Wokingham Local Plan Update

Addendum to Transport Assessment Report

2032 Interim Year Assessment

August 2024

On behalf of **Wokingham Borough Council**

WOKINGHAM BOROUGH COUNCIL

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Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
1C	1st Client Draft	NL/ RD	07/24	NL	07/24	PB	17/07/24
2	Final Draft	NL/ RD	08/24	NL	08/24	PB	21/08/24
2	Final	NL	08/24	NL	08/24	PB	13/09/24

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1 Introduction

1.1 Introduction

1.1.1 Wokingham Borough Council (WBC) is undertaking a review of the adopted development plan policy. Currently both the Core Strategy and the Managing Development Delivery local plans look forward to 2026. WBC are preparing a new local plan (the Local Plan Update) which will put in place the spatial strategy and planning policies until 2040.

1.1.2 To support the preparation of the Local Plan Update (LPU), Stantec was commissioned by WBC to provide transport and highways support to understand the impact of future housing and employment growth options on the highway network and to identify any works that are necessary to help mitigate the identified impacts.

1.1.3 The study reported in the "Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report", July 2024 evaluated the cumulative impact of the option known as Hall Farm/ Loddon Valley strategic development site, South Wokingham Extension and a number of smaller residential sites around the Borough. The assessment was presented for a forecast year of 2040 representing the final year of the LPU.

1.1.4 This report presents results of the assessment of an interim year – 2032 – to help inform implications of phased development and possible timescales for key infrastructure such as the M4 overbridge. The 2032 assessment utilises an agreed build out rate for the Strategic Development Locations (SDL) along with a level of development growth across the Borough, whereas the 2040 assessment assumes full development.

1.2 Assessment Approach

1.2.1 Similar to the 2040 assessment, a three-tier modelling framework has been adopted, which included strategic modelling, microsimulation modelling and local junction modelling:

- Strategic Modelling – this used the existing Wokingham Strategic Transport Model (WSTM4), which was refined and updated in the study area to represent November 2021 travel conditions and a set of 2032 forecast scenarios.

- Microsimulation Modelling – this involved application of a microsimulation model in VISSIM, which covers a wide area between Bracknell and M4 J11; the model was developed using November 2021 data.

- Junction Models – Existing and new standalone junction models have been used to inform the development of the microsimulation and strategic models as well as to assess individual junctions not covered by the VISSIM model at a more localised level.

1.2.2 The framework has leveraged the strengths of each modelling tier. Tier 1, strategic modelling, has been used to forecast the wider impacts of the LPU development and to identify key pressure points. Tier 2, microsimulation modelling, further details the assessment by accounting for network details and driver behaviour. And Tier 3 (local junction modelling) informs Tier 1 and Tier 2 modelling by feeding operational details such as optimised signal timings or acting as an independent assessment tool in the areas falling outside of the microsimulation model study area.

1.2.3 As with the 2040 assessment, three scenarios have been considered:

- Reference Case: includes planned development outside Wokingham borough, committed development and infrastructure in the borough (including 2026 LP) but no Hall Farm / Loddon Valley development or other Local Plan Update development.

- Development Scenario (Scenario 1A): Reference Case plus Hall Farm/ Loddon Valley development (800 dwellings), South Wokingham SDL extension site (280 dwellings) and other smaller LPU site allocations with a total quantum of 2,548 dwellings; the on-site infrastructure is included.

- Development Scenario with mitigation (Scenario 1B): this is based on Development Scenario but includes additional mitigation that may be required by 2032 to deliver additional housing and employment.

1.2.4 Forecast assumptions for each scenario are included in Section 2 ‘Assessment Scenarios’ of this report.

1.2.5 The assessment has focused on quantifying the impact of development in the AM and PM peak hours, which were determined to be 0800-0900 and 1700-1800.

1.3 Severity of Impact

1.3.1 NPPF update Dec’23, paragraph 111, states that:

“Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe”.

1.3.2 This directive is not supported by any guidance regarding the definition of ‘unacceptable’ or ‘severe’; as such there is still a requirement for councils to assess and apply their own interpretation on a plan wide or site-specific basis. The Department for Communities and Local Government issued a response to a Kent County Council request for clarity over this matter, which stated that local authorities are best placed to determine what impacts they consider to be an unacceptable or “severe” impact on their local area, after considering what mitigation measures are appropriate in each circumstance.

