029 (Total Junction Approach Flows – Vehicles)*				
	Base Flows	Dev Trips		Design Flows	Base Flow % Change	Base Flows	Dev Trips		Design Flows	Base Flow % Change
		Max on any Movement	Total				Max on any Movement	Total		
M62 Junction 24	2,765	5	7	2,772	+0.25%	2,940	5	7	2,947	+0.24%
M62 Junction 25	3,154	28	37	3,191	+1.17%	3,344	26	35	3,379	+1.05%

*Junction flows only i.e. do not include mainline flows



Junction 24 M62

3.3.4 As shown in table 3.1, at Junction 24 of the M62 there is:

- A **maximum of 5 development trips on any one movement** during both peak hours; and
- An **overall total of 7 two-way development trips** during both peak hours.

3.3.5 It is therefore clear that the impact of the BVF (Redrow) Phase development at Junction 24 is negligible and falls well below the 30 trip threshold. It is concluded that no further assessment work is required.

3.3.6 With respect to testing the impact of the overall HS11 Site Allocation (1,958 dwellings) it is noted that HE/JSJV consider this to be “*superfluous*” at this stage of the process because planning is only currently being sought for 280 units. Optima agrees with this statement.

Junction 25 M62

3.3.7 As shown in table 3.1, at Junction 24 of the M62 there is:

- A **maximum of 28 and 26 development trips on any one movement** during the morning and evening peak hours respectively; and
- An **overall total of 37 and 35 two-way development trips** during the morning and evening peak hours respectively.

3.3.8 Based on the above and the criteria set out within the TA of only giving further consideration to those junctions where development trips exceed 30 on any individual movement, Junction 25 was not modelled for the BVF (Redrow) Phase of 280 units.

3.3.9 Notwithstanding this, as requested by HE/JSJV in their consultation response, the model of Junction 25 of the M62 has been re-run to assess the BVF (Redrow) Phase impact of 280 dwellings. Further details of this are provided later in the chapter.

3.3.10 With respect to testing the impact of the overall HS11 Site Allocation (1,958 dwellings) it is noted that HE/JSJV consider this to be “*superfluous*” at this stage of the process because planning is only currently being sought for 280 units. Optima agrees with this statement.

3.4 TRAFFIC SURVEYS/FLOWS

3.4.1 JSJV/HE have raised the following two queries with respect to the traffic surveys/flows:

- Why wasn't 2020 data obtained for the SRN network? and
- What are the network peak hours for the SRN and do they match the peak hour periods applied across the highway network?

October 2020 Surveys

3.4.2 As stated in the October 2020 TA Scoping Study (and within the March 2021 TA) “*extensive junction and ATC surveys were completed on the 17th May 2018 for work undertaken on the garden suburb sites in Calderdale. It is therefore proposed to utilise this data and the locations where these surveys have taken place*”.

3.4.3 Such 2018 surveys were undertaken at Junction 25 of the M62 (as well as J24) and therefore no new surveys were required in these locations because the data pre-dates the Covid-19 pandemic. The only reason why a ‘Covid factor’ was determined was to be able to apply it to those junctions



where no 2018 (pre-pandemic) data existed to ensure that ‘normal’ conditions were replicated. This is not the case for the SRN so new additional surveys or factors are required.

SRN Peak Hour Periods

3.4.4 The morning and evening peak hour periods applied to all the junction assessments within the TA are 08:00 to 09:00 and 17:00 to 18:00 respectively. As is standard practice these peak hours have been determined in consideration of all the junctions across the highway network. It is clearly not practical to have a different peak hour period for every single junction that is being assessed, particularly when the network is so large. Furthermore, the 08:00 to 09:00 and 17:00 to 18:00 periods tie in with the AM and PM peak hours for development traffic generations.

3.4.5 Notwithstanding the above, as requested by HE/JSJV the survey data at Junction 25 of the M62 (the only junction which is materially impacted by the BVF Phase development) has been considered in isolation and it is confirmed that the following peak hours at this location are:

- AM Peak Hour of 07:00 to 08:00; and
- PM Peak Hour of 16:45 to 17:45.

3.4.6 The 2018 traffic flows at Junction 25 for the above time periods are shown on the attached Figures 400 and 401. Sensitivity modelling of Junction 25 has been undertaken applying these peak hour periods – details provided later in this chapter.

3.5 OPERATIONAL ASSESSMENT OF JUNCTION 25 M62

Impact of Other Committed Schemes/developments

3.5.1 HE/JSJV have queried in their consultation whether or not the modelling of Junction 25 incorporates the committed highway improvements secured as part of the Clifton Business Park planning consent.

3.5.2 The modelling is of the existing junction layout (as shown on Image 3.1) and does not include for the approved Clifton Business Park scheme, for which we have no details. As such the modelling is robust because the junction has been assessed without the benefits of a consented infrastructure improvement scheme but with the dis-benefit of including the traffic from the consented development i.e. trips from Clifton Business Park (Application Ref: 20/01354/LAA) have been included as committed development within the baseline flows – as referenced in Section 6.4 of the TA. Furthermore, it is not considered necessary to model the additional beneficial effects of the Clifton Business Park improvement scheme because the impact of the BVF Phase (Redrow) development at J25 is so small.

3.5.3 HE/JSJV also query whether or not the modelling of Junction 25 includes the effect of queuing back along the A644 from the Cooper Bridge junction, which is located some 1.7km to the south-east. The modelling does not include for the effect of Cooper Bridge for the following reasons:

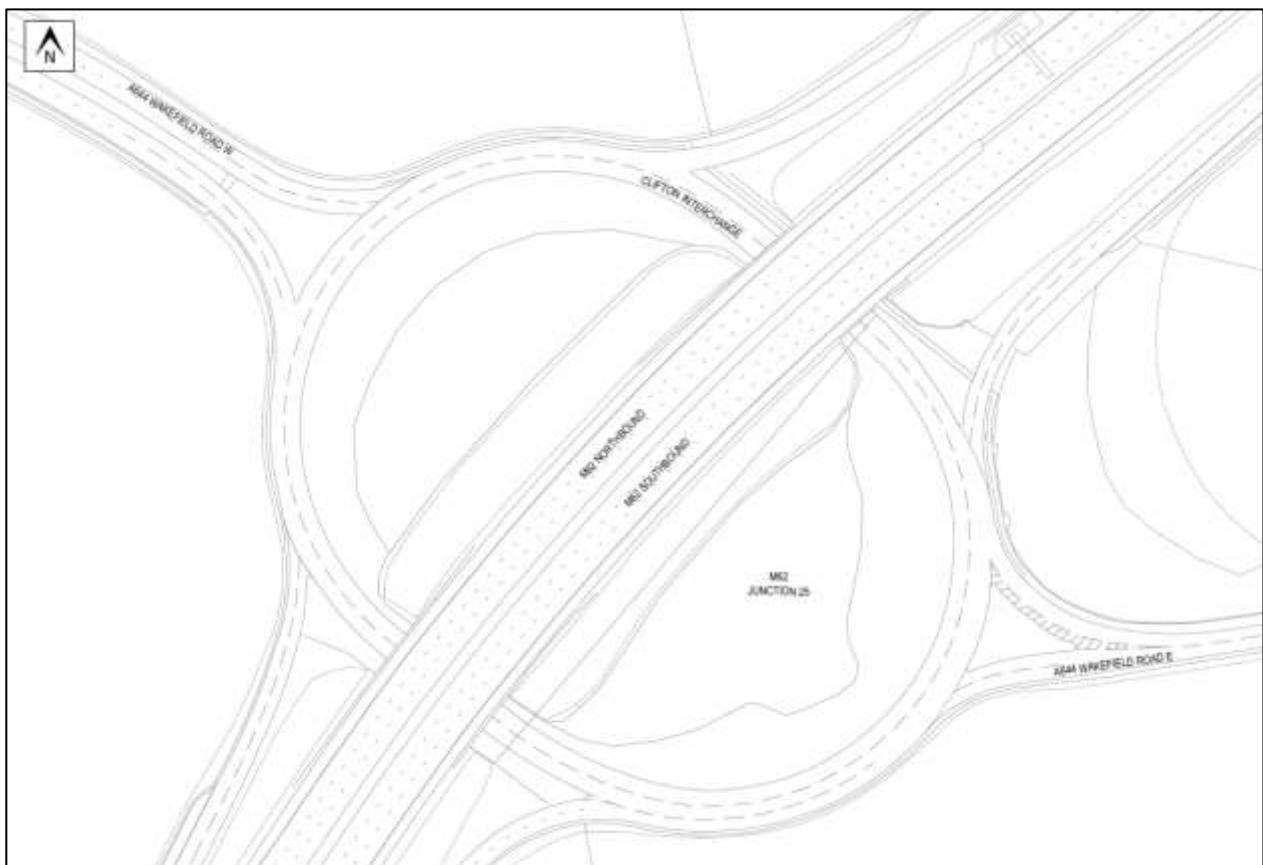
- It is important to model J25 in isolation so that its own operation can be fully understood and uninfluenced by neighbouring junctions on the local highway network. Modelling J25 on its own strips out the effect of the Cooper Bridge junction and thereby ensures that any capacity concerns at J25 can be readily identified;
- There is no point falsely identifying any potential measures at a junction only to find (once implemented) that they are a waste of time and resources because they do not fix the problem i.e. the problem in this instance is downstream at the Cooper Bridge and it is this junction that requires improvement, not J25;



- There is a separate mechanism/scheme to improve the Cooper Bridge junction and the proposed BVF (Redrow) Phase development is paying its fair share towards it – see section 2.4 of this report; and
- Details of the proposed Cooper Bridge Improvement scheme are still in flux and are being finalised by the promoters – it is therefore not possible to know at this stage what its effect is going to be. However, what is clear is that it will improve the existing highway situation and is likely to reduce the current ‘queuing back’ along the A644 Wakefield Road which can effect the operation of the southbound off-slip at J25. As suggested by JSJV in their consultation response it is agreed that *“Highways England should keep a watching brief on the emergence of development proposals at this location [Cooper Bridge], as well as liaising closely with Kirklees Council to ensure the scheme is delivered”*.

3.5.4 Notwithstanding any of the above reasons, whether the effect of Cooper Bridge is modelled or not is irrelevant to the outcome of the assessment work because the impact of the proposed BVF (Redrow) Phase of development on J25 is negligible - both in terms of overall development trips (maximum of 37 trips in the peak hour i.e. just one extra vehicle every 1.6 minutes on average) and in terms of material impact (just a 1.05% to 1.17% increase in flows compared to baseline traffic).

Image 3.1 M62 Junction 25 (Lower Level Roundabout) – Existing Layout



J25 Capacity Assessment of BVF Phase

3.5.5 As requested by HE/JSJV, the existing J25 (as shown in Image 3.1) has been modelled to assess the impact of the proposed BVF (Redrow) Phase development. The junction has initially been



modelled in the AM (08:00 to 09:00) and PM (17:00 to 18:00) peak hour periods for the following scenarios:

- 2018 Survey – count flows recorded in 2018 (undertaken in original March 2021 TA and included for completeness);
- 2029 Base – count flows factored to 2029 incorporating TEMPro Growth and committed/allocated developments (all as set out in TA and agreed); and
- 2029 Design – base flows plus the BVF (Redrow) Phase development trips associated with 280 dwellings.

3.5.6 The results of the above assessments are summarised within Table 3.2 and a full set of data output is provided in Appendix F.

Table 3.2 M62 Junction 25 (Lower Level Roundabout)

Junction Ref 23 Approach Arm	AM Peak (08:00 – 09:00)				PM Peak (17:00 – 18:00)			
	RFC	Delay (s)	Queue (PCU)	Observed Queue	RFC	Delay (s)	Queue (PCU)	Observed Queue
2018 Survey								
Arm 1 – M62 North Slips	0.53	4	1.1	4	0.58	4	1.4	8
Arm 2 – A644 Wakefield Road E	0.58	4	1.4	0	0.52	4	1.1	1
Arm 3 – M62 South Slips	0.34	5	0.5	1	0.32	4	0.5	1
Arm 4 – A644 Wakefield Road W	0.43	3	0.7	1	0.43	3	0.8	1
2029 Base								
Arm 1 – M62 North Slips	0.60	4	1.5	-	0.65	5	1.8	-
Arm 2 – A644 Wakefield Road E	0.66	6	2.0	-	0.59	5	1.4	-
Arm 3 – M62 South Slips	0.41	6	0.7	-	0.38	5	0.6	-
Arm 4 – A644 Wakefield Road W	0.49	4	1.0	-	0.51	4	1.0	-
2029 Design								
Arm 1 – M62 North Slips	0.60	4	1.5	-	0.66	5	1.9	-
Arm 2 – A644 Wakefield Road E	0.68	6	2.1	-	0.60	5	1.5	-
Arm 3 – M62 South Slips	0.42	6	0.7	-	0.39	5	0.6	-
Arm 4 – A644 Wakefield Road W	0.50	4	1.0	-	0.51	4	1.0	-

3.5.7 A Ratio of Flow to Capacity (RFC) value below 0.85 indicates that a junction or arm operates within its desirable practical capacity. An RFC value between 0.85 and 1.00 indicates that there may be occasions during the period modelled when queues will develop and delays will occur. An RFC value greater than 1.00 indicates that the junction or arm operates beyond its theoretical capacity and increased queuing and delay will be experienced.

3.5.8 The observed queues on Arm 1 (M62 southbound off slip) are noted to be slightly higher than those predicted by the model but other than that the 2018 model validates well against the recorded on-site queues.

3.5.9 The results in Table 3.2 shows that the existing junction operates within desirable practical capacity during both the 2018 AM and PM peak hours. The highest RFC is recorded as 0.58 on the Wakefield Road (East) and M62 North Slip approaches during the morning and evening peak hours respectively.

3.5.10 The capacity reduces in the 2029 Base scenario, but the junction still operates within desirable capacity with a maximum recorded RFC of 0.66 on the A644 Wakefield Road E arm during the morning peak hour.



3.5.11 In the 2029 Design scenario i.e. including the proposed BVF (Redrow) Phase development trips, the junction continues to operate within practical capacity (RFC of 0.85 or less) during both peak hours. Furthermore, the impact of the BVF Phase development at the junction is negligible as demonstrated by:

- RFC values on all approach arms either not changing at all or only increasing by 0.01 to 0.02;
- Delays (rounded to the nearest second) remaining unchanged; and
- Queues either not changing at all or only increasing by 0.1 vehicle.

J25 Capacity Assessment of BVF Phase (Peak Hour Sensitivity)

3.5.12 As requested by HE/JSJV and described in Section 3.4 of this report, the existing J25 has also been modelled as a sensitivity test for the following (junction specific) peak hour periods:

- AM Peak hour of 07:00 to 08:00; and
- PM Peak Hour of 16:45 to 17:45.

3.5.13 The modelled traffic flows have been updated accordingly to reflect the above peak hours and are shown on the attached figures:

- Figure 400 2018 Surveyed AM Peak Hour (07:00 – 08:00)
- Figure 401 2018 Surveyed PM Peak Hour (16:45 – 17:45)
- Figure 402 2029 Base AM Peak Hour (07:00 – 08:00)
- Figure 403 2029 Base PM Peak Hour (16:45 – 17:45)
- Figure 404 Development Trips AM Peak (07:00 – 08:00)
- Figure 405 Development Trips PM Peak (17:00 – 18:00)
- Figure 406 2029 Design AM Peak Hour (07:00 – 08:00)
- Figure 407 2029 Design PM Peak Hour (16:45 – 17:45)

3.5.14 It should be noted that in accordance with the agreed TRICS trip rates (as included in Appendix L of the March 2021 TA) the two-way development trip rate reduces to 0.422 for the new modelled period of 07:00 to 08:00. This compares with the 0.579 trip rate applied between 08:00 and 09:00. This change is reflected in Figures 404 and 406.

3.5.15 The junction has initially been modelled in the AM (07:00 to 08:00) and PM (16:45 to 17:45) peak hour periods for the following scenarios:

- 2018 Survey – count flows recorded in 2018 (undertaken in original March 2021 TA and included for completeness);
- 2029 Base – count flows factored to 2029 incorporating TEMPro Growth and committed/allocated developments (all as set out in TA and agreed); and
- 2029 Design – base flows plus the BVF (Redrow) Phase development trips associated with 280 dwellings.

3.5.16 The results of the above assessments are summarised within Table 3.3 and a full set of data output is provided in Appendix G.



Table 3.3 M62 Junction 25 (Lower Level Roundabout) – Peak Hr Sensitivity Test

Junction Ref 23 Approach Arm	AM Peak (07:00 – 08:00)				PM Peak (16:45 – 17:45)			
	RFC	Delay (s)	Queue (PCU)	Observed Queue	RFC	Delay (s)	Queue (PCU)	Observed Queue
2018 Survey								
Arm 1 – M62 North Slips	0.58	4	1.4	1	0.58	4	1.4	8
Arm 2 – A644 Wakefield Road E	0.69	6	2.2	0	0.51	4	1.0	1
Arm 3 – M62 South Slips	0.40	6	0.6	1	0.33	4	0.5	1
Arm 4 – A644 Wakefield Road W	0.67	6	2.0	2	0.47	3	0.9	1
2029 Base								
Arm 1 – M62 North Slips	0.64	5	1.8	-	0.64	5	1.8	-
Arm 2 – A644 Wakefield Road E	0.77	8	3.3	-	0.58	4	1.4	-
Arm 3 – M62 South Slips	0.49	9	1.0	-	0.39	5	0.6	-
Arm 4 – A644 Wakefield Road W	0.76	9	3.1	-	0.53	4	1.1	-
2029 Design								
Arm 1 – M62 North Slips	0.65	5	1.8	-	0.66	5	1.9	-
Arm 2 – A644 Wakefield Road E	0.78	9	3.5	-	0.58	4	1.4	-
Arm 3 – M62 South Slips	0.51	9	1.0	-	0.39	5	0.6	-
Arm 4 – A644 Wakefield Road W	0.77	10	3.3	-	0.54	4	1.2	-

3.5.17 The observed queues on Arm 1 (M62 southbound off slip) are noted to be slightly higher in the PM peak compared to those predicted by the model, but other than that the 2018 model validates well against the recorded on-site queues.

3.5.18 The results in Table 3.3 shows that the existing junction operates within desirable practical capacity during both the 2018 AM and PM peak hours. The highest RFC is recorded as 0.69 on the Wakefield Road (East) approach during the morning peak hour.

3.5.19 The capacity reduces in the 2029 Base scenario, but the junction still operates within desirable capacity with a maximum recorded RFC of 0.77 on the A644 Wakefield Road E arm during the morning peak hour.

3.5.20 In the 2029 Design scenario i.e. including the proposed BVF (Redrow) Phase development trips, the junction continues to operate within practical capacity (RFC of 0.85 or less) during both peak hours. Furthermore, the impact of the BVF Phase development at the junction is negligible as demonstrated by:

- RFC values on all approach arms either not changing at all or only increasing by 0.01 to 0.02;
- Delays (rounded to the nearest second) either remain unchanged or only increase by 1 second; and
- Queues either not changing at all or only increasing by 0.1 to 0.2 vehicles.

Summary

3.5.21 The impact of the proposed BVF (Redrow) Phase development can be satisfactorily and safely accommodated by the existing M62 Junction 25.

3.5.22 The junction will continue to operate within desirable capacity in the 2029 design year during all peak hour periods tested. It has also been demonstrated that the impact of the BVF Phase development is small and results in negligible, non-material changes to RFC, delay and queue values.



The impact is therefore not even close to the 'severe' threshold which is the test applied at paragraph 111 of the NPPF.

3.5.23 Such a small development impact would remain the case irrespective of whether it was appropriate to test the junction for any other scenarios such as incorporating the Clifton Business Park consented improvement i.e. the outcome remains the same.

3.5.24 It is therefore concluded that no mitigation measures are required at the junction as a result of the BVF (Redrow) Phase development and no further assessment work is necessary at this stage.



4. Summary and Conclusions

4.1.1 Optima prepared a Transport Assessment (TA) dated March 2021 in support of a proposed residential-led development on allocated land to the north of Bradley Road, Huddersfield.

4.1.2 The first significant phase of development for 275 dwellings, referred to as the Bradley Villa Farm (BVF) Phase, is to be provided on the western side of the allocation Site with access taken from the A641 Bradford Road. The March 2021 TA was prepared to support a full planning application by Redrow Homes for this first phase of development (275 units).

4.1.3 Following the submission of planning application (Ref: 2021/62/92086/W) Kirklees Council (KC) have provided comments dated 12th July 2021. In addition JSJV, acting on behalf of Highways England (HE), produced a consultation response dated 23rd June 2021. This TA Addendum (TAA) has been prepared to address the comments raised by both Kirklees Council and HE/JSJV with regards to the proposed Bradley Villa Farm application.