1.3.3 The Local Plan assessment considers the collective impact of the proposed developments and proposed mitigation measures within Wokingham Borough. The Infrastructure Delivery Plan (IDP) provides a means to define the possible mitigation schemes for the larger developments, as the quantum of impact is more identifiable, but this is less so for the cumulative impact of the smaller schemes which may only have a more localised impact on the network in the vicinity of their development.

1.3.4 This study is intended to support the ‘survey’ of needs (as defined in Planning and Compulsory Purchase Act 2004) to explore infrastructure requirements that may be necessary to support planned development and thereby judge the environmental affects and the viability of proposals, appropriate to the stage in planning. This report does not therefore assess severity of the development or infrastructure which has been included within the assessment scenarios. It does however highlight the scope of mitigation schemes likely to be required to address the potential impact of the larger developments.

1.3.5 In setting out the results of the various assessments, certain illustrative thresholds (e.g. vehicle delay) and associated colour coding schemes have been used to denote differences between scenarios. These do not necessarily imply a greater or lesser degree of acceptable impact, but can be used as a guide for comparison in the context of how each scenario test relates to the others. Factors such as whether a junction performs a key function for pedestrians, cyclists and/or public transport also needs to be taken into consideration, since trips made by more sustainable modes may take precedent over private car trips.

1.3.6 Therefore, the modelling assessment has sought to utilise a criteria based system that shows the differences between the with and without mitigation set of criteria to assess the impact of the potential development sites. By taking this approach, there will be certain locations where the council may choose to accept some degree of inconvenience for car users in order to encourage and promote the use of more sustainable travel.

1.4 Report Structure

1.4.1 This report presents the results of the assessment, which has tested and analysed the impact of the major development option known as Hall Farm / Loddon Valley on the highway network using a suite of transport models. It should be noted that multiple iterations of modelling scenarios were run to derive an optimum mitigation solution and this report only presents the preferred option.

1.4.2 The remainder of this report is structured as follows:

- Section 2 describes assessment scenarios and their assumptions
- Section 3 details the metrics used in the impact assessment
- Section 4 analyses the impact of the development on the Local Road Network (LRN)
- Section 5 analyses the impact of the development on the Strategic Road Network (SRN)
- Section 6 summarises and concludes this report.

2 Assessment Scenarios

2.1.1 This section provides a detailed description of the assessment scenarios, along with the underlying assumptions that form the basis for these scenarios.

2.2 Forecast Scenarios

2.2.1 To undertake the development assessment three forecast scenarios have been considered:

- Reference Case: includes planned development outside Wokingham borough, committed development, which gained planning approval up to 2032, and committed infrastructure in the borough (including 2026 LP) but no Hall Farm / Loddon Valley development or other Local Plan Update development.
- Development Scenario with on-site infrastructure and access points (Scenario 1A): Reference Case plus Hall Farm/ Loddon Valley development (800 dwellings), South Wokingham SDL extension site (280 dwellings) and other smaller LPU site allocations with a total quantum of 2,548 dwellings; the on-site infrastructure is included.
- Development Scenario with additional mitigation (Scenario 1B): this is based on Development Scenario but includes additional mitigation that may be required by 2032 to deliver additional housing and employment.

2.2.2 The Development Scenarios Without and With partial/strategic mitigation will be compared against the Reference Case scenario to understand the impacts of the Local Plan Update development proposals in the interim year of 2032.

2.2.3 In all the scenarios the positive borough-wide impact of sustainable transport measures on a car trip reduction has been considered. However, unlike the 2040 assessment, the impact of extra sustainable measures that will target the Hall Farm / Loddon Valley development and South Wokingham extension have not been considered in the Development Scenarios (Scenario 1A and Scenario 1B) recognising that not all infrastructure will be present by 2032 and travel plan measures take time to be effective.