4.1.4 The key request by Kirklees Council was to provide a controlled crossing on Bradford Road close to the Site Access junction. Such a scheme has therefore been explored/designed and a staggered signalised pedestrian crossing is proposed to be provided on Bradford Road between the Site Access and Dorchester Road. The location of the crossing facilitates the pedestrian desire line between the northbound bus stop and the Site Access as well as ensuring there is satisfactory visibility of the signalised stoplines for vehicles emerging from Dorchester Road as well as for vehicles travelling northbound and southbound along Bradford Road. The proposed crossing facilities will also benefit existing pedestrian trips to bus stops, local shops, schools etc.

4.1.5 The key request from Highways England was to re-run a capacity assessment of Junction 25 of the M62 to test the impact of the BVF (Redrow) Phase development – as opposed to the impact test of the full HS11 Allocation which was completed in the TA. This assessment has been completed and the results show that the proposed BVF (Redrow) Phase development can be satisfactorily and safely accommodated by the existing M62 Junction 25.

4.1.6 The junction will continue to operate within desirable capacity in the 2029 design year during all peak hour periods tested. It has also been demonstrated that the impact of the BVF Phase development is small and results in negligible, non-material changes to RFC, delay and queue values. The impact is therefore not even close to the 'severe' threshold which is the test applied at paragraph 111 of the NPPF. It is therefore concluded that no mitigation measures are required at the junction as a result of the BVF (Redrow) Phase development and no further assessment work is necessary at this stage.

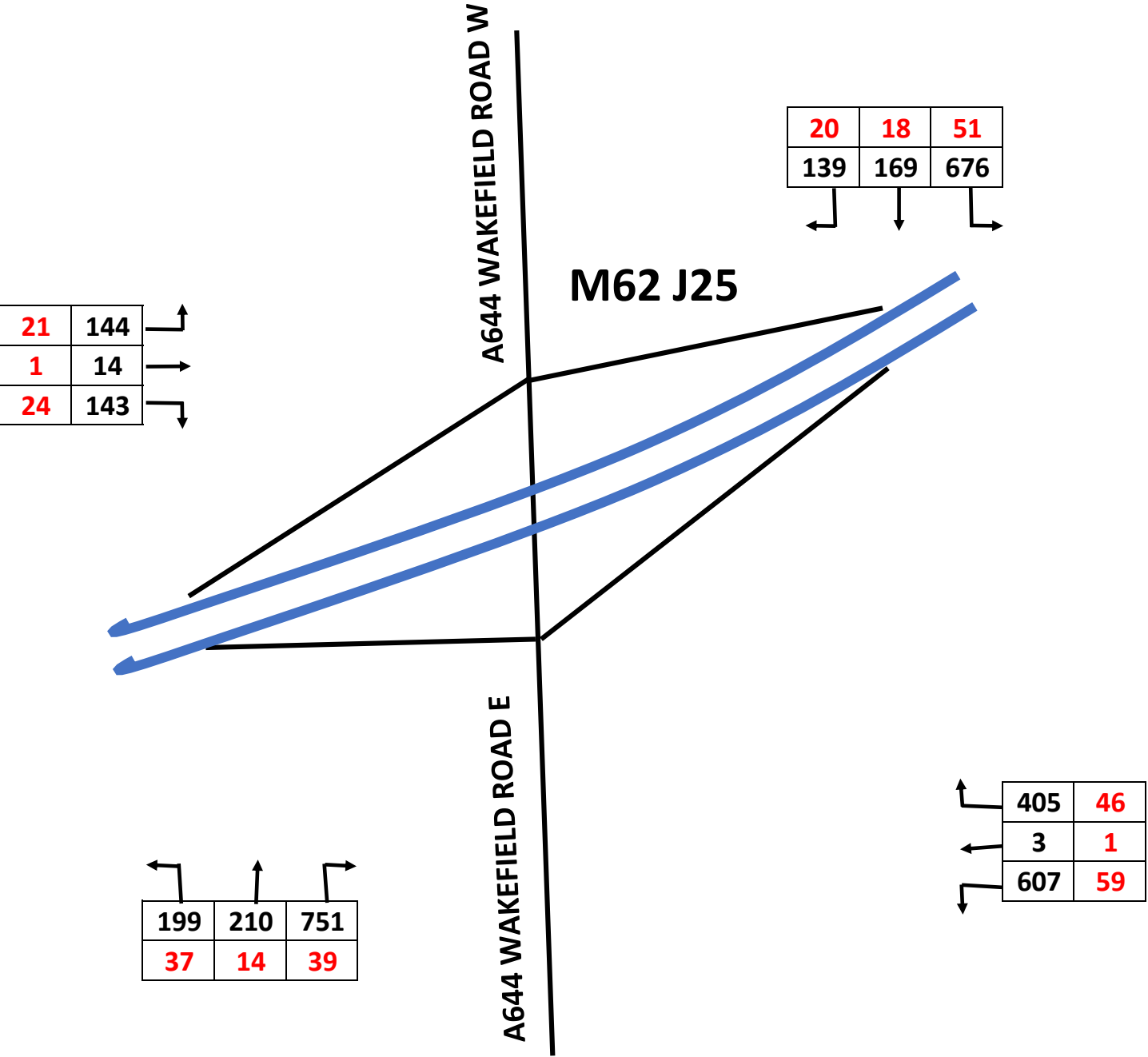
4.1.7 This TA Addendum has considered and satisfactorily addressed all of the Kirklees Council and Highways England consultation comments. From the additional work undertaken it is concluded that there are no reasons on highways or transport grounds why the proposed Redrow BVF Phase development for 275 dwellings should not be granted planning permission.



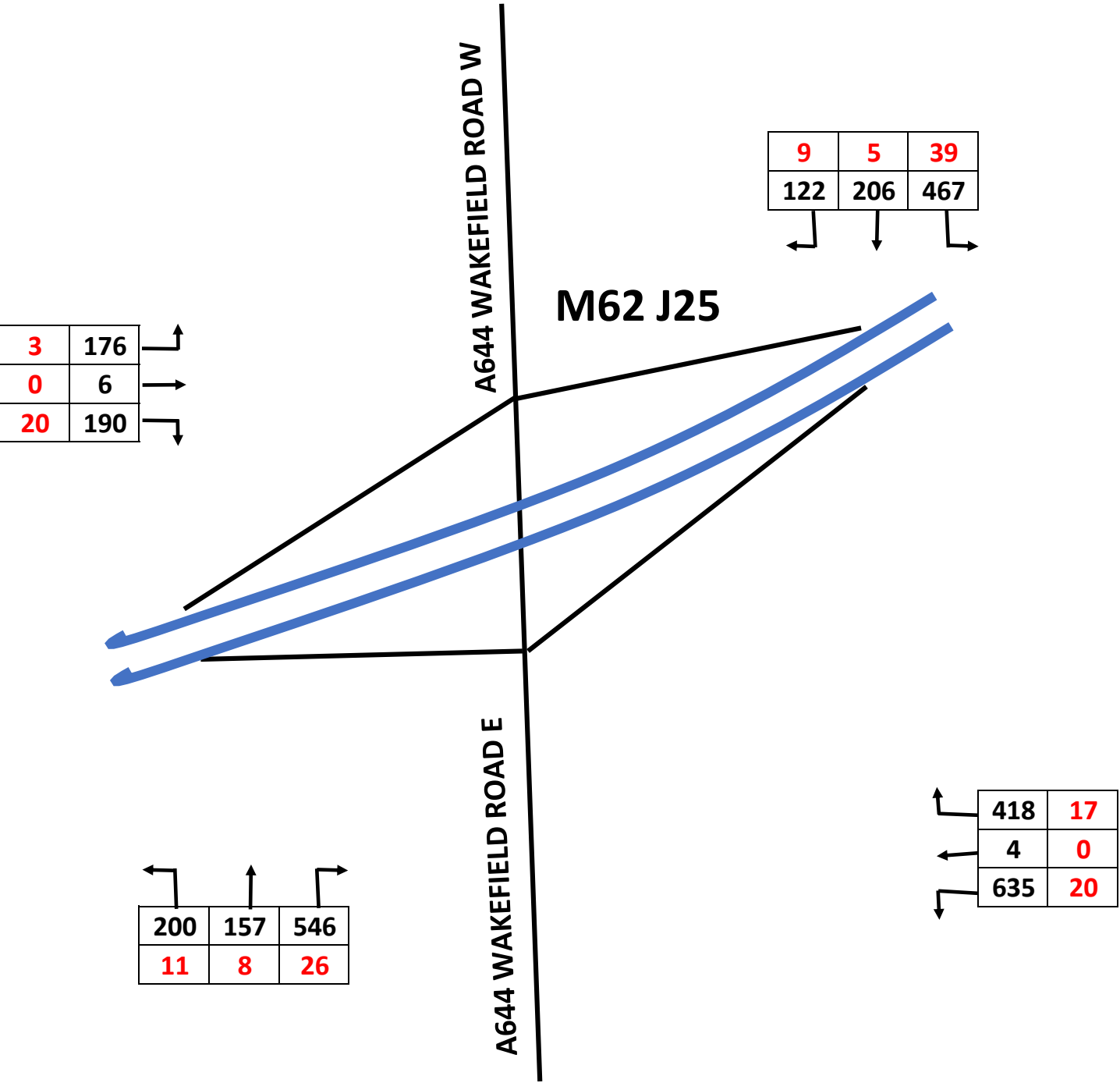
Figures



0	Total Vehicles
0	HGVs & PSVs



0	Total Vehicles
0	HGVs & PSVs



0	Total Vehicles
0	HGVs & PSVs

23	144	↖
1	14	→
26	153	↘

211	261	794
40	15	42

22	20	55
140	194	728

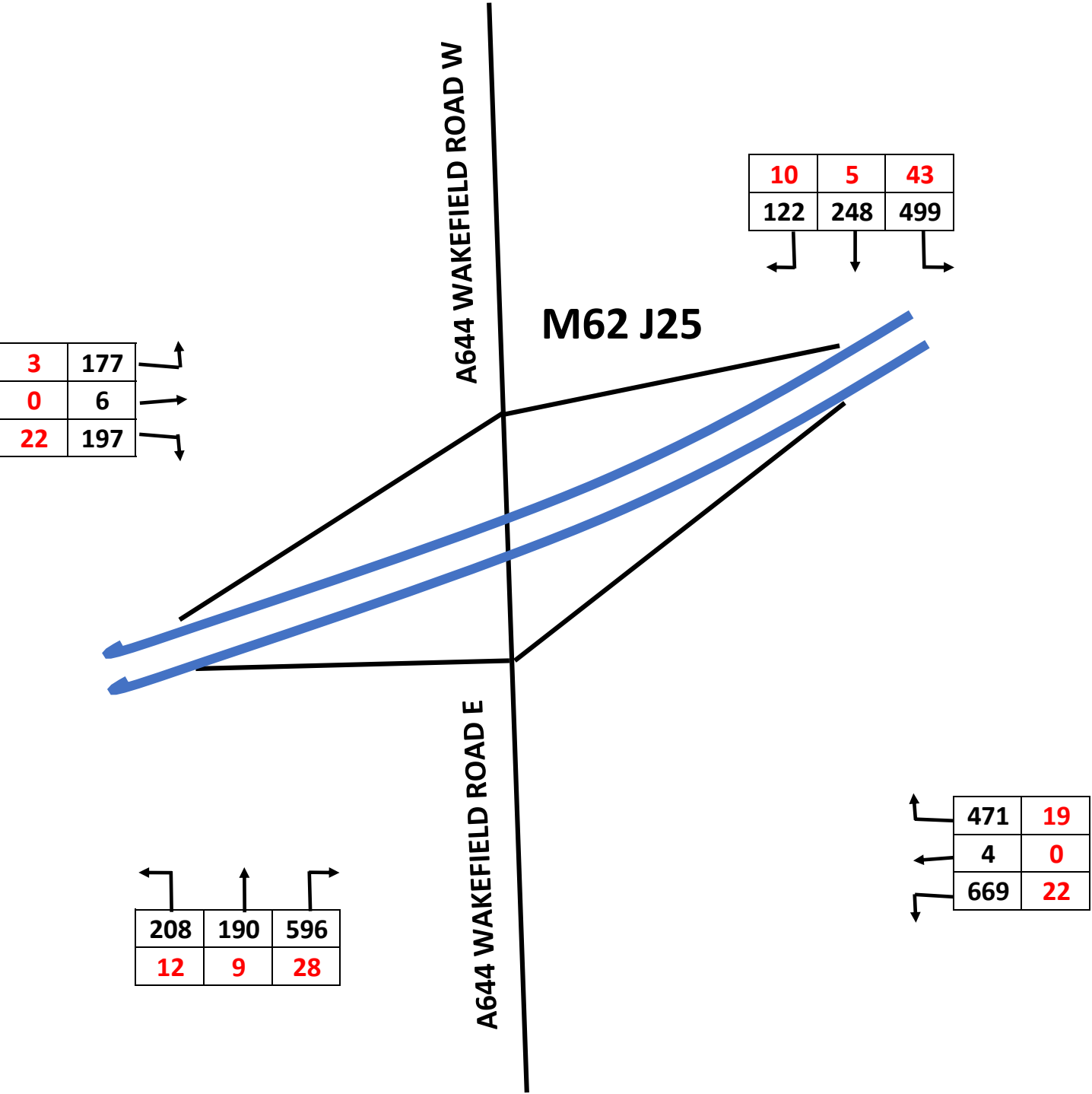
440	50
3	1
663	64

A644 WAKEFIELD ROAD W

A644 WAKEFIELD ROAD E

M62 J25

0	Total Vehicles
0	HGVs & PSVs



Arrivals	
Departures	

		22

5	

A644 WAKEFIELD ROAD W

A644 WAKEFIELD ROAD E

M62 J25

Arrivals	
Departures	

		9

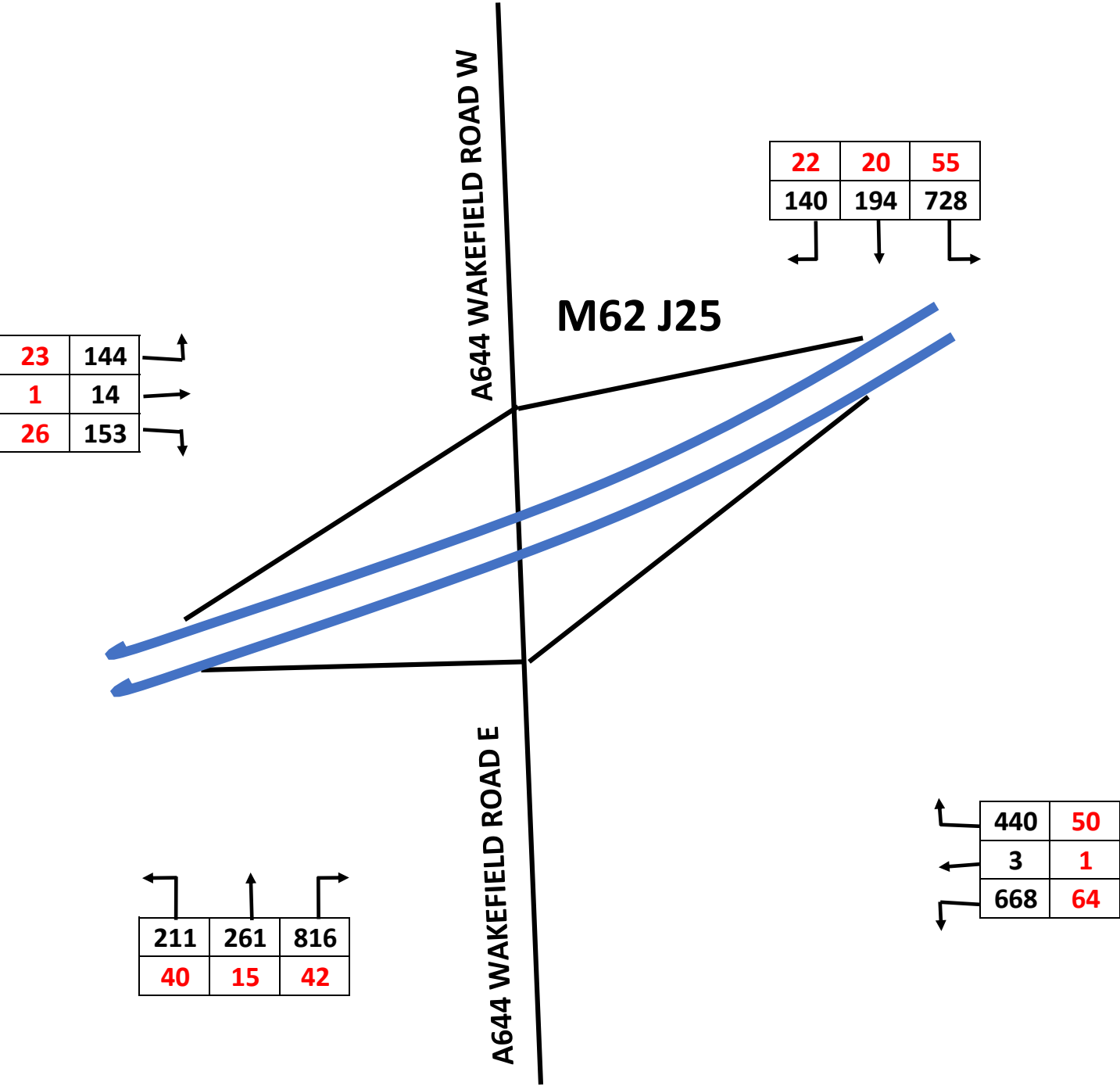
26	

A644 WAKEFIELD ROAD W

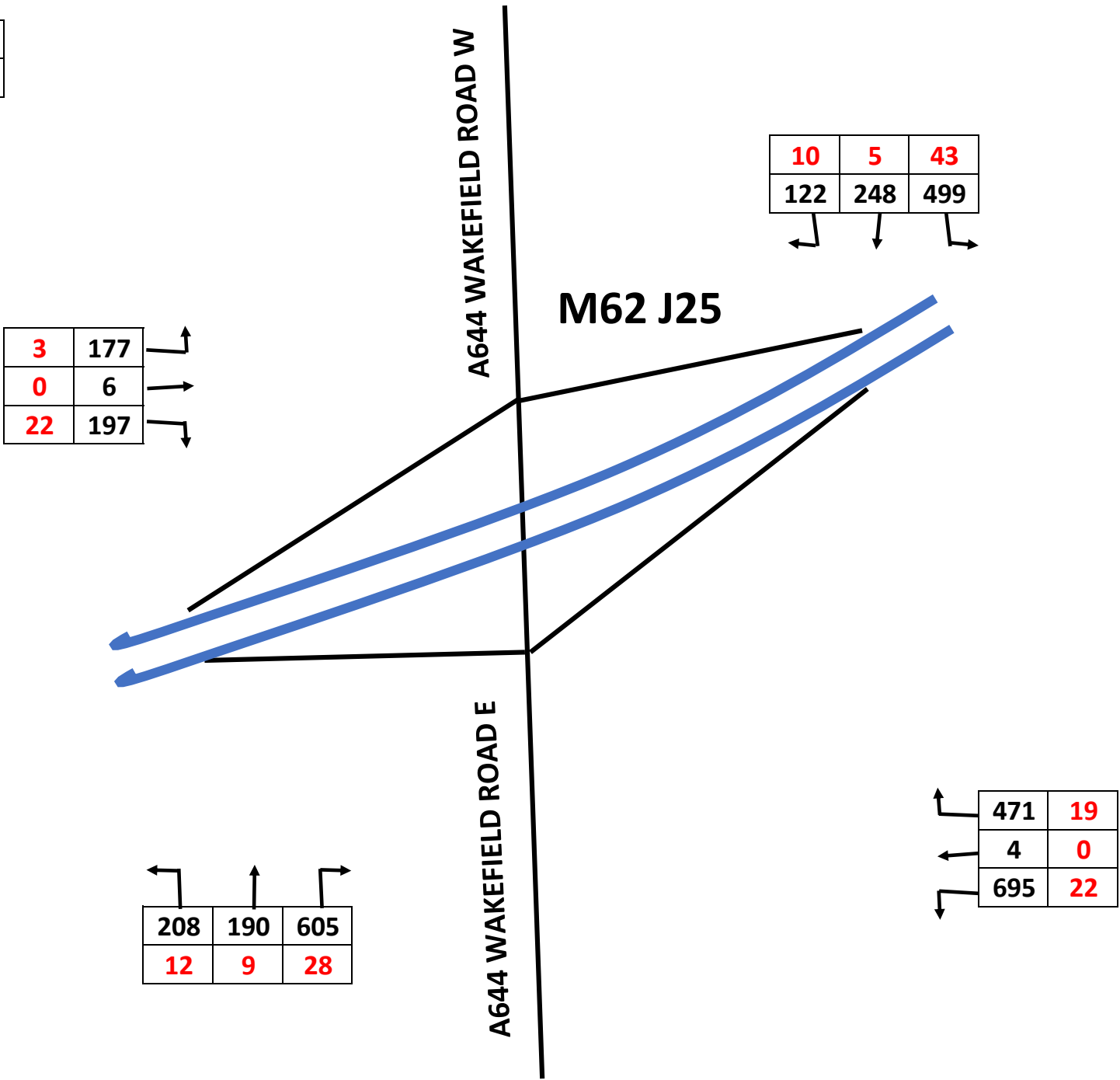
A644 WAKEFIELD ROAD E

M62 J25

0	Total Vehicles
0	HGVs & PSVs



0	Total Vehicles
0	HGVs & PSVs



Appendices



Appendix A Kirklees Council Consultation Response dated 12th July 2021



Kirklees Highways Development Management comments

2021/62/92086/W – Erection of 270 residential dwellings and associated infrastructure and access

Land at Bradley Villa Farm, Bradley Road, Bradley, Huddersfield, HD2 2JX

Context and Proposal

This is a full Planning Application for the development of 270 residential dwellings on land between Bradford Road and Bradley Road, Bradley, Huddersfield.

It is noted that Transport Assessment and Travel Plan documentation has been submitted in support of this application, as per pre-application advice provided by Kirklees HDM. This is part of Local Plan Site Allocation HS11 (total/max.1,958 dwellings). 1,460 of these dwellings are programmed for build-out before the end of the Local Plan period (2031).

Access

It is proposed to take vehicular access via an existing opening off the eastern side of the A641 Bradford Road via a new junction incorporating a right-turn ghost lane to facilitate right-turn vehicular manoeuvres into the site (not possible at present due to the central reserve). In accordance with the broader Masterplan, there is a vehicular connection proposed to the wider HS11 site, to the east of this development site. Through the site, a new primary road corridor (spine road) would be created, forming a 6.75m wide carriageway with a 3m cycleway along the northern edge and a 2m wide footway to the south.

It is noted that the spine road would extend up to the eastern boundary to provide a future connection with the wider HS11 site. Where the future vehicular connection would be temporarily stopped up, a temporary turning head should be proposed and secured accordingly via a submitted drawing. This does not presently appear to be proposed and hence, please request such.

In further details, it is noted that the development would be served by a priority junction onto the A641 Bradford Road, situated at an existing access point between residential dwellings, some 170m north of the Bradley Bar roundabout.

The proposed site access junction is presented on a Transport Assessment drawing (Appendix H) and permits left-in and left-out movements from the dual carriageway as well as a right-turn in through the creation of a gap in the central reserve.

It is proposed that right turn movements out of the site are not permitted and drivers wishing to travel northbound on Bradford Road towards Brighouse would be required to turn left and U-turn at the Bradley Bar roundabout which 150m away.

It is stated that approximately 8% of development trips would perform this U-turn manoeuvre.

In summary the proposed Bradford Road/Site Access junction comprises:

- 6.75m carriageway on Site Access;
- 2.0m footway to southern side of the Site Access;
- 3.0m shared footway/cycleway to northern side of the Site Access;
- Pedestrian crossing facilities on the Site Access comprising a central refuge island, dropped crossings and tactile paving;
- Pedestrian facilities across Bradford Road comprising staggered dropped crossings and tactile paving;
- 3.0m right turning lane on Bradford Road;
- 6.7m to 6.5m northbound and southbound through lanes on Bradford Road; and
- 2.4 x 120m visibility splays in accordance with the 40mph speed limit.

This should be subject to a full Road Safety Audit (Stages 1-4) and would form a future Section 278 Application/Agreement for off-site highways works. The submitted drawing should be secured by an appropriate planning condition, as should the Stage 1-4 Road Safety Audit. This is discussed in more detail, later.

It is noted that a secondary (emergency only) access is proposed to connect to Bradley Road, via Shepherds Thorn Lane and detailed within the TA on page 21 and Appendix I. This should also be secured by a planning condition and a detailed (referenced) engineering drawing to ensure it is implemented.

Existing Highway Conditions

The site is situated on land to the east of A641 Bradford Road and to the north of A6107 Bradley Road (some 3.8km north of Huddersfield and 2.4km south of Brighouse).

A6107 Bradley Road is a lit single carriageway, which runs east to west from its signalised junction with A62 Leeds Road and B6118 Colne Bridge Road for approximately 2.6km where it meets A641 Bradford Road at a four-arm roundabout known as Bradley Bar Roundabout (to the southwest of the site).

In the vicinity of the site, Bradley Road is approximately 11m wide with 3.5m wide grass verges and 2.5m wide footways to both flanks. It is subject to a 40mph speed limit, with the exception of a 30mph limit in the vicinity of All Saints High School opposite the site.

To the east of the site, Bradley Road forms a signalised T-junction with Dyson Wood Way, which serves Bradley Business Park.

The A641 runs between Bradford and Huddersfield on a north-south alignment. Along the western boundary of the Site the A641 is known as Bradford Road and forms a lit dual carriageway subject to a 40mph speed limit.

North of its junction with Dorchester Road, Bradford Road is subject to a 50mph speed limit as it crosses over the M62 and becomes Huddersfield Road on its approach to the Toothill Lane/Woodhouse Lane (crossroad) junction.

Collision analysis

Personal injury collision data was obtained for the highway network in the vicinity of the Site for the most recently available five-year period prior to the end of January 2021. The study

area included the main corridors of Bradley Road, Bradford Road, Fixby Road and A62 Leeds Road. Collision data for Junction 25 of the M62 was also obtained.

In summary there have been a total of 149 personal injury collisions across the large study area; 128 of which have been classified as slight in severity, 19 as serious and there have been two collisions that resulted in a fatal injury.

Pedestrian and Cycle Facilities

Footways that are approximately 2.5m wide are provided on both flanks of Bradley Road in the vicinity of the site. 1.6m wide footways are provided on Bradford Road segregated from the carriageway by circa 2.0m wide grass verges.

A pedestrian refuge island is provided opposite All Saints Catholic College within Bradley Road and dropped crossings are provided across all arms of Bradley Bar Roundabout.

There is a series of existing public rights of way in the vicinity of the site and these are detailed within the TA. On-road cycle lanes are located along Bradley Road between Bradley Bar Roundabout and A62 Leeds Road.

Pedestrian/cycle access would be provided from the proposed vehicular junction onto the A641 Bradford Road. This junction also provides uncontrolled pedestrian crossing facilities across the arm of the Site Access in the form of a central refuge island, dropped crossings and tactile paving – (presented on a drawing in TA Appendix H).

Additionally:

- A 3.5m wide pedestrian/cycle only link to Bradley Road would be provided utilising the existing Shepherds Thorn Lane corridor (as shown on the drawing in Appendix I and in Image 3.2);
- A second pedestrian connection would be provided from the site further north along the adopted Shepherds Thorn Lane, providing access over the M62 towards Woodhouse via a footbridge; and
- Numerous pedestrian routes would be provided throughout the site including footways either side of the spine road.

It is important that all this improvement/mitigation is secured by planning condition (with linked 1:200 engineering drawings) and is clearly referenced via the S106 Heads of Terms, subject to future planning consent.

Kirklees HDM is concerned at the lack of existing (or proposed) formal pedestrian crossing facilities on the A641 Bradford Road. This is formed of a 40mph road with 2 north-bound lanes and 2 south-bound lanes.

Passengers alighting buses at the north-bound bus stop would have to cross 4 lanes of (40 mph) traffic. They may be weighed down with shopping bags, have small children to hold onto, using a pushchair or be disabled and reliant on a mobility scooter. There are serious concerns that vulnerable road users would be at serious risk when crossing the A641, particularly in low light or inclement weather conditions.

HDM has concluded that the provision of dropped kerbs and tactile paving (with a central refuge) does not form mitigation that sufficiently addresses these concerns. It is therefore requested that the application team explores the provision of a signal-controlled pedestrian

crossing at a suitable location that facilitates a pedestrian desire line between the site access and the north-bound, Bradford Road bus stop.

Trip Generation and Development Impact on the Local Highway Network

Trip rates were agreed at pre-application and TA Scoping stages and appear acceptable, as follows:

Time Period	Vehicular Trip Rates (per dwelling)		
	Arrivals	Departures	Total
AM Peak 08:00-09:00	0.150	0.429	0.579
PM Peak 17:00-18:00	0.402	0.146	0.548

This results in the following AM and PM peak (two-way) flows:

Time Period	Vehicular Trip Generations (tested for 280 units)		
	Arrivals	Departures	Total
AM Peak 08:00-09:00	42	120	162
PM Peak 17:00-18:00	112	41	153

The full development allocation is likely to generate a total of 1,134 (AM) and 1,073 vehicular trips respectively:

Time Period	Vehicular Trip Generations (tested for 1,958 units)		
	Arrivals	Departures	Total
AM Peak 08:00-09:00	294	840	1,134
PM Peak 17:00-18:00	787	286	1,073

Assessment Methodology

The applicant has assessed the impact of 280 dwellings as the Bradley Villa Farm phase of development of the total allocation for 1,958 dwellings (allocated housing site: HS11 in the Kirklees Local Plan).

The following scenarios are considered:

- 2018/2019 Survey;
- Base Years of 2029 and 2034 including committed development and background traffic growth;
- Interim Design Year (2029) includes base traffic flows with the addition of the Bradley Villa Farm phase of traffic; and
- Full Design Year (2034) includes base traffic flows with the addition of the total allocation traffic.

Each development scenario was tested for both the weekday AM and PM peak hours.

Operational assessments of the junctions on the surrounding network have been undertaken with the addition of planned / committed development traffic.

It is noted that the following committed developments/associated traffic flows have been included in the assessment and this is welcomed/acceptable:

- Gernhill Avenue, Fixby (ref: 2018/62/92055/W) – 252 dwellings;
- Tithe House Lane, Bradley (ref: 2018/49/93965/W) – 105 dwellings;
- Land between Dewsbury Road and New Hey Road in Rastrick, Calderdale (ref: 19/00628/FUL) – 267 dwellings;
- Woodhouse Garden Suburb, Rastrick, Calderdale – 1,257 dwellings;
- Thornhills Garden Suburb, Brighouse, Calderdale – 1,998 dwellings;
- Clifton Business Park, Brighouse, Calderdale (ref: 20/01354/LAA) – employment uses;
- Dyson Wood Way, Bradley (ref: 2018/62/91432/W) – employment uses;
- Land to east of Netheroyd Hill Road, Cowcliffe – 68 dwellings;
- Land north of Ashbrow Road, Brackenhall (ref: 2019/62/92940/W) – 161 dwellings;
- Former Cooper Bridge Waste Water Treatment Works, Leeds Road – employment; and
- Land at Slipper Lane and Leeds Road, Mirfield – 166 dwellings and employment uses.

Meanwhile, it is noted that baseline conditions also include highway improvements regarding the A62/A644 (Wakefield Road) Link Road Scheme (Cooper Bridge).

Junction Assessment

Detailed capacity assessments of the following junctions have been completed and presented in the supporting Transport Assessment:

- Junction Ref 1: A6107 Fixby Road/A6107 Bradley Road/A641 Bradford Road (existing roundabout);
- Junction Ref 2: A6107 Bradley Road/Dyson Wood Way (existing signals);
- Junction Ref 3: A6107 Bradley Road/Oak Road (existing priority);
- Junction Ref 10: A641 Bradford Road/Long Hill Road (existing priority);
- Junction Ref 11: A641 Bradford Road/ASDA Access (existing roundabout); and
- Junction Ref A: A641 Bradford Road/Site Access (proposed priority).

It is noted that the Transport Assessment concludes that none of the existing junctions would operate in excess of capacity in the baseline scenario.

It is stated that there would be modest increases in congestion and delay at several junctions within the study area as a result of the completed development. It is noted that the addition of the proposed development traffic causes the operation of Bradley Bar Roundabout to worsen (in excess of the operational capacity) and that mitigatory measures would be required – as per the comment under Infrastructure Requirements set out below.

At other junctions located further away from the site the proposed development traffic impact is reduced and diluted as the traffic disperses through the network. As such it is considered that the magnitude of the effect of development traffic overall across the highway network is minor adverse.

Infrastructure Requirements

At pre-application stage, the council emphasised how infrastructure requirements and delivery development of the HS11 site would require significant infrastructure to render the site ready to take development, to support development during its operational phase, and to mitigate its impacts.

The spine road through the development (and therefore the specification of the HS11 spine road connecting with Bradford Road), should be as follows:

The specification of the spine road within the site should be designed as a residential connector street (Type A) within Kirklees (adopted SPD) Highway Design Guide, with a cross section of:

- 3m shared footway/cycleway;
- 2m verge;
- 6.75m carriageway;
- 2m verge; and
- 3m shared footway/cycleway.

In terms of highways, it was previously advised that infrastructure-related works and provisions would, or may, include the provision of new roads and junctions, signalisation works, new cycle routes, new footways and footpaths (and diversions and improvements to existing footpaths). Temporary, between-phase infrastructure may also be required, as may off-site infrastructure works.

Emphasis was made regarding how crucial it is that these infrastructure requirements are identified at an early stage and that forthcoming submissions must ascertain what is required, when these works and provisions are required (phased delivery of some works may be appropriate), their costs, and who would be responsible for their delivery.

Awareness was also drawn to the fact that the council (as landowner) had commissioned WSP to assess the infrastructure needs of the HS11 site.

Cooper Bridge Improvement Scheme

The Local Plan Allocation of HS11 states that “the spine road through the site should be linked to the Bradley Relief Road that is part of TS1, LP19. The Council will monitor the implementation of the early phases of delivery to manage the options and need for strategic intervention in advance of the 750th dwelling”.

Further details of the council’s current preferred option for the Cooper Bridge improvement scheme can be found at the following link:

[A62 to Cooper Bridge Corridor Improvement Scheme | Your Voice \(westyorks-ca.gov.uk\)](https://www.westyorks-ca.gov.uk/a62-to-cooper-bridge-corridor-improvement-scheme-your-voice)

The scheme is being promoted by several Local Highway Authorities including Kirklees as well as the West Yorkshire Combined Authority (WYCA).

An earlier option for the scheme is presented in a TA drawing (Appendix K).

While the scheme has secured public funding through the West Yorkshire Transport Fund, it is noted that the Council have also been collecting private sector contributions in line with

their 2007 SPD1 document *Negotiating Financial Contributions for Transport Improvements (Leeds Road, Huddersfield)*.

There is a requirement for the HS11 sites to contribute to the Cooper Bridge scheme, mindful of a funding shortfall and the cumulative impact of 1,958 dwellings on the local highways network and this important local highway intervention, with respect to delivering infrastructure to properly supporting local housing growth spanning the duration of the local plan.

A figure of **£3,064** per unit would be therefore appropriate/applicable under the Heads of Terms/Section 106 Agreement. For this planning application, that financial contribution would total **£827,280**.

This funding would be used to mitigate the impact of this planning application at the following location, as concluded by the WSP report.

Bradley Bar Roundabout

Bradley Bar roundabout would reach its saturation limit after the addition of only 200 dwellings during the AM peak hour and, therefore, no further development can be accommodated at Bradley Park beyond 2024 without the introduction of off-site highway mitigation measures.

A preliminary mitigation scheme has been developed (by WSP) which includes increased entry widths and effective flare lengths on each approach arm. It is, therefore, considered that the implementation of a mitigation scheme of this nature would be required to be implemented after delivery of 200 dwellings to ensure the continued acceptable operation of this intersection beyond 2024.

Additionally, and for the purposes of completeness with respect to the infrastructure requirements of the wider HS11 site, the WSP report also highlights the following:

A6107 Bradley Road / Tithe House Way

The A6107 Bradley Road / Tithe House Way Priority T-Junction would reach its saturation limit during the AM peak hour, after delivery of between 500-600 dwellings and, therefore, no further development can be accommodated beyond 2028 without the implementation of highway mitigation measures.

WSP has developed a preliminary signalised T-Junction mitigation scheme for A6107 Bradley Road / Tithe House Way, which would be required to be implemented after the delivery of 500 dwellings to ensure the continued acceptable operation of this intersection beyond 2028.

The upgraded intersection is forecast to reach its new saturation limit between 900-1,000 dwellings in the AM and PM peak hours.

Sustainable Transport

Bus

The view of WYCA must be sought. However, HDM's view is as follows.

There are bus stops on either side of Bradford Road, just north of the proposed site's primary vehicular access point. Regular (approximately 4/hour) bus services operate from these stops including:

- 349 Bradley to Halifax
- X49 Huddersfield to Brighouse
- 363 Huddersfield to Bradford Interchange
- X63 Huddersfield to Bradford Interchange

Brighouse Bus Station is approximately 2.5km from the site with regular services to Leeds, Huddersfield, Bradford, Halifax, Dewsbury and Elland.

It is noted that the existing stops on both the eastern and western sides of the A641 Bradford Road lacks bus stop clearways, shelter and real-time information.

Whilst Kirklees HDM have sought the view of WYCA, no response has been received to date. However, it is requested that the applicant makes an appropriate (Section 106 secured) contribution to improving both bus stops and provides the mitigation as detailed above.

The provision of additional pairs of bus stops along the spine road corridor (which routes through the centre of the proposed BVF Phase Site and the full HS11 allocation) is proposed. Officers were unable to establish exactly where these would be sited. The location of these should be confirmed.

As an aside, officers would be interested in better understanding which bus routes/services would serve the spine road and if this has been assessed by WYCA.

Rail

The nearest railway station to the site is at Deighton, some 2.5km to the southwest. This station provides access to Northern and TransPennine Express services providing regular connections to Huddersfield, Dewsbury, Batley, Manchester, Leeds, York and Hull.

Brighouse railway station is approximately 2km from the site with regular direct trains to Leeds, Huddersfield, Bradford and Wigan.

Deighton railway station is approximately 2km from the site with local services on the Huddersfield Line and an hourly TransPennine service between Leeds and Manchester.

Electric Vehicle (EV) Charging

EV charging points are proposed throughout the development, as set out on the EV charging plan. It is noted that charging points would be either:

- Externally mounted to houses;
- Internally mounted; or
- On mounting post adjacent to parking bays.

EV charging should be secured by a planning condition and cross-referenced to the submitted EV drawing submitted in support of this application.

Construction Access Strategy

During the construction of this phase, it is noted that a Construction Management Plan (CMP) would be implemented which would address any potential impacts arising from the development and ensure that the site operates efficiently and safely.

It is stated that the CMP will address construction hours of operation, treatment of delivery vehicles (wheel washing requirements, sheeting etc) and access routes to/from the site.

With regard to the latter point construction traffic access would be via the A641, Bradford Road. The impact of construction traffic on the local highway network would be minimised as much as possible.

With respect to the volume of traffic generated during the construction phase this would be substantially less than the development traffic generation of the site once it is occupied, particularly during peak periods.

HDM advises that a CMP be secured by planning condition and that additionally, a specific planning condition is secured relating to:

- Wheel washing facilities; and
- Carriageway and footway condition survey (pre- and post-construction).