2.2.4 Table 1 summarises the forecast scenario assumptions, which have been assessed.

Table 1: Summary of 2032 Forecast Scenario Assumptions

	Reference Case	**Scenario 1A**	**Scenario 1B**
Development Growth			
Background growth	✓	✓	✓
Planned development outside Wokingham borough	✓	✓	✓
Committed development in Wokingham Borough (including 2026 SDLs*)	✓	✓	✓
Hall Farm/ Loddon Valley development (800 homes)		✓	✓
South Wokingham SDL extension site (280 homes)		✓	✓
Other smaller Local Plan Update site allocations (2,548 dwellings)		✓	✓
Infrastructure Changes			
M4 Smart Motorway	✓	✓	✓

	Reference Case	Scenario 1A	Scenario 1B
Significant infrastructure schemes that are committed or planned to be delivered as part of the Local Plan delivery in neighbouring authorities	✓	✓	✓
Committed infrastructure changes in Wokingham borough (including 2026 SDL infrastructure)	✓	✓	✓
On-site infrastructure and site access locations associated with LPU		✓	✓
Additional mitigation that may be required to deliver South Wokingham Extension development			✓
Additional mitigation that may be required to deliver Hall Farm / Loddon Valley development			✓
Sustainable Transport Measures			
Wokingham borough-wide impact of My Journey programme	✓	✓	✓
Hall Farm / Loddon Valley targeted sustainable transport measures			
South Wokingham Extension targeted sustainable transport measures			

** It is assumed that by 2032 South Wokingham SDL will only be partially delivered (1,686 homes), with the remaining 750 homes to be delivered post 2032 by 2040.*

2.2.5 The composition of each of the assessment scenarios is described in the rest of this section.

2.3 Reference Case

2.3.1 The Reference Case has been used as the basis of comparison with the Development Scenarios and will inform the impacts and mitigation that would be required to deliver development in transport terms by 2032. The Reference Case therefore includes all growth up to 2032, which results from development in neighbouring authorities and growth within Wokingham, including growth associated with the adopted local plan, but excluding the growth associated with Wokingham Local Plan Update. The Reference Case utilises the Tempro growth factors for the neighbouring authorities and specific local data for Wokingham from committed developments.

2.3.2 Refer to the main report ("Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report", July 2024) for further information on the development of the Reference Case.

2.4 Hall Farm / Loddon Valley - Assumptions

2.4.1 The Reference Case scenario has formed the basis for the assessment of LPU development proposals in Scenario 1A (without mitigation) and Scenario 1B (with additional mitigation). The development proposals include Hall Farm/ Loddon Valley development, South Wokingham SDL extension site and other smaller proposed site allocations.

2.4.2 Table 2 shows a summary of the 2032 land use quanta for Hall Farm / Loddon Valley development, which represents a mix of housing and employment.

Table 2: Hall Farm / Loddon Valley Land Use and Quantum (indicative)

Land Use	Local Plan Update quantum
Residential Dwellings	800 houses
Local Centres	food store - 500m² mixed retail/café etc.- 500 m²
Primary School	1 x 1FE
R&D (m^2)	40,000m²

2.4.3 In the year 2032, the assumptions for trip generation, internalisation, and trip distribution for the Hall Farm/Loddon Valley development are identical to those used in the 2040 assessment, as detailed in the main report ("Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report", July 2024).

Site Access

2.4.4 Figure 1 shows on-site infrastructure and access only locations for the Hall Farm / Loddon Valley Development as assumed in Scenario 1A without additional mitigation. These schemes are:

(1) Provision of an additional southbound lane between Black Boy Roundabout and South Avenue and improvements to the roundabout

(2) New arm on Arborfield Relief Road roundabout to accommodate access from Hall Farm / Loddon Valley and possible increase in the roundabout ICD (Increased Circle Diameter) if required

(3) New access to Mole Road

(4) Mill Lane closed to through traffic

(5) New access to Mill Lane and connection to Winnersh Relief Road

2.4.5 It should be noted that the figure is indicative and should not be taken as prescriptive of what must be provided in terms of locations, alignments, and compliance with standards. The 2032 scenario is intended to consider implications for existing network constraints without the proposed M4 bridge. Build-out rates and occupation in the four corners of the Development may vary, where alternative scenarios would need to be tested to better understand if access points 2, 3 & 5 or even 1 might be connected sooner.

2.4.6 Appendix A further details on-site infrastructure assumptions and access locations for Hall Farm / Loddon Valley.

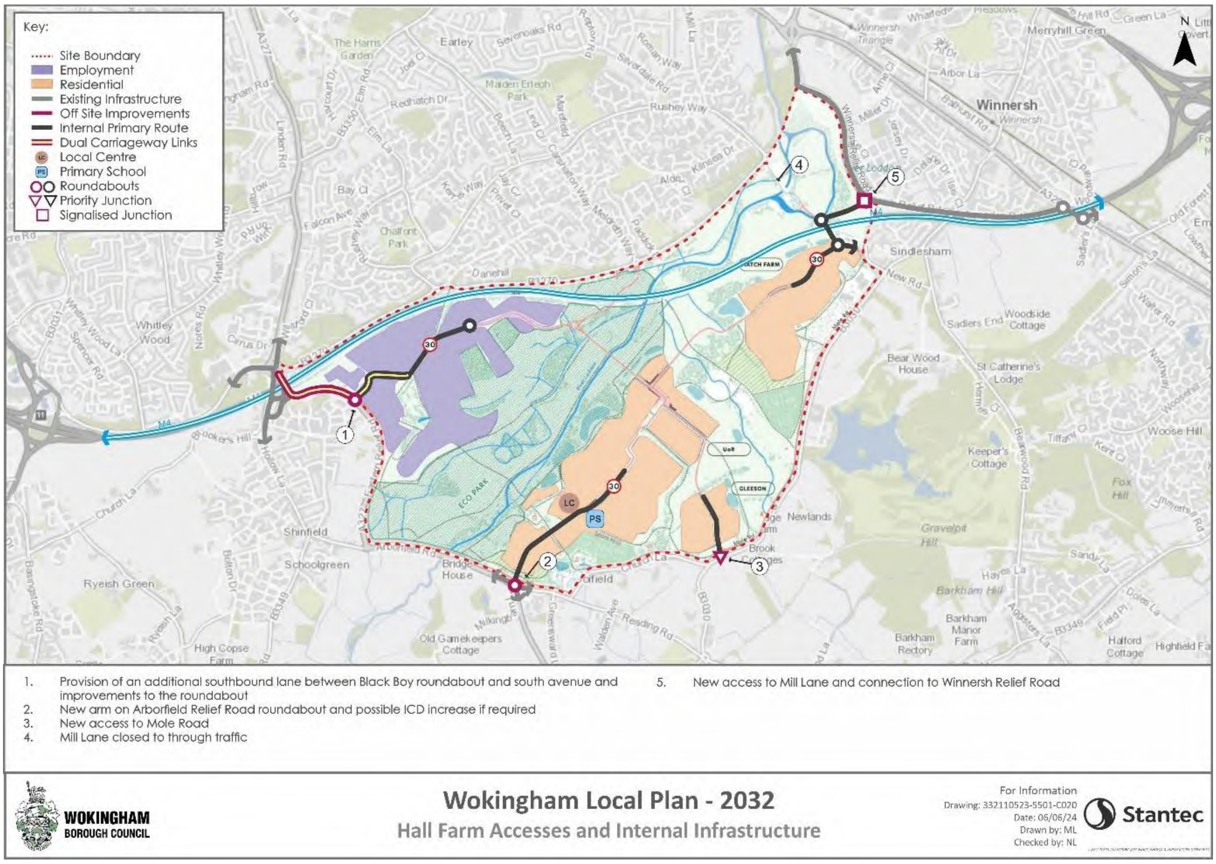

Figure 1: Hall Farm / Loddon Valley – Access and Internal Infrastructure in 2032

2.5 South Wokingham Extension - Assumptions

2.5.1 The land uses and quanta assumed for South Wokingham Extension are detailed below in Table 3.

Table 3: South Wokingham Extension Land Use and Quantum

Land Use	Quantum
Residential Houses (dwellings)	280
Local Centres (m^2)	500m²
Primary School	1 x 1FE

2.5.2 The assumptions regarding trip generation, internalisation, and trip distribution for the South Wokingham Extension in 2032 are the same as those applied in the 2040 assessment, as described in the main report.

Site Access

2.5.3 On-site infrastructure and access only locations for the South Wokingham Extension as assumed in Scenario 1A without additional mitigation are:

(1) New roundabout to provide access from the site to Old Wokingham Road

2.5.4 These schemes are graphically shown in Figure 2 and Appendix C provides further details. All the figures are indicative, high level and should not be taken as prescriptive of what must be provided in terms of locations, alignments, and compliance with standards.

2.5.5 Relevant to South Wokingham development, all the scenarios include a committed improvement scheme at Waterloo Road/ Peacock Lane/ Old Wokingham Road junction. The scheme will involve converting a priority junction with a minor arm from Waterloo Road to a roundabout to improve traffic flow. A shared footway/cycleway will be provided along the northern edge of the carriageway, with footways and uncontrolled crossing facilities provided on other arms of the junction.