Section 38 comments

Site Access

- Bradford Road where the access is to be formed off is a dual carriageway that is divided by a central reserve (verge area). At the location of the proposed access the speed limit of Bradford Road is 40mph;
- The site access is indicated to be served by a ghost island access. A complete proposal is required for our review;
- The proposed ghost island must comply with DMRB, CD 123 Geometric design of at grade priority and signal-controlled junctions;
- The ghost island shall be subject to Section 278 technical approval in due course;
- The site access will be required to be in a form of a simple junction with corner radii of 6m minimum;
- The required visibility tangent of $x=2.4m$ by $y=90m$ must be satisfied;
- The sight stopping distance/ forward distance of 90m from Bradford Road (northbound/southbound) to where the proposed site access junction would be sited needs to be demonstrated and satisfied;
- The site access must have a corner radii of 6m minimum. If the Kirklees Council refuse vehicles struggles to negotiate the junction, then the corner radii must be increased to 10m;

The proposed access is in close proximity to existing private driveways. This can result in the increased likelihood of collisions and some form of speed reduction measures along Bradford Road should be considered to mitigate this concern;

Site Layout

i. Provision of visitor bays must be to a ratio of 1:4 to the total number of dwellings proposed. Hence, a minimum of 68 spaces are required, where currently no sufficient provisions are made;

ii. All visitor parking bays need to be parallel to the proposed internal roads that should be ideally created as lay-bys and staggered across the overall development area;

iii. The main internal road alignment into the site seems jagged in places and has very tight centreline alignment - this is unacceptable. A minimum 20m centreline radius on the internal road should be used to ensure refuse swept paths of refuse vehicles are not compromised. It is noted that this requirement would not be complied with near plot 135;

iv. Note all footways are required to be 2.0m width. Current proposals need to be amended to suit;

v. Carriageways should be 5.5m width.

vi. Any bell mouths formed off this road should be staggered 25m apart and have visibility splay tangent with a y distance of 25m and x distance of 2.4m. Current proposals may need to be amended to suit if they do not comply;

vii. All corner radii are required to be 6m minimum to assist with refuse swept path movements, this is to also to be required at all proposed turning head areas;

viii. Vertical speed control features (e.g., speed tables) are discouraged. However, if proposed these should be less than 60m apart for them to be effective;

ix. All roads are required to have forward visibility of 25m throughout and especially around bends. Visibility envelopes around bends are required to be illustrated to ensure any proposed plots do not interfere. Initially, a sight stopping distance of 25m is to be used but can be relaxed to 23m if it impacts a proposed plot location. Current proposals need to be amended to suit;

x. Private land for plot 35 may be required to be included in the forward visibility tangent. This needs to be checked and proposals modified accordingly;

xi. All areas required for visibility must be included in the adoptable carriageway. Any areas of visibility that fall within private driveways and gardens are not acceptable and proposals should be amended to suit;

xii. Any shared surfaces are required to be 5.5m with a 0.6m hard margin on either side. This may should be amended on the current proposals;

xiii. Where on-street parking is envisaged, swept path analysis is required to demonstrate if the Kirklees Refuse Vehicle can manoeuvre through;

xiv. No swept path analysis (SPA) drawings have been provided for our assessment for the development layout. The current development proposal shown strongly indicates issues with refuse vehicle manoeuvrability;

xv. SPA is required on all turning head areas and severe bends to optimise their size in relation to refuse vehicle movements;

xvi. On all turning heads it is required to demonstrate using swept path analyses that when manoeuvring, Refuse Collection Vehicles shall be able to travel at a minimum speed of 5 km/h. In other words, drivers shall not need to stop to adjust the steering while stationary before setting off again. The Kirklees vehicle parameters are set out in Table 1 of Emergency Access, Waste Management, Servicing and Deliveries - April 2020 (version 1): -

- Length – 11.85 m
- Width – 2.50 m (including wing mirrors)
- Width when loading – 4.10 m
- Working height – 6.00 m
- Turning circle (wall to wall) – 22.07 m (diameter)
- Turning circle (between kerbs) – 17.88 m (diameter)
- Gross vehicle weight – 32 t

xvii. Bin collection points need to be shown, as they are required to assess if the refuse vehicle can effectively access them with the adoptable Section 38 carriageway area;

xviii. Around tight bends in the carriageway consideration should be given to making provisions for overrun areas or localised carriageway widening where required following SPA checks;

xix. To transition from the widened existing tarmacked road to the proposed Section 38 block paved road a ramp should be introduced that should be no steeper than 1:12;

xx. The footway around the turning head areas made of standard carriageway construction should be 2.0m wide. Where a turning head area is made of block paved construction, then a proposed 0.6m hard margin must be provided instead of a footway;

xxi. Around bends SPA for two normal size vehicles being able to cross each other in the contraflow direction needs to be demonstrated too;

xxii. Around tight bends in the carriageway consideration should be given to making provisions for overrun areas or localised carriageway widening;

xxiii. New 2-to-3-bedroom dwellings within Kirklees must provide 2 no. off-street car parking spaces, with 4+ bedroom dwellings providing 3 no. off-street car parking spaces. Any new 1–2-bedroom apartments must provide 1 space, where 3+ bed providing 2 no. spaces. One cycle space per unit is recommended;

xxiv. With regards to the vertical design of the proposed roads, the following needs to be complied with:-

- Given the significant level differences, roads with intermittent 1:10 longitudinal gradients can be considered for adoption. A road with 1:10 gradient throughout would not be acceptable as it prejudices against users with disabilities.
- At internal junctions 15m from the tie-in to the main road channel will need to have a maximum gradient of 1:25 to avoid grounding issues for vehicular users;
- While proposing longitudinal gradients it must be noted that given the above gradients up to 5% (1:20) are generally considered acceptable for pedestrians, including wheelchair users. Gradients over 2.5% (1:40) might be impassable for

some manual wheelchair users. On gradients of 8% (1:12.5) or above, the physical effort of getting up the slope would be too much for many wheelchair users and there would be a risk of some wheelchairs toppling over. Slopes exceeding 10% (1:10) might prove impassable to many non-wheelchair users;

- It is advised that a minimum K value of 3 should be used. Minimum curve length of 20m should be used throughout;
- On footpaths and cycle paths, crossfall should usually be 2.5% (1:40). This provides a good balance between the need to remove surface water and the needs of users. Crossfalls steeper than about 3% (1:33.3) can be uncomfortable to walk on and, where the slope runs towards a road, can be dangerous, as wheeled users tend to edge down the crossfall. Accordingly, 3% is the desirable maximum crossfall. However, it will generally be necessary to increase crossfalls at vehicle crossings and similar. In these situations, the crossfall may be increased to an absolute maximum of 5% (1:20) providing that the increase is minimized, the risks are adequately assessed, and any necessary mitigation measures are implemented;
- At slopes of 10% or over, separate off-carriageway facilities for pedestrians should be provided. These shall be to an independent vertical alignment to the adjacent carriageway to reduce the maximum gradient required. Level 'landings' at spacing appropriate to the gradient and handrails shall be provided for pedestrians. Consideration shall be given to the provision of parallel, alternative routes utilising steps to reduce local gradients; and
- Shared spaces should have a gradient not steeper than 1:20. If this cannot be achieved then a separate footway along the shared space should be provided in addition.

Other Items for Consideration

- i. For a full application site contours, plot finished floor levels and proposed road contours/road long sections are necessary for officers' full assessment. Complete information was not made available on this occasion;
- ii. Details of proposed surface finishes have not been provided for comment. From the block plan it is assumed that the main residential road will be block paved;
- iii. A Stage 1 Road Safety Audit with designers' comments is required. The Audit must comply with GG119 and an audit brief must be approved beforehand;
- iv. Landscaping plans must be provided to ensure proposed trees do not impact on necessary highway visibility. All proposed trees need to be assessed and relocated to be placed outside of any required visibility splay/envelopes;
- v. Note highway drains over 900mm diameter within the proposed Section 38 corridor are not acceptable to Kirklees. Hence, culverts within the Section 38 highway corridor should be avoided, when trying to divert the existing stream;
- vi. Any proposed combined cycle route will need to be 3m wide. There seems to be no provision for cyclist within the development – the proposals need to be amended to accommodate minimum requirements in accordance with LTN 1/20 Cycle Infrastructure Design.

Bridges and Structures

The following conditions are recommended:

- 1) Before the development commences a scheme detailing the location and cross sectional information together with the proposed design and construction details for all new retaining walls/ building retaining walls adjacent to the proposed adoptable highways shall be submitted to and approved by the Highway Authority in writing. The approved scheme shall be implemented prior to the commencement of the proposed development and thereafter retained during the life of the development.
- 2) Before the development commences a scheme detailing the location and cross sectional information together with the proposed design and construction details for all new surface water attenuation tanks/pipes/manholes located within the proposed highway footprint shall be submitted to and approved by the Highway Authority in writing. The approved scheme shall be implemented prior to the commencement of the proposed development and thereafter retained during the life of the development. See <https://www.kirklees.gov.uk/beta/regeneration-and-development/highways-guidance-and-standards.aspx> for further details.

Notes:

All new storm water attenuation tanks/pipes/culverts with internal diameter/ spans exceeding 0.9m must be located off the adoptable highway. Any decision to locate these facilities within the adoptable highway footprint must be accompanied with a full risk evaluation report with particular reference to their proposed inspection, structural assessment and maintenance regime in compliance with the CDM Regulations 2015 requirements.

The adopting authority (i.e. Yorkshire Water) will also be required to produce and submit a legally binding agreement to the Highway Authority explicitly stating that they will be fulfilling their obligations in relation to the systematic and cyclical inspection and structural assessment of any attenuation structure located within the highway footprint, in full compliance with CS450 - Inspection of Highway structures.

Furthermore, all new precast pipes/ culverts/storage tanks proposed for use within the footprint of an adoptable highway must comply with the Specification for Highway Works (SHW-Series 500 or 2500) and must be accredited with a BBA (The British Board of Agrément Roads and Bridges) or HAPAS (Highway Authority Product Approval Scheme) or equivalent certificate.

(Condition 2 should only be included if the provision of a storm water attenuation facility is conditioned by the LLFA).

End.
AP.
12/07/2021.

Appendix B Highways England/JSJV Consultation Response dated 23rd June 2021



Proposed Residential Development - Bradley Villa Farm – Transport Assessment and Travel Plan Review

Prepared for: Paula Bedford (Highways England)
Prepared by: Cat Campbell (JSJV)
Date: 23rd June 2021
Case Reference: DevWY0043
Document Reference: TM001
Reviewed/approved by: Jonathan Parsons (JSJV)

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Overview

This Technical Memorandum [TM] was prepared by Jacobs Systra Joint Venture [JSJV] on behalf of Highways England and provides a response to the Transport Assessment [TA] and Travel Plan [TP] submitted by Optima, on behalf of Redrow Homes (Yorkshire) Ltd, R Kershaw and S Gill, planning reference 2021/92086.

The TA and TP has been prepared in support of a full planning application for a residential development of up to 275 dwellings. The development site is referred to as Bradley Villa Farm and is the first phase of development for the Kirklees Local Plan Allocation Site HS11.

The development proposals are situated on land to the north of the A6107 Bradley Road, approximately 4km north of Huddersfield and 2km south of Brighouse. M62 Junctions 24 and 25 are the closest junctions of the Strategic Road Network [SRN] to the development site (approximately 4km), hence the need for this review to assess the impact of the development proposals at the SRN.

JSJV has reviewed the information in the TA and TP in the order in which the issues are presented; and this TM comments on the suitability of the TA and TP in considering the impact of the development proposals at the SRN. For ease of cross referencing, the headings adopted below are the same as those utilised within the TA and TP, where appropriate to Highways England.

A summary and conclusions are presented at the end of this TM.

Previous Scoping Note Review

The scope of this TA was set out in a Transport Assessment Scoping Study [TASS], prepared by Optima and dated 8th October 2020. The TASS was issued to Kirklees and Calderdale Councils and Highways England and was reviewed by CH2M (Document reference AA.20.15.16 DevWY0043 TM001).

The TASS included matters relating to site access, development quantum, trip generations / distributions, future design years, committed development, traffic surveys and the extent of the highway network to be considered for the development proposals, as well as the overall Site Allocation HS11.

CH2M presented the following conclusions (with the aim for these to be resolved at TA / planning submission stage):

- In broad terms, it is considered by CH2M that the TP will have to contain aggressive modal shift targets given the quantum of development proposed, and the number of single-occupancy private vehicle trips that could be generated at full build out;
- The Scoping Note states that for robustness and to allow a little headroom as the scheme is finalised, it is proposed to test the Phase 1 development at 280 units, 10 dwellings more than the anticipated 270. Whilst this robust approach is accepted by CH2M, it is considered that the robustness is for the Phase 1 TA only and should not be carried through into subsequent TAs;
- From the trip generation figures presented within the TA, it is noted that the Phase 1 development proposals has an impact of over 30 two-way trips in the Morning and Evening Peaks, and as such, M62 Junction 25 should be included within the list of junctions assessed within the Phase 1 TA;
- Clarity on the Cooper Bridge Link Road should be provided by Optima when more certainty on the details of the scheme is known, especially as this is contained with the policy requirements for HS11 within the Kirklees Local Plan;
- Given that Bradley Wood, Thornhills and Woodhouse are being considered as a cumulative entity through masterplanning work, it is considered that all of the garden suburbs should be considered within the base traffic flows and junction assessments. Furthermore, the development proposals at Clifton Business Park – as well as the associated mitigation works – should also be considered as committed. Evidenced approval of the committed developments should be provided by both Kirklees and Calderdale Councils; and
- With regard to the assessment of the SRN, as well as operational assessment of M62 Junctions 24 and 25 it is considered that merge / diverge analysis will be required for M62 Junctions 24 and 25.

This TM has been prepared in the context of the review of the TASS, to ensure that the issues raised previously have been considered / agreed.

Transport Assessment Review

Development Proposals and Access Strategy

It is slated that the development proposals are for 275 dwellings, although it is also stated that these details are generally in line with those specified in the planning application, however the number of residential dwellings is slightly higher in the TA than compared to the planning application (270). As with the comments on the TASS, whilst this robust approach is accepted by JSJV, it is considered that the robustness should be for the Phase 1 TA only and should not be carried through into subsequent TAs.

The TA states that the public transport strategy will provide numerous attractive pedestrian links throughout the site and the existing highway corridors to ensure that the Phase 1 development proposals can access established, frequent bus services. It

is considered by JSJV that this is an appropriate approach to take with regards to site accessibility, although this will be primarily considered through the review of the TP.

With regards to the Cooper Bridge Link Road – as identified in the review of the TASS – it is stated in the TA that the Local Plan Allocation of HS11 states that *“the spine road through the site should be linked to the Bradley Relief Road that is part of TS1 LP19; and Kirklees Council will monitor the implementation of the early phases of delivery to manage the options and need for strategic intervention in advance of the 750th dwelling”*.

Furthermore, it is stated that Transport scheme TS1 in Policy LP19 of the Local Plan is referred to as *“A62 / A644 Huddersfield to M62 Junction 25”* which, alongside improvements to the A62 and the A644 corridors and junctions in the Cooper Bridge area, also includes a new Link Road that routes from the A62 Leeds Road / Bradley Road junction, along the northern edge of Bradley before turning ninety degrees in a north-easterly direction to cross the River Calder and connect with the A644 Wakefield Road to the south-east of M62 Junction 25. The TA states that the scheme is being promoted by several Local Highway Authorities including Kirklees Council as well as the West Yorkshire Combined Authority.

With regards to the funding and delivery of the Link Road, the TA states that whilst the scheme has secured public funding through the West Yorkshire Transport Fund, Kirklees Council have also been collecting private sector contributions in line with their 2007 SPD1 document ‘Negotiating Financial Contributions for Transport Improvements (Leeds Road, Huddersfield).

It is noted by JSJV that the scheme is required to be delivered in advance of the 750th dwelling, which will occur in future phases, beyond Phase 1 which is being reviewed within this TM. As such, it is considered that Highways England should keep a watching brief on the emergence of development proposals at this location, as well as liaising closely with Kirklees Council, to ensure the scheme is delivered.

Site Accessibility and Travel Behaviour

This section of the TA describes the accessibility and sustainability of the development site by non-car modes (walking, cycling, public transport), and sets out how the travel planning measures proposed will enhance accessibility and seek to minimise single occupancy trips.

Within the TA, each mode of transport has been considered in turn, and includes measures aimed to positively influence and encourage existing users and proposed residents to use those modes of transportation. Such measures are welcomed by JSJV since it is important to provide a viable alternative to the private car to encourage sustainable travel. As mentioned previously, this will be primarily considered through the review of the TP.

Trip Generation and Distribution

The TA considers the potential traffic impact on the highway network, by estimating the vehicle trip generation potential and distribution profile of the development proposals.

For robustness and to allow a little headroom as the scheme is finalised, the TA states that the development site has been tested at 280 units (stated as being five more than the anticipated 275) although the planning application was subsequently submitted for 270 dwellings. Whilst this is considered robust by JSJV, the previous point that

robustness should be for the Phase 1 TA only and should not be carried through into subsequent TAs remains.

Furthermore, it is stated that a future design year of 2029 has been adopted as that is the proposed year of completion due to the stated build out in Table 5.1 of the TA. This is noted by JSJV and is consistent with discussions regarding the TASS.

Trip Generation

The trip rates produced in this section of the TA is consistent the agreed approach undertaken within the TASS, and as such, is considered agreed. The development proposals are stated to generate 162 two-way trips in the morning peak and 153 two-way trips in the evening peak.

In addition, the full HS11 allocation has been considered in trip generation terms within the TA. Whilst this is welcomed by JSJV, the TA has been prepared to consider the impact of the development quantum allied to Phase 1.

The proportion of trips by each mode, including vehicle trips, was calculated using the 2011 Census Data for the closest and most representative Middle Layer Super Output Area [MSOA]– Kirklees 002, which includes the site. The MSOA can be seen in Image 5.1 of the TA. It is considered by JSJV that the approach to modal split is appropriate.

Trip Distribution

The TA states that a distribution exercise has been undertaken to determine the assignment of these trips onto the local and strategic road networks. The traffic distribution of the site has been assessed based on travel patterns contained within the 2011 Census data for the Kirklees 002 MSOA. The Census has been filtered in order to identify all destinations where car driver trips make up more than 1% of all journeys in order to highlight key destinations and to provide a focus for the traffic distribution calculation; and these trips have been assigned to the local highway network based on logical route choice and anticipated journey times during peak hour periods.

This approach is the same undertaken within the TASS, and as such, is considered agreed.

The diagrams presented within the TA show that 23% of arrivals / departures from the site access M62 Junction 25 and 4% of arrivals / departures from the site access M62 Junction 24. This is consistent with the agreed approach in the TASS.

These distribution figures, along with the distribution assignment in the TA are identical to those presented in the October 2020 TASS and has been reviewed by and agreed with Highways England.

Furthermore, it is stated that traffic distributions have been adjusted within the Cooper Bridge area to allow for the re-assignment effect of the committed Link Road scheme, and this is for only the full allocation, which is consistent with the approach detailed above regarding the delivery of the Link Road.

Traffic Flows and Materiality Assessment

The TA states that the previous national Guidance on Transport Assessment (GTA) document (now withdrawn) suggested that a development traffic generation of 30 two-way (*two-way added by JSJV for completeness*) trips represented a reasonable threshold figure above which further assessment may be required, but below which the impact could be considered non-material.

It is stated that consideration has been given to those junctions where development trips exceed thirty on any individual movement, as well as taking into account the likely percentage increase in traffic against background flows. As noted above by JSJV, it is 30 two-way trips which is considered the starting point for discussion as per the GTA.

Table 6.1 of the TA presents the junctions to be assessed (i.e. a materiality or capacity assessment) to consider the impact of the development proposals, and this table does not include any junctions at the SRN. Furthermore, the TA states that the list of junctions was agreed with Highways England.

However, this is not the case, as the review of the TASS, replicated at the start of this TM, stated that M62 Junction 25 should be included within the junctions to be reviewed when Phase 1 of the Site Allocation is being considered. As such, justification is required from Optima as to why this requirement has been disregarded.

Whilst it is stated in the TA that M62 Junctions 24 and 25 will be assessed for the whole Site Allocation, this is noted by JSJV but this information is considered superfluous at the stage in the process.

With regards to peak hour traffic flows, it was stated in the TASS that surveys would be undertaken in October 2020 to compare with the 2018 data that Optima had, to enable the determination of an appropriate and representative 'Covid factor' to apply to the new survey information. However, this has not been collected for M62 Junction 25, and as such, there is only 2018 data for the SRN.

Given this, justification from Optima as to their approach within the TA is required.

Committed Development Sites

The committed developments included within the assessment are consistent with scoping discussions as well as being ratified by Kirklees Council. As such, the committed developments named are accepted by JSJV.

Traffic Growth

The TA states that the traffic growth is predicted based on a combination of proposed future development, car ownership and changing attitudes to the way people use and have access to their vehicles. Background traffic growth rates for the local area surrounding the site have been determined using Temprow 7.2b for the two base years of 2029 and 2034. This approach was accepted in the review of the TASS.

It is stated that the growth rates are as follows:

- Morning Peak growth 2018 – 2029 – 8.7%;
- Evening Peak growth 2018 – 2029 – 9.0%;
- Morning Peak growth 2018 – 2034 – 13.1%; and
- Evening Peak growth 2018 – 2034 – 13.4%.

Traffic Surveys

It is stated in the TA that Manual Classified Counts have been obtained for a number of junctions on the local highway network in 2018 and 2020 between the hours of 07:00 to 10:00 and 16:00 to 19:00. As such, the traffic surveys identified the following existing weekday peak hour periods:

- Morning Peak – 08:00 to 09:00; and

- Evening Peak – 17:00 to 1800.