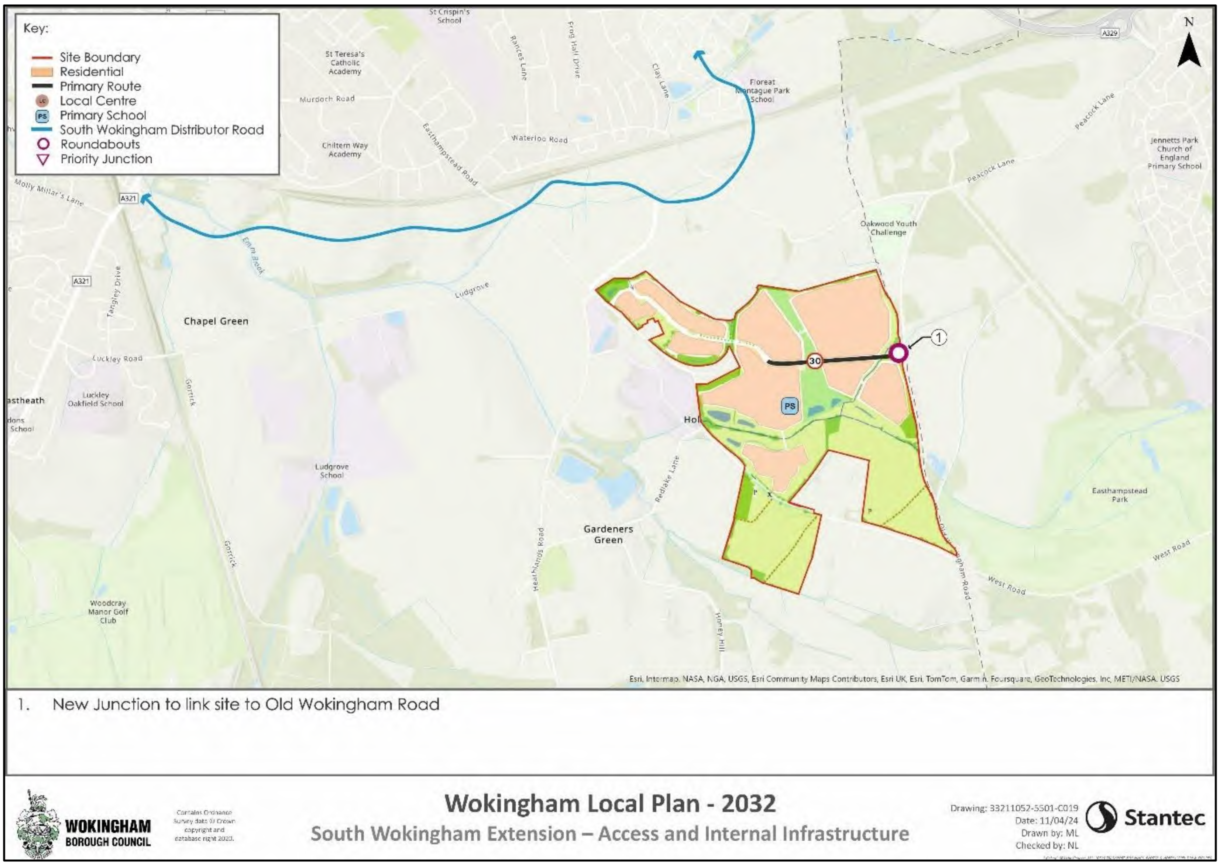

Figure 2: South Wokingham Extension – Access and Internal Infrastructure in 2032

2.6 Additional Smaller Sites

2.6.1 As part of the Local Plan update process, WBC are considering the allocation of further smaller sites beyond Hall Farm / Loddon Valley and South Wokingham Extension. A list of these sites that have been assumed within Scenario 1A with the 2032 quantum is provided in Table 4. The list of sites used is indicative of options to enable testing. The list is not necessarily reflective of proposed allocations or phasing.

Table 4: Additional Smaller Sites

Site address	Site reference	Indicative No. of Dwellings - 2032
Arborfield SDL additional capacity		200
Woodlands Farm, Wood Lane	5BA013	None Occupied
24 Barkham Ride	5BA032	30
High Barn Farm, Commonfield Lane, Barkham	5BA036	None Occupied
Land east of Park View Drive North, Charvil	5CV001	80
Land west of Park Lane, Charvil	5CV002	75
31 and 33 Barkham Ride	5FI003	80
Greenacres Farm, Nine Mile Ride	5FI004	100

Site address	Site reference	Indicative No. of Dwellings - 2032
Hillside, Lower Wokingham Road, Finchampstead	5FI024	15
Westwood Yard, Sheerlands Road	5FI028	20
Honeysuckle Lodge, Commonfield Lane	5FI032	None Occupied
Land on the north side of Orchard Road	5HU006	23
Land north of London Road and east of A329(M), Hurst	5HU051	45
Land to the rear of 9-17 Northbury Lane, Ruscombe	5RU007	12
Land between 39-53 New Road, Ruscombe	5RU008	20
Land east and west of Hyde End Road, Shinfield	5SH023, 5SH027	140
Land north of Arborfield Road	5SH025	130
Rustlings, The Spring and Land to rear of Cushendell, Shinfield Road	5SH031	10
Land at Sonning Farm	5SO001	None Occupied
Sonning Golf Club	5SO008	50
Land west of Trowes Lane	5SW019	81
Land at Bridge Farm, Twyford	5TW005, 5TW009, 5TW010	200
Winnersh Plant Hire, Reading Road	5WI008	85
Land on north west of Old Forest Road	5WI009, 5WI019	50
Land off Wheatsheaf Close	5WI011	24
69 King Street Lane, Sindlesham	5WI014	28
Land south of Gipsy Lane	5WK006	None Occupied
Station Industrial Estate	5WK029	None Occupied
Woodside Caravan Park, Blagrove Lane	5WK042	None Occupied
Land at St Annes Drive	5WK043	54
Bridge Retail Park	5WK045	59
Land at the corner of Wellington Road and Station Road, Wokingham	5WK046	20
Land east of Toutley Depot	5WK051	130
Lee Springs, Latimer Road, Wokingham	5WK053	42
WBC council offices, Shute End	5WK054	55
Wokingham Town Centre (general area of search)	N/A	80
Barkham Square	5BA010	None Occupied
Land east of Trowes Lane	5SW005	85
Land off Maidensfield (Winnersh Farms)	5WI006	111
Land to the rear of Bulldog Garage and BP Triangle, Reading Road	5WI012, 5WI021	34
Rosery Cottage and 171 Evendons Lane	5WK023	None Occupied
Land at Blagrove Lane	5WK028, 5WK032, 5WK034, 5WK039	180
Ravenswood Village	5WW009	200
Total		**2,548**

2.7 Local Plan Update – 2032 Mitigation Package

2.7.1 This section discusses mitigation proposals for the Local Plan Update development in 2032, which has been assessed in Scenario 1B.

Defining Mitigation Proposals

2.7.2 The methodology for defining the future mitigation for the interim year of 2032 has been based on a number of considerations. It has used key metrics (such as flow, delay, V/C, etc.) from the Reference Case and Scenario 1A (with additional Local Plan Update development) to assess where the local and strategic highway are forecast to experience capacity constraint of a sufficient nature to warrant the need for interventions to accommodate the level of development being considered in the scenario tested.

2.7.3 The objective was to ascertain which elements of the 2040 LPU mitigation package might be required to be implemented by 2032.

2.7.4 Various combinations of the 2032 mitigation package were tested as part of this study until a preferred solution was identified. This study only discusses the performance of the resultant mitigation package.

2.7.5 The subsequent part of this section provides an outline of the 2032 mitigation package, which has been tested within the models. The mitigation measures for Hall Farm / Loddon Valley and South Wokingham extension are presented separately.

Hall Farm / Loddon Valley – Highway Network Mitigation

2.7.6 Figure 3 shows a mitigation package that is deemed to be preferrable to accommodate the 2032 levels of residential and employment development at Hall Farm / Loddon Valley. The highway improvement schemes included in the mitigation package are listed below with Appendix B further detailing the assumptions. The improvement schemes will also consider pedestrian and cycle needs incorporating where possible LCWIP proposals. These, however, cannot be explicitly modelled within the tools used and therefore no further details are provided.

2.7.7 It is assumed the mitigation measures will include a range of measures to establish sustainable travel choices early in development, recognising there will be limits to influence trips to schools and other community facilities until they are built. The mitigation strategies therefore supplementary the access and internal road infrastructure depicted in Figure 1 and include:

(6) Dual carriageway links in both directions on a section of A327 Eastern Relief Road between Black Boy Roundabout and South Avenue

2.7.8 Compared to the 2040 assessment, which includes the cumulative effects of development and infrastructure, the 2032 assessment only considers a portion of the housing and employment development, excluding the M4 bridge. The 2032 assessment concludes that improvements to the A327 Eastern Relief Road would be necessary. However, it might be possible to limit the scale of development, such as reducing employment at Hall Farm, to maintain broadly acceptable conditions. These options could be further explored during the application process.