Whilst this is noted, it is stated previously within this TM that the SRN has not been considered within the junctions for assessment, so it is not known as to whether the peak hours identified are the network peak hours for the SRN.

The TA states that a materiality assessment of the junctions identified in Table 6.1 has been undertaken to determine which will require further, detailed capacity modelling. This assessment considers the quantum of additional Morning and Evening Peak hour development trips at each junction and the percentage change in traffic flow when comparing the Base 'without development' scenario and the Design 'with development' scenario.

This assessment within the TA identifies that M62 Junction 25 should be modelled, however, M62 Junction 25 has not been modelled within Section 7 of the TA which considers the Phase 1 development proposals.

Operational and Highway Safety Assessment

Section 8 of the TA reviews the full Site Allocation, although it is stated that this is to inform the Environmental Statement, and this includes an assessment of M62 Junction 25. However, in the spirit of expediency, JSJV has reviewed the assessment presented of M62 Junction 25.

Initially, it is not clear as to whether the improvements allied to the Clifton Business Park proposals at this location have been included within the junction modelling, and as such, clarification is required on this issue. Furthermore, clarification is required as to whether the assessment of M62 Junction 25 includes the construction and operation of the improvement scheme at Cooper Bridge, which has implications for the operation of M62 Junction 25.

The modelling of the junction presented in the TA shows minimal queuing in the 2018 and 2034 base scenarios, which is not considered by JSJV of how the junction operates at present, and does not reflect the queuing observed on the M62 southbound off-slip, which is caused by queuing on the A644 from Cooper Bridge.

When development flows are added in the 2034 scenarios, it is noted that the queue lengths and delay on all arms increases, although from the outputs presented in the TA, the junction does not operate over capacity, although due cognisance should be paid to JSJV's comments above regarding the modelling of the base scenarios.

It is stated that the impact of the proposed full HS11 allocation, in terms of highway capacity and safety, does not trigger the requirement of any mitigation at this junction. However, it was requested that M62 Junction 25 be assessed for the Phase 1 development proposals, and this has not been undertaken by Optima.

In addition, M62 Junction 25 has been assessed with regards to its merge / diverge provision, again for 2018 and 2034 scenarios, but also for a 2029 design year scenario.

Considering the information presented, it is considered by JSJV that the Northbound Merge and the Southbound Diverge require upgrading as a consequence of the 2034 assessment of the full HS11 allocation. However, it is noted that this assessment has been prepared for the Environmental Statement and more detailed modelling will be required by Optima for submission within a subsequent TA.

Highway Safety

The TA states that personal injury accident has been obtained for the highway network in the vicinity of the site for the most recently available five-year period (25th January

2016 to 24th January 2021); with the data was supplied by Leeds City Council. Assessments were carried out of the circumstances behind each collision that has occurred to ascertain whether there are any underlying contributing factors relating to junction design or layout. This approach has been previously accepted in the review of the TASS.

The TA states that having taken into account the extended study area, over a five-year period, combined with a number of causal factors and variety of locations, there are no specific accident concerns or that the proposed development will exacerbate the existing situation. Having reviewed the information provided, JSJV concurs with this assessment.

Travel Plan Review

The TP will mainly be a matter for Kirklees Council to comment upon in more detail, given they will be responsible for monitoring its effectiveness. As such, JSJV has undertaken a high-level review of the TP to broadly ensure that it is fit for purpose.

Objectives and Targets

It is stated that the overall objectives of the TP for the development are:

- Promoting walking, cycling and public transport as the primary modes of travel;
- To deliver mode shift from car journeys to alternative modes including multi-occupancy vehicle trips;
- To reduce vehicle emissions through the take up of alternative transport modes; and
- To deliver education and promotion of walking and cycling as options for a healthier lifestyle.

These are considered by JSJV to be appropriate.

Furthermore, it is stated that overarching targets are to be set once baseline travel surveys have been carried out; and these will need to be 'SMART' i.e. they must be:

- Site-specific;
- Measurable;
- Achievable;
- Realistic; and
- Time related.

Again, this is considered by JSJV to be appropriate.

With regards to targets, the TP proposes the following targets, and these are to be met within two years from first occupation:

- 5% reduction in 68.8% driving a car without any passengers = 63.8%;
- 100% increase in cycling trips = 1.6%; and
- For any school trips, the target is for a maximum of 20% of school children to be taken to school by car where that is the sole purpose of the journey.

In addition, it is stated that whilst these are initial targets, a further target of reducing single occupancy car trips to and from the development by 10% will be aimed for within five years of first occupation.

It is stated in the TP that these targets will be reviewed, expanded and confirmed within three months following the initial travel survey; and these or other targets set shall not be omitted or changed by the Travel Plan Coordinator [TPC] without prior consultation with Kirklees Council.

Roles and Responsibilities

The TP states that Redrow Homes (Yorkshire) Ltd will appoint a TPC prior to first occupation of the development; and once appointed the TPC will inform Kirklees Council of the date that this work commenced and provide a contact name and details. The duties of the TPC will include:

- Implementation of the TP;
- Acting as a single point of contact across the development for all transport, access and travel related issues;
- Liaising with any other TPCs across the wider development;
- Obtaining and providing residents / visitors with up to date details of information relating to access to the site via sustainable modes; and
- Liaison with Kirklees Council, West Yorkshire Combined Authority and other key stakeholders such as Highways England.

The identified roles and responsibilities for the TPC are considered appropriate by JSJV.

Monitoring and Review

It is stated that a critical element of the information gathering exercise for the TP is to carry out a questionnaire survey of residents; as this will provide details of individual circumstances, travel patterns and preferences etc.

The TP states that a travel survey of all residents will take place within 12 months of first occupation; with the results of the survey will be provided to Kirklees Council within three months of the survey taking place and will be compared against the interim targets.

Furthermore, it is stated that the TP will be monitored on an annual basis, which will include a full survey of all residents. Within three months of the annual review the TPC shall agree the following Travel Plan items with Kirklees Council:

- Any revised site-specific measures to reduce the numbers of car-borne trips; and
- Any revisions to the modal split targets for the residents as a result of carrying out the surveys.

The annual monitoring report will also review the progress that has been achieved in implementing measures against the modal shift targets over the preceding 12-month period; and any progress made will be reported by the TPC to the relevant external organisations including Kirklees Council, and public transport operators where appropriate.

It is considered by JSJV that this is an appropriate approach to take.

In addition, it is stated that following the completion of the annual monitoring report, the TP will be reviewed as appropriate and any further actions/measures will be identified and implemented to progress and, if necessary, improve the TP to meet objectives and targets. This review should be undertaken in consultation with Kirklees

Council and any other relevant stakeholders. Potential secondary measures / actions could include the following for which the TPC would be responsible:

- Re-promote the Residential Metrocard scheme and target households that have not taken up the offer;
- Arrange for a local cycle store to provide a troubleshooting/maintenance day. Promotion of this through marketing would be coordinated by the TPC;
- Seek to arrange a discount for residents at a local cycle store. Promotion of this through marketing would be coordinated by the TPC; or
- Seek to arrange a discount for residents at a local running / sportswear store to try and increase the number of people walking / running.

In overall terms, it is considered that the TP is acceptable, however, as mentioned previously, it will mainly be a matter for Kirklees Council to comment upon in more detail, given they will be responsible for monitoring its effectiveness.

Summary and Conclusions

This Technical Memorandum was prepared by JSJV on behalf of Highways England and provides a response to the Transport Assessment and Travel Plan submitted by Optima, on behalf of Redrow Homes (Yorkshire) Ltd, R Kershaw and S Gill, planning reference 2021/92086.

The TA and TP has been prepared in support of a full planning application for a residential development of up to 275 dwellings. The development site is referred to as Bradley Villa Farm and is the first phase of development for the Kirklees Local Plan Allocation Site HS11.

The development proposals are situated on land to the north of the A6107 Bradley Road, approximately 4km north of Huddersfield and 2km south of Brighouse. M62 Junctions 24 and 25 are the closest junctions of the Strategic Road Network to the development site (approximately 4km), hence the need for this review to assess the impact of the development proposals at the SRN.

JSJV has reviewed the information in the TA and TP in the order in which the issues are presented; and this TM comments on the suitability of the TA and TP in considering the impact of the development proposals at the SRN, paying due cognisance to the previous review of the Transport Assessment Scoping Study undertaken in October 2020.

On the basis of this review, the recommendation to Highways England in relation to this development proposals is:

Holding Recommendation – further information required (as identified below)

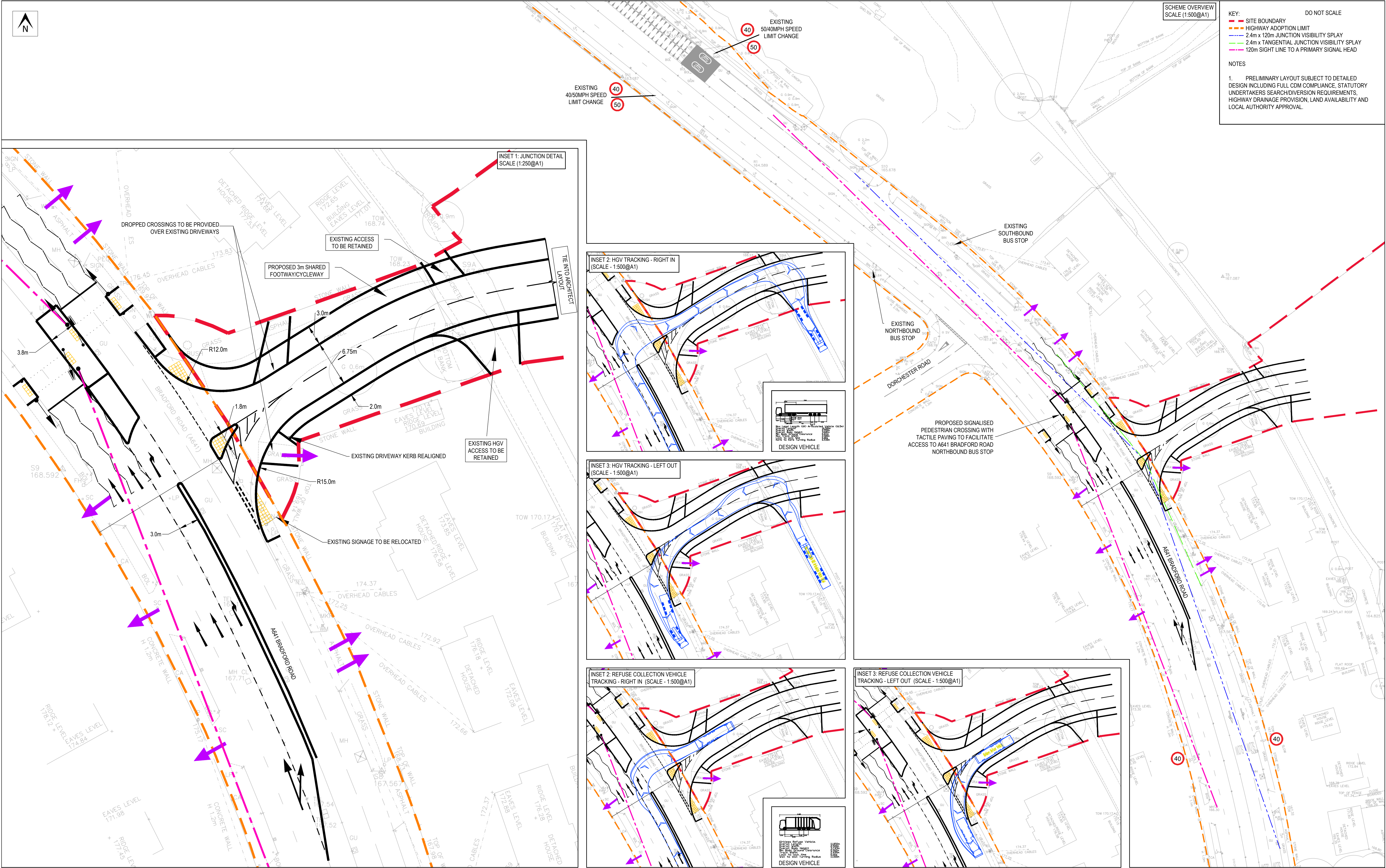
This review has highlighted the following deficiencies as follows:

- 1) Table 6.1 of the TA presents the junctions to be assessed (i.e. a materiality or capacity assessment) to consider the impact of the development proposals, this table does not include any junctions at the SRN, and it is stated that the list of junctions was agreed with Highways England. However, this is not the case, as the review of the TASS, stated that M62 Junction 25 should be included within the junctions to be reviewed when Phase 1 of the Site Allocation is being considered. As such, justification is required from Optima as to why this requirement has been disregarded;

- 2) With regards to peak hour traffic flows, it was stated in the TASS that surveys would be undertaken in October 2020 to compare with the 2018 data that Optima had, to enable the determination of an appropriate and representative 'Covid factor' to apply to the new survey information. However, this has not been collected for M62 Junction 25, and as such, there is only 2018 data for the SRN. Given this, justification from Optima as to their approach within the TA is required;
- 3) It is not known as to whether the peak hours identified within the TA are the network peak hours for the SRN;
- 4) The assessment within the TA identifies that M62 Junction 25 should be modelled, however, M62 Junction 25 has not been modelled within Section 7 of the TA which considers the modelling of the Phase 1 development proposals;
- 5) With regards to the modelling of M62 Junction 25 for the purposes of the Environmental Statement, it is not clear as to whether the improvements allied to the Clifton Business Park proposals at this location have been included within the junction modelling, and as such, clarification is required on this issue. Furthermore, clarification is required as to whether the assessment of M62 Junction 25 includes the improvement scheme at Cooper Bridge, which has implications for the operation of M62 Junction 25;
- 6) The modelling of the junction presented in the TA shows minimal queuing in the 2018 and 2034 base scenarios, which is not considered by JSJV of how the junction operates at present, and does not reflect the queuing observed on the M62 southbound off-slip, which is caused by queuing on the A644 from Cooper Bridge;
- 7) It is stated that the impact of the proposed full HS11 allocation, in terms of highway capacity and safety, does not trigger the requirement of any mitigation at this junction. However, it was requested that M62 Junction 25 be assessed for the Phase 1 development proposals, and this has not been undertaken by Optima;
- 8) Considering the information presented with regards to the assessment of the merge / diverge provision, it is considered by JSJV that the Northbound Merge and the Southbound Diverge require upgrading as a consequence of the 2034 assessment of the full HS11 allocation;
- 9) Finally, clarification is required to why M62 Junction 24 has not been included within the modelling in advance of the Environmental Statement being prepared, as stated previously within the TA; and
- 10) In overall terms, it is considered that the TP is acceptable, however, as mentioned previously, it will mainly be a matter for Kirklees Council to comment upon in more detail, given they will be responsible for monitoring its effectiveness.

Appendix C Proposed Bradford Road/Site Access Arrangements (Optima Drawing No.19154/GA/01 Rev C)





SCHEME OVERVIEW
SCALE (1:500@A1)

- KEY:
- SITE BOUNDARY
 - HIGHWAY ADOPTION LIMIT
 - 2.4m x 120m JUNCTION VISIBILITY SPY
 - 2.4m x 120m TANGENTIAL JUNCTION VISIBILITY SPY
 - 120m SIGHT LINE TO A PRIMARY SIGNAL HEAD

NOTES

1. PRELIMINARY LAYOUT SUBJECT TO DETAILED DESIGN INCLUDING FULL CDM COMPLIANCE, STATUTORY UNDERTAKERS SEARCH/DIVERSION REQUIREMENTS, HIGHWAY DRAINAGE PROVISION, LAND AVAILABILITY AND LOCAL AUTHORITY APPROVAL.

REV	DATE	BY	DESCRIPTION	CHK	APP
C	11/10/21	CJF	BRADFORD RD SIGNAL CROSSING ADDED	PMO	PMO
B	18/01/21	JS	EXTENDED TOPO SURVEY ADDED	PMO	PMO
A	07/09/20	JS	HGV TRACKING ADDED	PMO	PMO
-	26/08/20	JS	INITIAL ISSUE	PMO	PMO
STATUS			PRELIMINARY		

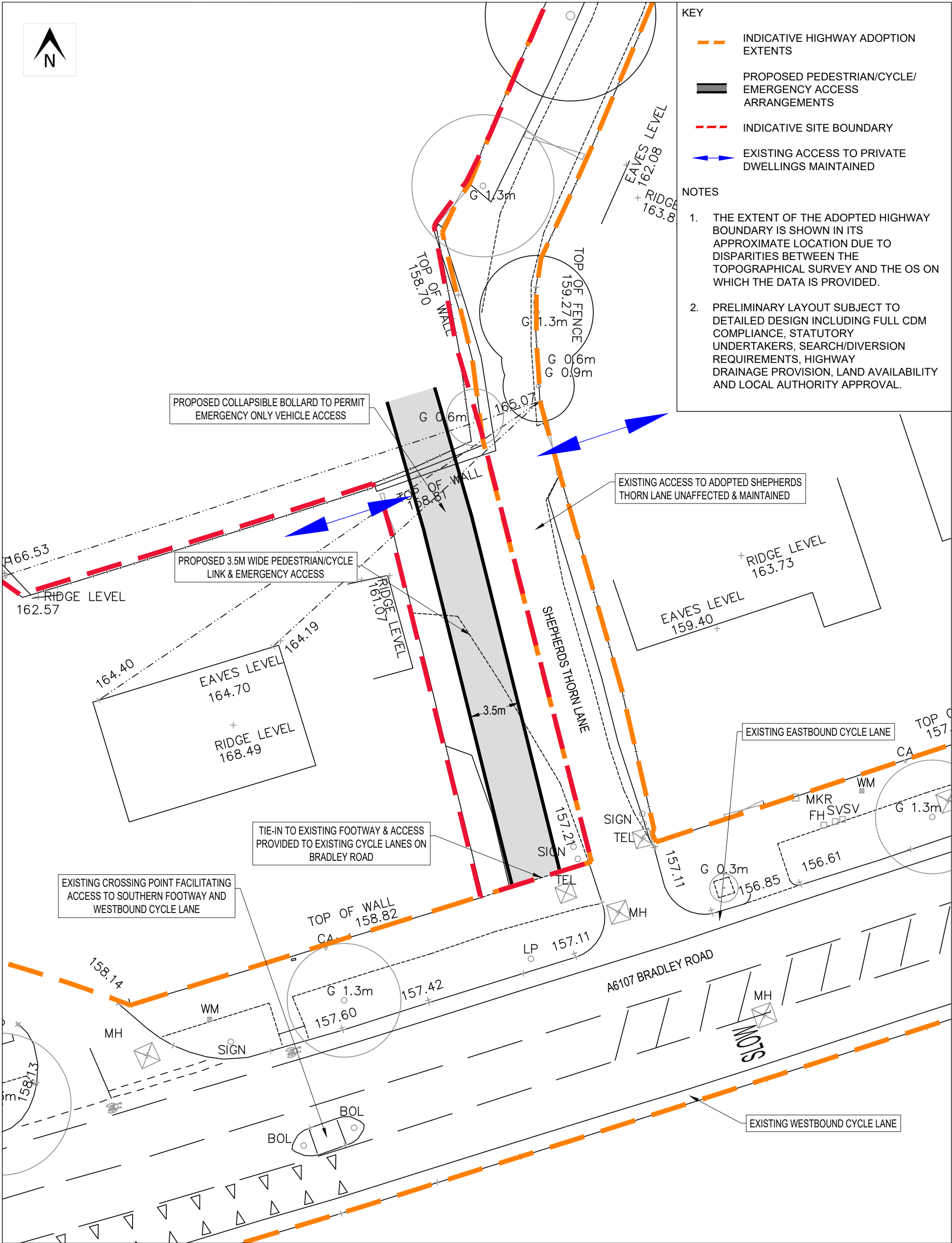
PROJECT	BRADLEY VILLA, HUDDERSFIELD
DRAWING TITLE	A641 BRADFORD ROAD PROPOSED SITE ACCESS ARRANGEMENT

CLIENT			
REDROW PLC			
CHECKED	APPROVED	DRG No.	
PMO	PMO	19154/GA/01	
DRAWN BY:	SCALE @ A1	DATE	REV.
JS	1:500 OR AS SHOWN	11/10/21	C



Appendix D Proposed Pedestrian/Cycle/Emergency Link to Bradley Road (Optima Drawing No.19154/GA/04)





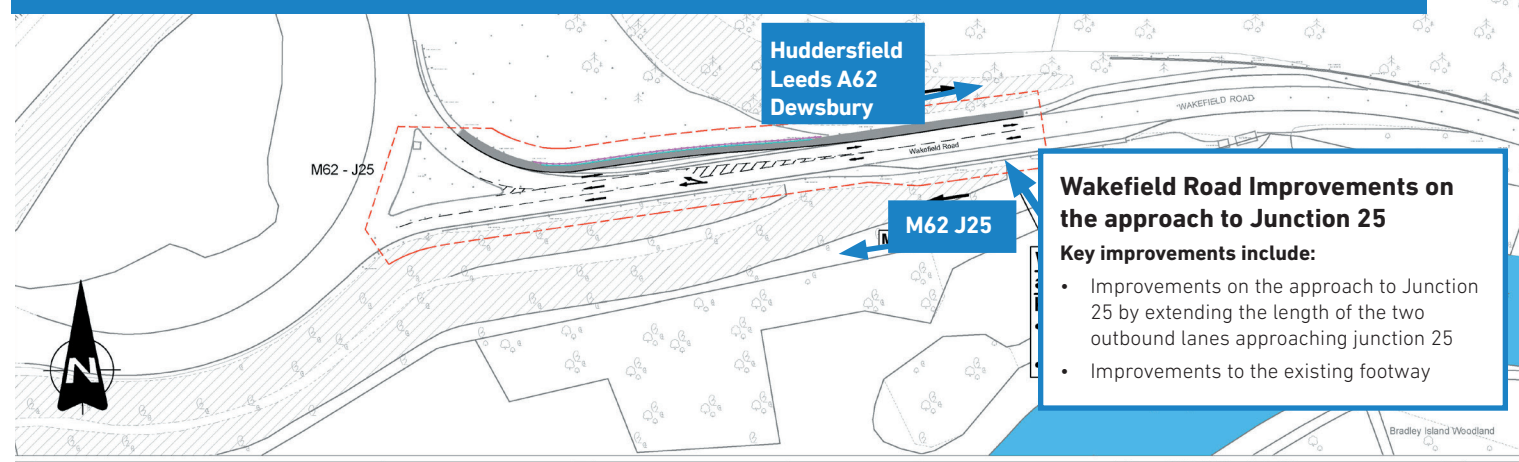
						PROJECT BRADLEY VILLA FARM, HUDDERSFIELD	CLIENT REDROW PLC			 OPTIMA Intelligent Highway Solutions Suite 1, 3rd Floor, Goodbard House, Infirmary Street Leeds LS1 2JP optimahighways.com T 0113 245 1679	
-	01/12/2020	CJF	INITIAL ISSUE	PMO	PMO	DRAWING TITLE	CHECKED PMO	APPROVED PMO	DRG No. 19154/GA/04		
REV	DATE	BY	DESCRIPTION	CHK	APP	PROPOSED PEDESTRIAN/CYCLE LINK & EMERGENCY ACCESS TO BRADLEY ROAD	DRAWN BY: CJF	SCALE @ A3 1:250	DATE 01/12/2020		REV. -
STATUS											
PRELIMINARY											

Appendix E A62 to Cooper Bridge Improvement Scheme (Promoters Preferred Option)



A62 to Cooper Bridge Corridor Improvement Scheme - Preferred Option

Wakefield Road Improvements on the approach to Junction 25



Cooper Bridge and Bradley to Brighouse Greenway

Following a separate public consultation we are currently refining our designs to deliver a new cycle route to Brighouse which will connect with the cycling facilities in our proposed highway scheme to improve cycling connectivity across the wider area

Bradley Junction / Leeds Road

Key improvements include:

- Improving signal timings to reduce journey times
- New signal controlled pedestrian and cycle crossing points
- Widening Leeds Road from Oak Road to Bradley junction to provide 2 lanes towards Huddersfield
- Diverting traffic travelling from Cooper Bridge to Bradley Road via Oak Road
- Preventing vehicles turning left from Leeds Road onto Bradley Road
- New segregated cycle lanes, dedicated cycle signals and improved footways
- Improvements to bus stops & shelters
- Additional filter lanes to and from Colne Bridge Road

Bradley Road

Key improvements include:

- Resurfacing existing road & footways
- Resurfacing existing parking bays
- Providing new a signal controlled pedestrian and cycle crossing
- New shared use pedestrian and cycle areas providing a connection to the proposed Cooper Bridge and Bradley to Brighouse Greenway route

Oak Road

Key improvements include:

- Converting Oak Road into a one way road for traffic
- Provision of a new signal controlled junction from Leeds Road onto Oak Road with new pedestrian crossings
- New segregated cycle lanes & shared cycle/pedestrian areas
- Provision of new parking bays
- Improving the playground/recreational area

For details see A62 to Cooper Bridge Corridor Improvement Scheme - Proposed Indicative Cross Sections drawing

For details see A62 to Cooper Bridge Corridor Improvement Scheme - Proposed Indicative Cross Sections drawing

Cooper Bridge Junction/A62

Key improvements include:

- Converting the existing three armed signalised roundabout at Cooper Bridge into a large signal controlled roundabout with additional left turn links to provide more capacity
- Improving signal timings to reduce journey times
- New signal controlled pedestrian and cycle crossing points
- New segregated cycle lanes and improved footways
- New landscaping and sustainable drainage systems
- Improvements to bus stops & shelters

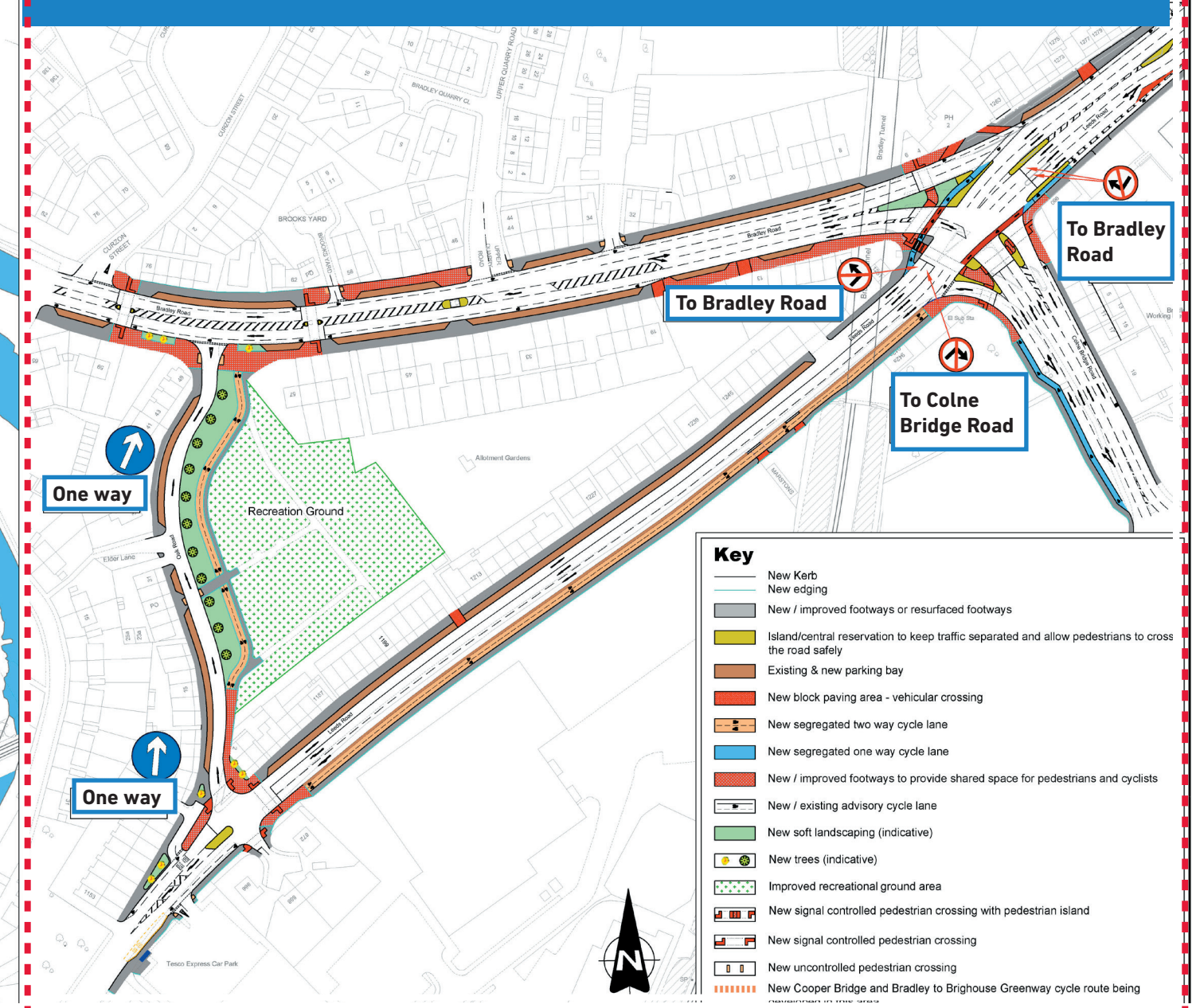
Cooper Bridge Road

Key improvements include:

- Widening the railway, river and canal bridges to provide additional lanes
- Provision of two continuous lanes in each direction between Cooper Bridge and Bradley junctions
- Provision of three lanes on the approach to Cooper Bridge junction
- New segregated cycle lanes and improved pedestrian footways

For details see A62 to Cooper Bridge Corridor Improvement Scheme - Proposed Indicative Cross Sections drawing

Highway improvement works to Bradley Road, Oak Road and Bradley Junction



Appendix F Junction 25 M62 Model (Junctions 9 Data)



Junctions 9							
ARCADY 9 - Roundabout Module							
Version: 9.5.1.7462 © Copyright TRL Limited, 2019							
For sales and distribution information, program advice and maintenance, contact TRL: +44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk							
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution							

Filename: 210824 J25 M62 Phase 1.j9

Path: O:\Bradley Villa, Huddersfield\ANALYSIS\CAPACITY\Roundabouts\J25 M62\Phase 1

Report generation date: 24/08/2021 11:43:42

»SURVEY 2018, AM
»SURVEY 2018, PM
»BASE 2029, AM
»BASE 2029, PM
»DESIGN 2029, AM
»DESIGN 2029, PM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	Junction Delay (s)	Queue (PCU)	Delay (s)	RFC	Junction Delay (s)
	SURVEY 2018							
1 - M62 North Slips	1.1	3.60	0.53	3.86	1.4	4.10	0.58	3.74
2 - A644 Wakefield Road E	1.4	4.31	0.58		1.1	3.66	0.52	
3 - M62 South Slips	0.5	4.64	0.34		0.5	4.14	0.32	
4 - A644 Wakefield Road W	0.7	3.20	0.43		0.8	3.16	0.43	
	BASE 2029							
1 - M62 North Slips	1.5	4.29	0.60	4.75	1.8	5.03	0.65	4.56
2 - A644 Wakefield Road E	2.0	5.48	0.66		1.4	4.46	0.59	
3 - M62 South Slips	0.7	6.00	0.41		0.6	5.18	0.38	
4 - A644 Wakefield Road W	1.0	3.79	0.49		1.0	3.79	0.51	
	DESIGN 2029							
1 - M62 North Slips	1.5	4.35	0.60	4.94	1.9	5.24	0.66	4.67
2 - A644 Wakefield Road E	2.1	5.75	0.68		1.5	4.51	0.60	
3 - M62 South Slips	0.7	6.35	0.42		0.6	5.25	0.39	
4 - A644 Wakefield Road W	1.0	3.94	0.50		1.0	3.84	0.51	

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages.

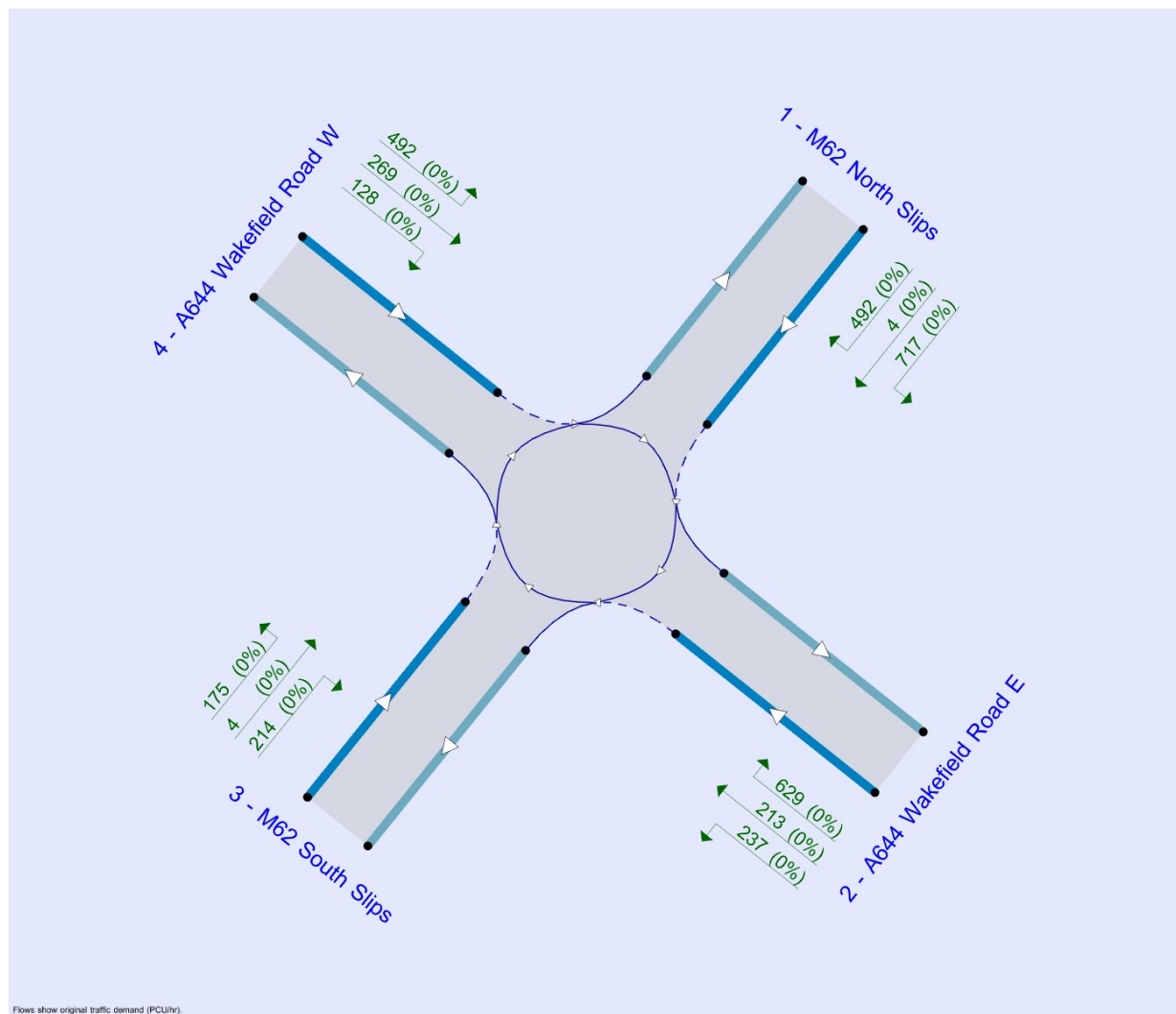
File summary

File Description

Title	
Location	
Site number	
Date	22/01/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	OPTIMA/optima
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	SURVEY 2018	AM	ONE HOUR	07:45	09:15	15	✓
D2	SURVEY 2018	PM	ONE HOUR	16:45	18:15	15	✓
D3	BASE 2029	AM	ONE HOUR	07:45	09:15	15	✓
D4	BASE 2029	PM	ONE HOUR	16:45	18:15	15	✓
D5	DESIGN 2029	AM	ONE HOUR	07:45	09:15	15	✓
D6	DESIGN 2029	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

SURVEY 2018, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	3.86	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	M62 North Slips	
2	A644 Wakefield Road E	
3	M62 South Slips	
4	A644 Wakefield Road W	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - M62 North Slips	6.20	6.20	0.0	50.0	204.0	25.0	
2 - A644 Wakefield Road E	3.60	8.00	31.0	30.0	204.0	16.0	
3 - M62 South Slips	6.10	6.10	0.0	70.0	204.0	24.0	
4 - A644 Wakefield Road W	7.40	7.40	0.0	50.0	204.0	25.0	

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - M62 North Slips	1.054	2731
2 - A644 Wakefield Road E	1.113	2750
3 - M62 South Slips	1.053	2665
4 - A644 Wakefield Road W	1.167	3003

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically

D1	SURVEY 2018	AM	ONE HOUR	07:45	09:15	15	✓
----	-------------	----	----------	-------	-------	----	---

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1035	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1064	100.000
3 - M62 South Slips		ONE HOUR	✓	365	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	758	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	581	2	452
	2 - A644 Wakefield Road E	619	0	234	211
	3 - M62 South Slips	4	191	0	170
	4 - A644 Wakefield Road W	438	167	153	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.53	3.60	1.1	A	950	1425
2 - A644 Wakefield Road E	0.58	4.31	1.4	A	976	1465
3 - M62 South Slips	0.34	4.64	0.5	A	335	502
4 - A644 Wakefield Road W	0.43	3.20	0.7	A	696	1043

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	779	195	384	2327	0.335	777	797	0.0	0.5	2.319	A
2 - A644 Wakefield Road E	801	200	456	2243	0.357	799	705	0.0	0.6	2.490	A
3 - M62 South Slips	275	69	963	1651	0.166	274	292	0.0	0.2	2.613	A
4 - A644 Wakefield Road W	571	143	611	2291	0.249	569	625	0.0	0.3	2.091	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	930	233	459	2248	0.414	930	953	0.5	0.7	2.729	A
2 - A644 Wakefield Road E	957	239	545	2144	0.446	956	843	0.6	0.8	3.027	A
3 - M62 South Slips	328	82	1151	1452	0.226	328	349	0.2	0.3	3.202	A
4 - A644 Wakefield Road W	681	170	731	2151	0.317	681	748	0.3	0.5	2.449	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1140	285	562	2140	0.533	1138	1166	0.7	1.1	3.587	A
2 - A644 Wakefield Road E	1171	293	667	2008	0.583	1169	1032	0.8	1.4	4.280	A
3 - M62 South Slips	402	100	1409	1181	0.340	401	428	0.3	0.5	4.613	A
4 - A644 Wakefield Road W	835	209	894	1960	0.426	833	916	0.5	0.7	3.192	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1140	285	563	2139	0.533	1140	1168	1.1	1.1	3.602	A
2 - A644 Wakefield Road E	1171	293	668	2007	0.584	1171	1034	1.4	1.4	4.309	A
3 - M62 South Slips	402	100	1411	1178	0.341	402	428	0.5	0.5	4.638	A
4 - A644 Wakefield Road W	835	209	896	1958	0.426	835	917	0.7	0.7	3.203	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	930	233	460	2246	0.414	932	956	1.1	0.7	2.741	A
2 - A644 Wakefield Road E	957	239	547	2142	0.447	959	846	1.4	0.8	3.047	A
3 - M62 South Slips	328	82	1155	1448	0.227	329	350	0.5	0.3	3.218	A
4 - A644 Wakefield Road W	681	170	734	2148	0.317	683	750	0.7	0.5	2.458	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	779	195	385	2326	0.335	780	800	0.7	0.5	2.329	A
2 - A644 Wakefield Road E	801	200	457	2241	0.357	802	708	0.8	0.6	2.504	A
3 - M62 South Slips	275	69	966	1647	0.167	275	293	0.3	0.2	2.624	A
4 - A644 Wakefield Road W	571	143	614	2288	0.249	571	628	0.5	0.3	2.099	A

SURVEY 2018, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	3.74	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	SURVEY 2018	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1101	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	966	100.000
3 - M62 South Slips		ONE HOUR	✓	380	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	792	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	652	4	445
	2 - A644 Wakefield Road E	564	0	224	178
	3 - M62 South Slips	4	204	0	172
	4 - A644 Wakefield Road W	443	223	126	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.58	4.10	1.4	A	1010	1515
2 - A644 Wakefield Road E	0.52	3.66	1.1	A	886	1330
3 - M62 South Slips	0.32	4.14	0.5	A	349	523
4 - A644 Wakefield Road W	0.43	3.16	0.8	A	727	1090

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	829	207	415	2294	0.361	827	759	0.0	0.6	2.451	A
2 - A644 Wakefield Road E	727	182	432	2270	0.320	725	810	0.0	0.5	2.327	A
3 - M62 South Slips	286	72	891	1726	0.166	285	266	0.0	0.2	2.497	A
4 - A644 Wakefield Road W	596	149	580	2327	0.256	595	597	0.0	0.3	2.076	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	990	247	497	2208	0.448	989	908	0.6	0.8	2.949	A
2 - A644 Wakefield Road E	868	217	516	2176	0.399	868	969	0.5	0.7	2.751	A
3 - M62 South Slips	342	85	1066	1542	0.222	341	318	0.2	0.3	2.999	A
4 - A644 Wakefield Road W	712	178	693	2195	0.324	711	714	0.3	0.5	2.427	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1212	303	608	2091	0.580	1210	1112	0.8	1.4	4.077	A
2 - A644 Wakefield Road E	1064	266	632	2047	0.520	1062	1186	0.7	1.1	3.647	A
3 - M62 South Slips	418	105	1305	1290	0.324	418	389	0.3	0.5	4.121	A
4 - A644 Wakefield Road W	872	218	849	2013	0.433	871	874	0.5	0.8	3.148	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1212	303	609	2090	0.580	1212	1113	1.4	1.4	4.101	A
2 - A644 Wakefield Road E	1064	266	633	2046	0.520	1064	1188	1.1	1.1	3.663	A
3 - M62 South Slips	418	105	1307	1288	0.325	418	390	0.5	0.5	4.138	A
4 - A644 Wakefield Road W	872	218	850	2012	0.433	872	875	0.8	0.8	3.157	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	990	247	498	2207	0.449	992	910	1.4	0.8	2.968	A
2 - A644 Wakefield Road E	868	217	518	2174	0.399	870	972	1.1	0.7	2.765	A
3 - M62 South Slips	342	85	1069	1538	0.222	342	319	0.5	0.3	3.013	A
4 - A644 Wakefield Road W	712	178	695	2192	0.325	713	716	0.8	0.5	2.437	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	829	207	417	2292	0.362	830	762	0.8	0.6	2.464	A
2 - A644 Wakefield Road E	727	182	433	2268	0.321	728	813	0.7	0.5	2.340	A
3 - M62 South Slips	286	72	895	1722	0.166	286	267	0.3	0.2	2.507	A
4 - A644 Wakefield Road W	596	149	582	2325	0.256	597	599	0.5	0.3	2.085	A

BASE 2029, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	4.75	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	BASE 2029	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1136	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1180	100.000
3 - M62 South Slips		ONE HOUR	✓	380	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	844	100.000

Origin-Destination Data

Demand (PCU/hr)

From	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
	1 - M62 North Slips	0	642	4	490
	2 - A644 Wakefield Road E	667	0	250	263
	3 - M62 South Slips	4	204	0	172
	4 - A644 Wakefield Road W	495	194	155	0

Vehicle Mix

Heavy Vehicle Percentages

From	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.60	4.29	1.5	A	1042	1564
2 - A644 Wakefield Road E	0.66	5.48	2.0	A	1083	1624
3 - M62 South Slips	0.41	6.00	0.7	A	349	523
4 - A644 Wakefield Road W	0.49	3.79	1.0	A	774	1162

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	855	214	415	2294	0.373	853	875	0.0	0.6	2.493	A
2 - A644 Wakefield Road E	888	222	487	2208	0.402	886	781	0.0	0.7	2.716	A
3 - M62 South Slips	286	72	1066	1542	0.186	285	307	0.0	0.2	2.863	A
4 - A644 Wakefield Road W	635	159	657	2237	0.284	634	694	0.0	0.4	2.243	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1021	255	497	2208	0.462	1020	1047	0.6	0.9	3.027	A
2 - A644 Wakefield Road E	1061	265	583	2102	0.505	1059	934	0.7	1.0	3.449	A
3 - M62 South Slips	342	85	1275	1322	0.258	341	367	0.2	0.3	3.669	A
4 - A644 Wakefield Road W	759	190	786	2087	0.364	758	831	0.4	0.6	2.707	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1251	313	607	2091	0.598	1248	1281	0.9	1.5	4.258	A
2 - A644 Wakefield Road E	1299	325	713	1957	0.664	1295	1143	1.0	1.9	5.414	A
3 - M62 South Slips	418	105	1559	1022	0.409	417	449	0.3	0.7	5.937	A
4 - A644 Wakefield Road W	929	232	961	1883	0.494	928	1016	0.6	1.0	3.762	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1251	313	609	2090	0.598	1251	1284	1.5	1.5	4.289	A
2 - A644 Wakefield Road E	1299	325	715	1955	0.664	1299	1145	1.9	2.0	5.484	A
3 - M62 South Slips	418	105	1563	1018	0.411	418	450	0.7	0.7	6.003	A
4 - A644 Wakefield Road W	929	232	963	1880	0.494	929	1018	1.0	1.0	3.786	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1021	255	499	2206	0.463	1024	1051	1.5	0.9	3.052	A
2 - A644 Wakefield Road E	1061	265	585	2100	0.505	1065	937	2.0	1.0	3.492	A
3 - M62 South Slips	342	85	1281	1316	0.260	343	369	0.7	0.4	3.707	A
4 - A644 Wakefield Road W	759	190	789	2082	0.364	760	834	1.0	0.6	2.725	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	855	214	417	2292	0.373	856	879	0.9	0.6	2.510	A
2 - A644 Wakefield Road E	888	222	489	2206	0.403	890	784	1.0	0.7	2.737	A
3 - M62 South Slips	286	72	1071	1537	0.186	287	308	0.4	0.2	2.879	A
4 - A644 Wakefield Road W	635	159	660	2234	0.284	636	697	0.6	0.4	2.255	A

BASE 2029, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	4.56	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	BASE 2029	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1187	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1070	100.000
3 - M62 South Slips		ONE HOUR	✓	393	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	889	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	691	4	492
	2 - A644 Wakefield Road E	620	0	237	213
	3 - M62 South Slips	4	214	0	175
	4 - A644 Wakefield Road W	492	269	128	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.65	5.03	1.8	A	1089	1634
2 - A644 Wakefield Road E	0.59	4.46	1.4	A	982	1473
3 - M62 South Slips	0.38	5.18	0.6	A	361	541
4 - A644 Wakefield Road W	0.51	3.79	1.0	A	816	1224

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	894	223	459	2248	0.398	891	838	0.0	0.7	2.649	A
2 - A644 Wakefield Road E	806	201	468	2229	0.361	803	881	0.0	0.6	2.520	A
3 - M62 South Slips	296	74	995	1617	0.183	295	277	0.0	0.2	2.722	A
4 - A644 Wakefield Road W	669	167	629	2270	0.295	668	661	0.0	0.4	2.245	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1067	267	549	2153	0.496	1066	1002	0.7	1.0	3.305	A
2 - A644 Wakefield Road E	962	240	560	2127	0.452	961	1054	0.6	0.8	3.084	A
3 - M62 South Slips	353	88	1190	1411	0.250	353	331	0.2	0.3	3.398	A
4 - A644 Wakefield Road W	799	200	753	2126	0.376	798	790	0.4	0.6	2.711	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1307	327	671	2024	0.646	1304	1226	1.0	1.8	4.973	A
2 - A644 Wakefield Road E	1178	295	685	1988	0.593	1176	1290	0.8	1.4	4.420	A
3 - M62 South Slips	433	108	1456	1131	0.382	432	405	0.3	0.6	5.135	A
4 - A644 Wakefield Road W	979	245	921	1930	0.507	977	967	0.6	1.0	3.773	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1307	327	673	2023	0.646	1307	1229	1.8	1.8	5.028	A
2 - A644 Wakefield Road E	1178	295	687	1986	0.593	1178	1293	1.4	1.4	4.456	A
3 - M62 South Slips	433	108	1459	1128	0.384	433	406	0.6	0.6	5.176	A
4 - A644 Wakefield Road W	979	245	923	1927	0.508	979	969	1.0	1.0	3.795	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1067	267	551	2151	0.496	1070	1006	1.8	1.0	3.339	A
2 - A644 Wakefield Road E	962	240	563	2124	0.453	964	1058	1.4	0.8	3.109	A
3 - M62 South Slips	353	88	1194	1407	0.251	354	333	0.6	0.3	3.427	A
4 - A644 Wakefield Road W	799	200	755	2122	0.377	801	793	1.0	0.6	2.729	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	894	223	461	2246	0.398	895	841	1.0	0.7	2.668	A
2 - A644 Wakefield Road E	806	201	470	2227	0.362	807	885	0.8	0.6	2.536	A
3 - M62 South Slips	296	74	999	1613	0.183	296	278	0.3	0.2	2.737	A
4 - A644 Wakefield Road W	669	167	632	2266	0.295	670	663	0.6	0.4	2.257	A

DESIGN 2029, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	4.94	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	DESIGN 2029	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1146	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1208	100.000
3 - M62 South Slips		ONE HOUR	✓	380	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	844	100.000

Origin-Destination Data

Demand (PCU/hr)

From	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
	1 - M62 North Slips	0	652	4	490
	2 - A644 Wakefield Road E	695	0	250	263
	3 - M62 South Slips	4	204	0	172
	4 - A644 Wakefield Road W	495	194	155	0

Vehicle Mix

Heavy Vehicle Percentages

From	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.60	4.35	1.5	A	1052	1577
2 - A644 Wakefield Road E	0.68	5.75	2.1	A	1108	1663
3 - M62 South Slips	0.42	6.35	0.7	A	349	523
4 - A644 Wakefield Road W	0.50	3.94	1.0	A	774	1162

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	863	216	415	2294	0.376	860	896	0.0	0.6	2.506	A
2 - A644 Wakefield Road E	909	227	487	2208	0.412	907	788	0.0	0.7	2.760	A
3 - M62 South Slips	286	72	1087	1520	0.188	285	307	0.0	0.2	2.915	A
4 - A644 Wakefield Road W	635	159	678	2213	0.287	634	694	0.0	0.4	2.278	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1030	258	497	2208	0.467	1029	1072	0.6	0.9	3.050	A
2 - A644 Wakefield Road E	1086	271	583	2102	0.517	1085	943	0.7	1.1	3.534	A
3 - M62 South Slips	342	85	1300	1295	0.264	341	367	0.2	0.4	3.771	A
4 - A644 Wakefield Road W	759	190	811	2058	0.369	758	831	0.4	0.6	2.768	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1262	315	607	2092	0.603	1259	1311	0.9	1.5	4.312	A
2 - A644 Wakefield Road E	1330	333	713	1957	0.680	1326	1153	1.1	2.1	5.671	A
3 - M62 South Slips	418	105	1590	990	0.423	417	449	0.4	0.7	6.265	A
4 - A644 Wakefield Road W	929	232	991	1847	0.503	928	1016	0.6	1.0	3.907	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1262	315	609	2090	0.604	1262	1315	1.5	1.5	4.346	A
2 - A644 Wakefield Road E	1330	333	715	1955	0.680	1330	1156	2.1	2.1	5.754	A
3 - M62 South Slips	418	105	1594	985	0.425	418	450	0.7	0.7	6.347	A
4 - A644 Wakefield Road W	929	232	994	1844	0.504	929	1018	1.0	1.0	3.936	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1030	258	499	2206	0.467	1033	1077	1.5	0.9	3.076	A
2 - A644 Wakefield Road E	1086	271	585	2100	0.517	1090	947	2.1	1.1	3.582	A
3 - M62 South Slips	342	85	1306	1289	0.265	343	369	0.7	0.4	3.810	A
4 - A644 Wakefield Road W	759	190	815	2053	0.370	760	834	1.0	0.6	2.788	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	863	216	417	2292	0.376	864	900	0.9	0.6	2.523	A
2 - A644 Wakefield Road E	909	227	489	2206	0.412	911	792	1.1	0.7	2.782	A
3 - M62 South Slips	286	72	1092	1515	0.189	287	308	0.4	0.2	2.934	A
4 - A644 Wakefield Road W	635	159	681	2209	0.288	636	697	0.6	0.4	2.289	A

DESIGN 2029, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	4.67	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	DESIGN 2029	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1213	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1079	100.000
3 - M62 South Slips		ONE HOUR	✓	393	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	889	100.000

Origin-Destination Data

Demand (PCU/hr)

From	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
	1 - M62 North Slips	0	717	4	492
	2 - A644 Wakefield Road E	629	0	237	213
	3 - M62 South Slips	4	214	0	175
	4 - A644 Wakefield Road W	492	269	128	0

Vehicle Mix

Heavy Vehicle Percentages

From	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.66	5.24	1.9	A	1113	1670
2 - A644 Wakefield Road E	0.60	4.51	1.5	A	990	1485
3 - M62 South Slips	0.39	5.25	0.6	A	361	541
4 - A644 Wakefield Road W	0.51	3.84	1.0	A	816	1224

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	913	228	459	2248	0.406	910	845	0.0	0.7	2.685	A
2 - A644 Wakefield Road E	812	203	468	2229	0.364	810	901	0.0	0.6	2.532	A
3 - M62 South Slips	296	74	1001	1610	0.184	295	277	0.0	0.2	2.737	A
4 - A644 Wakefield Road W	669	167	636	2262	0.296	668	661	0.0	0.4	2.256	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1090	273	549	2153	0.506	1089	1010	0.7	1.0	3.378	A
2 - A644 Wakefield Road E	970	242	560	2127	0.456	969	1078	0.6	0.8	3.106	A
3 - M62 South Slips	353	88	1198	1403	0.252	353	331	0.2	0.3	3.426	A
4 - A644 Wakefield Road W	799	200	761	2116	0.378	798	790	0.4	0.6	2.730	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1336	334	671	2024	0.660	1332	1236	1.0	1.9	5.174	A
2 - A644 Wakefield Road E	1188	297	685	1988	0.598	1185	1318	0.8	1.5	4.472	A
3 - M62 South Slips	433	108	1465	1121	0.386	432	405	0.3	0.6	5.211	A
4 - A644 Wakefield Road W	979	245	930	1918	0.510	977	966	0.6	1.0	3.820	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1336	334	673	2023	0.660	1335	1239	1.9	1.9	5.236	A
2 - A644 Wakefield Road E	1188	297	687	1986	0.598	1188	1321	1.5	1.5	4.511	A
3 - M62 South Slips	433	108	1469	1118	0.387	433	406	0.6	0.6	5.255	A
4 - A644 Wakefield Road W	979	245	933	1916	0.511	979	969	1.0	1.0	3.842	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1090	273	551	2151	0.507	1094	1014	1.9	1.0	3.415	A
2 - A644 Wakefield Road E	970	242	563	2124	0.457	973	1082	1.5	0.8	3.131	A
3 - M62 South Slips	353	88	1203	1398	0.253	354	333	0.6	0.3	3.453	A
4 - A644 Wakefield Road W	799	200	764	2113	0.378	801	794	1.0	0.6	2.747	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	913	228	461	2246	0.407	915	848	1.0	0.7	2.707	A
2 - A644 Wakefield Road E	812	203	470	2227	0.365	813	905	0.8	0.6	2.548	A
3 - M62 South Slips	296	74	1006	1605	0.184	296	278	0.3	0.2	2.752	A
4 - A644 Wakefield Road W	669	167	639	2259	0.296	670	663	0.6	0.4	2.268	A

Appendix G Junction 25 M62 Sensitivity Test Model (Junctions 9 Data)



Junctions 9							
ARCADY 9 - Roundabout Module							
Version: 9.5.1.7462 © Copyright TRL Limited, 2019							
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Filename: 211012 J25 M62 Phase 1.j9

Path: O:\Bradley Villa, Huddersfield\ANALYSIS\CAPACITY\Roundabouts\J25 M62\Phase 1\211012 J25 Phase1 Standalone Peak Hr

Report generation date: 12/10/2021 13:07:08

»SURVEY 2018, AM

»SURVEY 2018, PM

»BASE 2029, AM

»BASE 2029, PM

»DESIGN 2029, AM

»DESIGN 2029, PM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	Junction Delay (s)	Queue (PCU)	Delay (s)	RFC	Junction Delay (s)
	SURVEY 2018							
1 - M62 North Slips	1.4	3.99	0.58	5.43	1.4	4.06	0.58	3.76
2 - A644 Wakefield Road E	2.2	5.79	0.69		1.0	3.57	0.51	
3 - M62 South Slips	0.6	6.17	0.40		0.5	4.13	0.33	
4 - A644 Wakefield Road W	2.0	6.27	0.67		0.9	3.40	0.47	
	BASE 2029							
1 - M62 North Slips	1.8	4.84	0.64	7.39	1.8	4.96	0.64	4.55
2 - A644 Wakefield Road E	3.3	8.05	0.77		1.4	4.31	0.58	
3 - M62 South Slips	1.0	8.78	0.49		0.6	5.17	0.39	
4 - A644 Wakefield Road W	3.1	8.87	0.76		1.1	4.03	0.53	
	DESIGN 2029							
1 - M62 North Slips	1.8	4.88	0.65	7.79	1.9	5.16	0.66	4.66
2 - A644 Wakefield Road E	3.5	8.51	0.78		1.4	4.36	0.58	
3 - M62 South Slips	1.0	9.36	0.51		0.6	5.25	0.39	
4 - A644 Wakefield Road W	3.3	9.53	0.77		1.2	4.09	0.54	

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages.

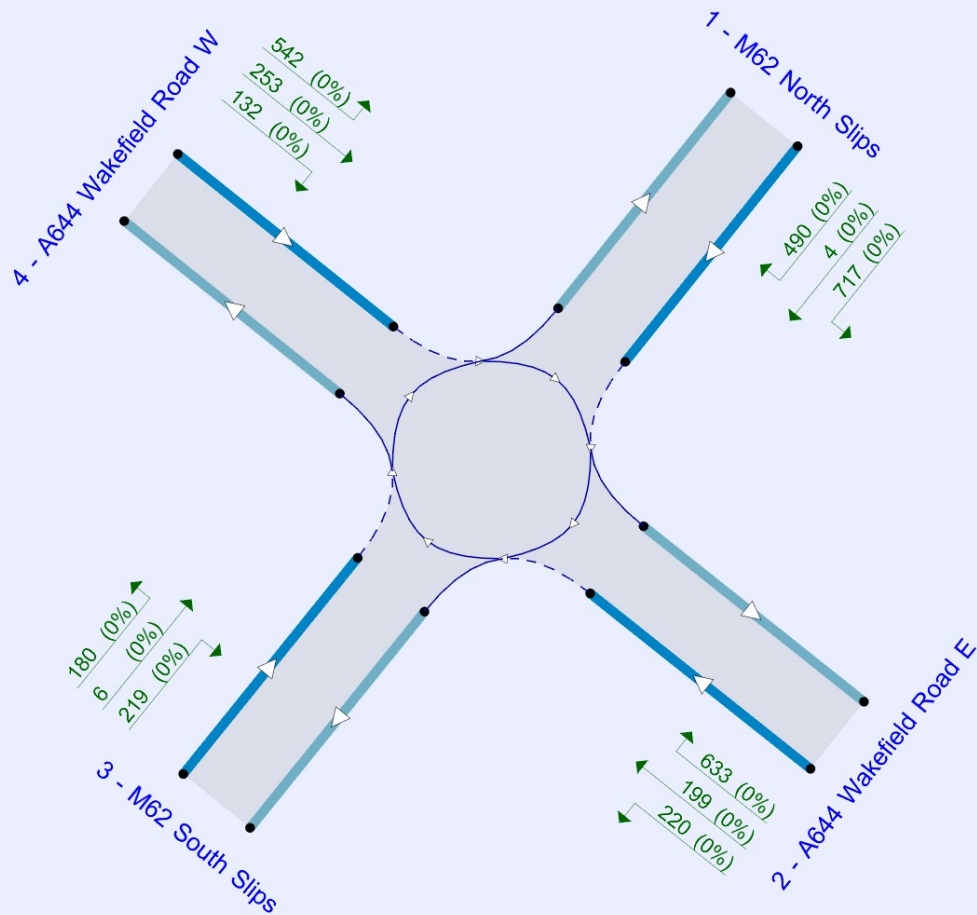
File summary

File Description

Title	
Location	
Site number	
Date	22/01/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	OPTIMA\optima
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



Flows show original traffic demand (PCU/hr).

The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	SURVEY 2018	AM	ONE HOUR	06:45	08:15	15	✓
D2	SURVEY 2018	PM	ONE HOUR	16:30	18:00	15	✓
D3	BASE 2029	AM	ONE HOUR	06:45	08:15	15	✓
D4	BASE 2029	PM	ONE HOUR	16:30	18:00	15	✓
D5	DESIGN 2029	AM	ONE HOUR	06:45	08:15	15	✓
D6	DESIGN 2029	PM	ONE HOUR	16:30	18:00	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

SURVEY 2018, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	5.43	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	M62 North Slips	
2	A644 Wakefield Road E	
3	M62 South Slips	
4	A644 Wakefield Road W	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - M62 North Slips	6.20	6.20	0.0	50.0	204.0	25.0	
2 - A644 Wakefield Road E	3.60	8.00	31.0	30.0	204.0	16.0	
3 - M62 South Slips	6.10	6.10	0.0	70.0	204.0	24.0	
4 - A644 Wakefield Road W	7.40	7.40	0.0	50.0	204.0	25.0	

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - M62 North Slips	1.054	2731
2 - A644 Wakefield Road E	1.113	2750
3 - M62 South Slips	1.053	2665
4 - A644 Wakefield Road W	1.167	3003

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	SURVEY 2018	AM	ONE HOUR	06:45	08:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1121	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1250	100.000
3 - M62 South Slips		ONE HOUR	✓	347	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	1073	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	666	4	451
	2 - A644 Wakefield Road E	790	0	236	224
	3 - M62 South Slips	15	167	0	165
	4 - A644 Wakefield Road W	727	187	159	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.58	3.99	1.4	A	1029	1543
2 - A644 Wakefield Road E	0.69	5.79	2.2	A	1147	1721
3 - M62 South Slips	0.40	6.17	0.6	A	318	478
4 - A644 Wakefield Road W	0.67	6.27	2.0	A	985	1477

Main Results for each time segment

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	844	211	385	2326	0.363	842	1150	0.0	0.6	2.423	A
2 - A644 Wakefield Road E	941	235	461	2237	0.421	938	766	0.0	0.7	2.765	A
3 - M62 South Slips	261	65	1100	1506	0.173	260	299	0.0	0.2	2.888	A
4 - A644 Wakefield Road W	808	202	730	2152	0.375	805	631	0.0	0.6	2.668	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1008	252	461	2246	0.449	1007	1375	0.6	0.8	2.900	A
2 - A644 Wakefield Road E	1124	281	551	2137	0.526	1122	916	0.7	1.1	3.544	A
3 - M62 South Slips	312	78	1315	1279	0.244	311	358	0.2	0.3	3.718	A
4 - A644 Wakefield Road W	965	241	873	1985	0.486	963	754	0.6	0.9	3.517	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1234	309	563	2138	0.577	1232	1681	0.8	1.4	3.962	A
2 - A644 Wakefield Road E	1376	344	675	2000	0.688	1372	1120	1.1	2.2	5.696	A
3 - M62 South Slips	382	96	1609	970	0.394	381	438	0.3	0.6	6.093	A
4 - A644 Wakefield Road W	1181	295	1067	1759	0.672	1177	923	0.9	2.0	6.142	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1234	309	565	2136	0.578	1234	1687	1.4	1.4	3.990	A
2 - A644 Wakefield Road E	1376	344	676	1998	0.689	1376	1123	2.2	2.2	5.785	A
3 - M62 South Slips	382	96	1613	966	0.396	382	439	0.6	0.6	6.166	A
4 - A644 Wakefield Road W	1181	295	1070	1755	0.673	1181	925	2.0	2.0	6.271	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1008	252	463	2243	0.449	1010	1383	1.4	0.8	2.925	A
2 - A644 Wakefield Road E	1124	281	553	2134	0.526	1128	920	2.2	1.1	3.593	A
3 - M62 South Slips	312	78	1321	1273	0.245	313	360	0.6	0.3	3.755	A
4 - A644 Wakefield Road W	965	241	877	1980	0.487	969	757	2.0	1.0	3.574	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	844	211	387	2324	0.363	845	1155	0.8	0.6	2.437	A
2 - A644 Wakefield Road E	941	235	463	2235	0.421	943	769	1.1	0.7	2.789	A
3 - M62 South Slips	261	65	1105	1501	0.174	262	301	0.3	0.2	2.904	A
4 - A644 Wakefield Road W	808	202	733	2148	0.376	809	633	1.0	0.6	2.692	A

SURVEY 2018, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	3.76	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	SURVEY 2018	PM	ONE HOUR	16:30	18:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1094	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	948	100.000
3 - M62 South Slips		ONE HOUR	✓	395	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	848	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	655	4	435
	2 - A644 Wakefield Road E	572	0	211	165
	3 - M62 South Slips	6	210	0	179
	4 - A644 Wakefield Road W	506	211	131	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.58	4.06	1.4	A	1004	1506
2 - A644 Wakefield Road E	0.51	3.57	1.0	A	870	1305
3 - M62 South Slips	0.33	4.13	0.5	A	362	544
4 - A644 Wakefield Road W	0.47	3.40	0.9	A	778	1167

Main Results for each time segment

16:30 - 16:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	824	206	415	2295	0.359	821	814	0.0	0.6	2.440	A
2 - A644 Wakefield Road E	714	178	428	2274	0.314	712	808	0.0	0.5	2.303	A
3 - M62 South Slips	297	74	880	1738	0.171	297	260	0.0	0.2	2.497	A
4 - A644 Wakefield Road W	638	160	592	2313	0.276	637	585	0.0	0.4	2.145	A

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	983	246	496	2209	0.445	983	974	0.6	0.8	2.932	A
2 - A644 Wakefield Road E	852	213	512	2181	0.391	852	966	0.5	0.6	2.707	A
3 - M62 South Slips	355	89	1053	1556	0.228	355	311	0.2	0.3	2.997	A
4 - A644 Wakefield Road W	762	191	708	2178	0.350	762	700	0.4	0.5	2.540	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1205	301	607	2092	0.576	1202	1192	0.8	1.3	4.036	A
2 - A644 Wakefield Road E	1044	261	626	2053	0.508	1042	1183	0.6	1.0	3.556	A
3 - M62 South Slips	435	109	1288	1308	0.333	434	380	0.3	0.5	4.118	A
4 - A644 Wakefield Road W	934	233	866	1993	0.468	932	856	0.5	0.9	3.389	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1205	301	608	2091	0.576	1204	1193	1.3	1.4	4.060	A
2 - A644 Wakefield Road E	1044	261	628	2052	0.509	1044	1185	1.0	1.0	3.569	A
3 - M62 South Slips	435	109	1290	1305	0.333	435	381	0.5	0.5	4.134	A
4 - A644 Wakefield Road W	934	233	868	1991	0.469	934	858	0.9	0.9	3.402	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	983	246	497	2208	0.446	986	976	1.4	0.8	2.950	A
2 - A644 Wakefield Road E	852	213	513	2179	0.391	854	969	1.0	0.6	2.719	A
3 - M62 South Slips	355	89	1056	1553	0.229	356	312	0.5	0.3	3.009	A
4 - A644 Wakefield Road W	762	191	710	2175	0.350	764	702	0.9	0.5	2.553	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	824	206	416	2293	0.359	825	817	0.8	0.6	2.452	A
2 - A644 Wakefield Road E	714	178	430	2272	0.314	714	811	0.6	0.5	2.311	A
3 - M62 South Slips	297	74	883	1734	0.171	298	261	0.3	0.2	2.506	A
4 - A644 Wakefield Road W	638	160	594	2311	0.276	639	587	0.5	0.4	2.154	A

BASE 2029, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	7.39	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	BASE 2029	AM	ONE HOUR	06:45	08:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1221	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1363	100.000
3 - M62 South Slips		ONE HOUR	✓	361	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	1159	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	727	4	490
	2 - A644 Wakefield Road E	836	0	251	276
	3 - M62 South Slips	15	179	0	167
	4 - A644 Wakefield Road W	783	214	162	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.64	4.84	1.8	A	1120	1681
2 - A644 Wakefield Road E	0.77	8.05	3.3	A	1251	1876
3 - M62 South Slips	0.49	8.78	1.0	A	331	497
4 - A644 Wakefield Road W	0.76	8.87	3.1	A	1064	1595

Main Results for each time segment

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	919	230	416	2293	0.401	917	1226	0.0	0.7	2.612	A
2 - A644 Wakefield Road E	1026	257	492	2202	0.466	1023	841	0.0	0.9	3.042	A
3 - M62 South Slips	272	68	1202	1398	0.194	271	313	0.0	0.2	3.189	A
4 - A644 Wakefield Road W	873	218	773	2102	0.415	870	700	0.0	0.7	2.916	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1098	274	498	2207	0.497	1096	1466	0.7	1.0	3.240	A
2 - A644 Wakefield Road E	1225	306	589	2095	0.585	1223	1005	0.9	1.4	4.119	A
3 - M62 South Slips	325	81	1438	1150	0.282	324	374	0.2	0.4	4.355	A
4 - A644 Wakefield Road W	1042	260	924	1925	0.541	1040	838	0.7	1.2	4.059	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1344	336	608	2091	0.643	1341	1790	1.0	1.8	4.779	A
2 - A644 Wakefield Road E	1501	375	720	1949	0.770	1493	1229	1.4	3.2	7.774	A
3 - M62 South Slips	397	99	1757	814	0.488	395	457	0.4	0.9	8.545	A
4 - A644 Wakefield Road W	1276	319	1128	1687	0.756	1269	1023	1.2	3.0	8.462	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1344	336	611	2088	0.644	1344	1799	1.8	1.8	4.841	A
2 - A644 Wakefield Road E	1501	375	722	1947	0.771	1500	1233	3.2	3.3	8.052	A
3 - M62 South Slips	397	99	1764	807	0.492	397	459	0.9	1.0	8.783	A
4 - A644 Wakefield Road W	1276	319	1134	1681	0.759	1276	1027	3.0	3.1	8.869	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1098	274	502	2202	0.498	1101	1479	1.8	1.0	3.280	A
2 - A644 Wakefield Road E	1225	306	592	2092	0.586	1233	1011	3.3	1.4	4.229	A
3 - M62 South Slips	325	81	1448	1140	0.285	327	377	1.0	0.4	4.440	A
4 - A644 Wakefield Road W	1042	260	932	1917	0.544	1049	843	3.1	1.2	4.188	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	919	230	419	2290	0.401	921	1233	1.0	0.7	2.632	A
2 - A644 Wakefield Road E	1026	257	495	2200	0.466	1028	845	1.4	0.9	3.077	A
3 - M62 South Slips	272	68	1208	1392	0.195	272	315	0.4	0.2	3.219	A
4 - A644 Wakefield Road W	873	218	777	2097	0.416	875	704	1.2	0.7	2.949	A

BASE 2029, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	4.55	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	BASE 2029	PM	ONE HOUR	16:30	18:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1185	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1043	100.000
3 - M62 South Slips		ONE HOUR	✓	405	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	927	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	691	4	490
	2 - A644 Wakefield Road E	624	0	220	199
	3 - M62 South Slips	6	219	0	180
	4 - A644 Wakefield Road W	542	253	132	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.64	4.96	1.8	A	1087	1631
2 - A644 Wakefield Road E	0.58	4.31	1.4	A	957	1436
3 - M62 South Slips	0.39	5.17	0.6	A	372	557
4 - A644 Wakefield Road W	0.53	4.03	1.1	A	851	1276

Main Results for each time segment

16:30 - 16:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	892	223	453	2254	0.396	890	880	0.0	0.7	2.635	A
2 - A644 Wakefield Road E	785	196	470	2227	0.353	783	873	0.0	0.5	2.489	A
3 - M62 South Slips	305	76	986	1626	0.187	304	267	0.0	0.2	2.721	A
4 - A644 Wakefield Road W	698	174	637	2260	0.309	696	652	0.0	0.4	2.300	A

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1065	266	542	2160	0.493	1064	1053	0.7	1.0	3.282	A
2 - A644 Wakefield Road E	938	234	562	2125	0.441	937	1044	0.5	0.8	3.026	A
3 - M62 South Slips	364	91	1179	1423	0.256	364	320	0.2	0.3	3.397	A
4 - A644 Wakefield Road W	833	208	762	2114	0.394	833	780	0.4	0.6	2.808	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1305	326	664	2032	0.642	1302	1288	1.0	1.8	4.904	A
2 - A644 Wakefield Road E	1148	287	688	1985	0.578	1146	1277	0.8	1.4	4.279	A
3 - M62 South Slips	446	111	1443	1145	0.389	445	391	0.3	0.6	5.131	A
4 - A644 Wakefield Road W	1021	255	933	1915	0.533	1019	955	0.6	1.1	4.006	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1305	326	665	2031	0.642	1305	1290	1.8	1.8	4.957	A
2 - A644 Wakefield Road E	1148	287	689	1983	0.579	1148	1280	1.4	1.4	4.310	A
3 - M62 South Slips	446	111	1446	1142	0.390	446	392	0.6	0.6	5.171	A
4 - A644 Wakefield Road W	1021	255	935	1913	0.534	1021	957	1.1	1.1	4.033	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1065	266	544	2158	0.494	1068	1056	1.8	1.0	3.313	A
2 - A644 Wakefield Road E	938	234	564	2122	0.442	940	1049	1.4	0.8	3.052	A
3 - M62 South Slips	364	91	1183	1418	0.257	365	321	0.6	0.3	3.422	A
4 - A644 Wakefield Road W	833	208	765	2111	0.395	835	783	1.1	0.7	2.826	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	892	223	455	2252	0.396	893	883	1.0	0.7	2.652	A
2 - A644 Wakefield Road E	785	196	472	2225	0.353	786	877	0.8	0.5	2.504	A
3 - M62 South Slips	305	76	990	1622	0.188	305	268	0.3	0.2	2.736	A
4 - A644 Wakefield Road W	698	174	640	2257	0.309	699	655	0.7	0.4	2.313	A

DESIGN 2029, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	7.79	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	DESIGN 2029	AM	ONE HOUR	06:45	08:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1226	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1385	100.000
3 - M62 South Slips		ONE HOUR	✓	361	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	1159	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	732	4	490
	2 - A644 Wakefield Road E	858	0	251	276
	3 - M62 South Slips	15	179	0	167
	4 - A644 Wakefield Road W	783	214	162	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.65	4.88	1.8	A	1125	1687
2 - A644 Wakefield Road E	0.78	8.51	3.5	A	1271	1906
3 - M62 South Slips	0.51	9.36	1.0	A	331	497
4 - A644 Wakefield Road W	0.77	9.53	3.3	A	1064	1595

Main Results for each time segment

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	923	231	416	2293	0.403	920	1243	0.0	0.7	2.619	A
2 - A644 Wakefield Road E	1043	261	492	2202	0.473	1039	844	0.0	0.9	3.086	A
3 - M62 South Slips	272	68	1219	1381	0.197	271	313	0.0	0.2	3.239	A
4 - A644 Wakefield Road W	873	218	789	2083	0.419	870	700	0.0	0.7	2.959	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1102	276	498	2207	0.499	1101	1486	0.7	1.0	3.253	A
2 - A644 Wakefield Road E	1245	311	589	2095	0.594	1243	1010	0.9	1.4	4.213	A
3 - M62 South Slips	325	81	1458	1129	0.287	324	374	0.2	0.4	4.470	A
4 - A644 Wakefield Road W	1042	260	944	1902	0.548	1040	838	0.7	1.2	4.166	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1350	337	607	2092	0.645	1347	1813	1.0	1.8	4.811	A
2 - A644 Wakefield Road E	1525	381	720	1949	0.782	1517	1234	1.4	3.5	8.176	A
3 - M62 South Slips	397	99	1780	790	0.503	395	457	0.4	1.0	9.074	A
4 - A644 Wakefield Road W	1276	319	1152	1660	0.769	1268	1023	1.2	3.2	9.019	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1350	337	611	2088	0.647	1350	1823	1.8	1.8	4.877	A
2 - A644 Wakefield Road E	1525	381	722	1947	0.783	1525	1238	3.5	3.5	8.509	A
3 - M62 South Slips	397	99	1788	782	0.509	397	459	1.0	1.0	9.363	A
4 - A644 Wakefield Road W	1276	319	1158	1653	0.772	1276	1027	3.2	3.3	9.526	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1102	276	503	2202	0.501	1105	1499	1.8	1.0	3.292	A
2 - A644 Wakefield Road E	1245	311	592	2091	0.595	1253	1016	3.5	1.5	4.335	A
3 - M62 South Slips	325	81	1468	1118	0.290	327	378	1.0	0.4	4.561	A
4 - A644 Wakefield Road W	1042	260	952	1893	0.550	1050	843	3.3	1.2	4.313	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	923	231	419	2290	0.403	924	1250	1.0	0.7	2.637	A
2 - A644 Wakefield Road E	1043	261	495	2200	0.474	1045	848	1.5	0.9	3.125	A
3 - M62 South Slips	272	68	1225	1374	0.198	272	315	0.4	0.2	3.268	A
4 - A644 Wakefield Road W	873	218	794	2077	0.420	875	704	1.2	0.7	2.997	A

DESIGN 2029, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - A644 Wakefield Road E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Large Roundabout	1 - M62 North Slips - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Junction 25 M62	Large Roundabout		1, 2, 3, 4	4.66	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - M62 North Slips	0	48.00
2 - A644 Wakefield Road E	0	119.00
3 - M62 South Slips	0	72.00
4 - A644 Wakefield Road W	0	99.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	DESIGN 2029	PM	ONE HOUR	16:30	18:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - M62 North Slips		ONE HOUR	✓	1211	100.000
2 - A644 Wakefield Road E		ONE HOUR	✓	1052	100.000
3 - M62 South Slips		ONE HOUR	✓	405	100.000
4 - A644 Wakefield Road W		ONE HOUR	✓	927	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	717	4	490
	2 - A644 Wakefield Road E	633	0	220	199
	3 - M62 South Slips	6	219	0	180
	4 - A644 Wakefield Road W	542	253	132	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - M62 North Slips	2 - A644 Wakefield Road E	3 - M62 South Slips	4 - A644 Wakefield Road W
From	1 - M62 North Slips	0	0	0	0
	2 - A644 Wakefield Road E	0	0	0	0
	3 - M62 South Slips	0	0	0	0
	4 - A644 Wakefield Road W	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - M62 North Slips	0.66	5.16	1.9	A	1111	1667
2 - A644 Wakefield Road E	0.58	4.36	1.4	A	965	1448
3 - M62 South Slips	0.39	5.25	0.6	A	372	557
4 - A644 Wakefield Road W	0.54	4.09	1.2	A	851	1276

Main Results for each time segment

16:30 - 16:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	912	228	453	2254	0.405	909	887	0.0	0.7	2.671	A
2 - A644 Wakefield Road E	792	198	470	2227	0.356	790	893	0.0	0.5	2.501	A
3 - M62 South Slips	305	76	992	1619	0.188	304	267	0.0	0.2	2.736	A
4 - A644 Wakefield Road W	698	174	644	2252	0.310	696	652	0.0	0.4	2.312	A

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1089	272	542	2160	0.504	1087	1061	0.7	1.0	3.351	A
2 - A644 Wakefield Road E	946	236	562	2125	0.445	945	1068	0.5	0.8	3.047	A
3 - M62 South Slips	364	91	1187	1414	0.257	364	320	0.2	0.3	3.424	A
4 - A644 Wakefield Road W	833	208	770	2105	0.396	833	780	0.4	0.7	2.828	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1333	333	664	2032	0.656	1330	1298	1.0	1.9	5.099	A
2 - A644 Wakefield Road E	1158	290	688	1985	0.583	1156	1306	0.8	1.4	4.328	A
3 - M62 South Slips	446	111	1452	1135	0.393	445	391	0.3	0.6	5.207	A
4 - A644 Wakefield Road W	1021	255	943	1904	0.536	1019	954	0.7	1.1	4.058	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1333	333	665	2031	0.657	1333	1300	1.9	1.9	5.160	A
2 - A644 Wakefield Road E	1158	290	689	1983	0.584	1158	1309	1.4	1.4	4.362	A
3 - M62 South Slips	446	111	1455	1132	0.394	446	392	0.6	0.6	5.249	A
4 - A644 Wakefield Road W	1021	255	945	1901	0.537	1021	957	1.1	1.2	4.086	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	1089	272	544	2158	0.505	1092	1064	1.9	1.0	3.390	A
2 - A644 Wakefield Road E	946	236	564	2122	0.446	948	1072	1.4	0.8	3.071	A
3 - M62 South Slips	364	91	1192	1409	0.258	365	321	0.6	0.4	3.453	A
4 - A644 Wakefield Road W	833	208	773	2101	0.397	835	784	1.2	0.7	2.847	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - M62 North Slips	912	228	455	2252	0.405	913	890	1.0	0.7	2.691	A
2 - A644 Wakefield Road E	792	198	472	2225	0.356	793	896	0.8	0.6	2.514	A
3 - M62 South Slips	305	76	997	1615	0.189	305	268	0.4	0.2	2.751	A
4 - A644 Wakefield Road W	698	174	647	2249	0.310	699	655	0.7	0.5	2.325	A