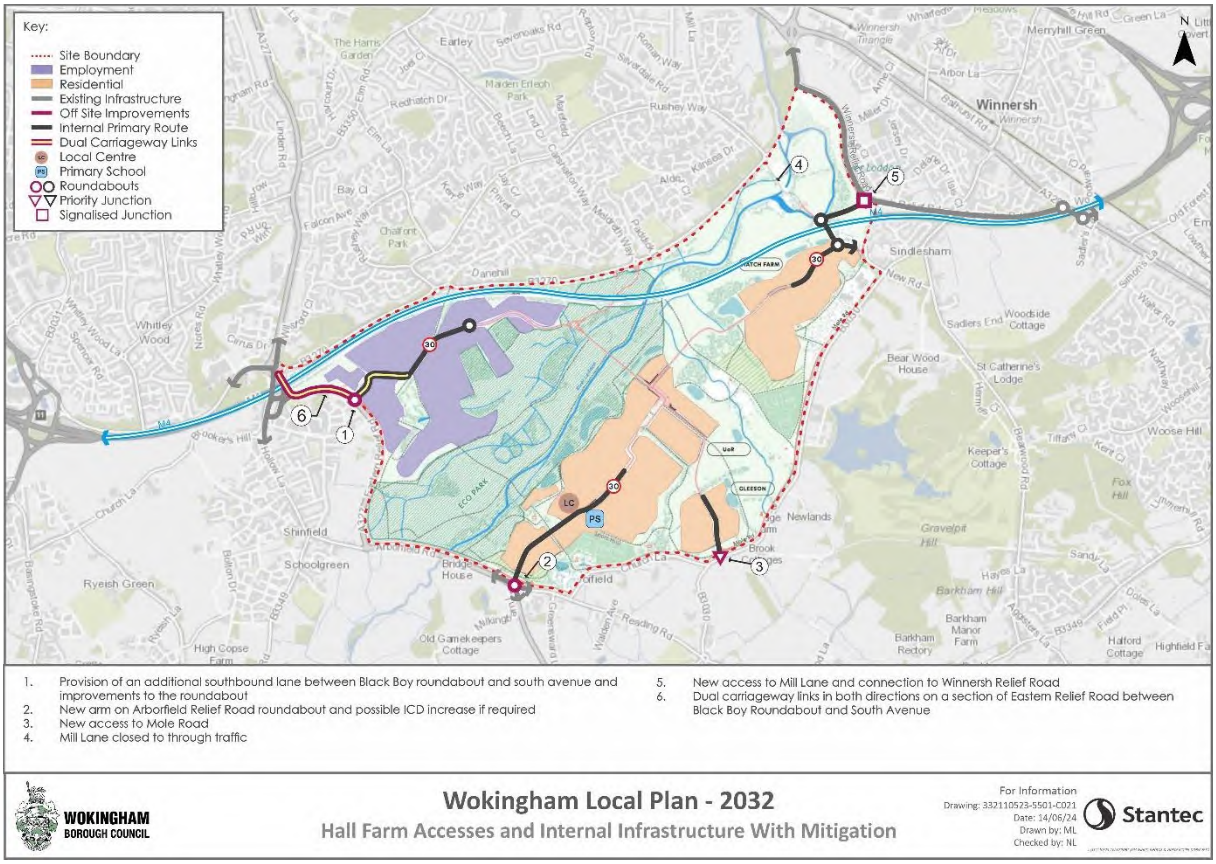

Figure 3: 2032 Mitigation Package for Hall Farm / Loddon Valley

2.7.9 Where necessary, signal optimisation has been carried out (for example, at M4 J11) to enhance the performance of the network in Scenario 1B. This process has involved adjusting the timing of traffic signals to improve traffic flow and reduce congestion, leading to smoother traffic movement, reduced travel times, and improved road safety.

2.7.10 Stantec recommends a strong promotion of hard and soft measures to encourage the use of sustainable modes for trips within the site and those outside. For the delivery of the major highway infrastructure as shown in Figure 3, a monitor and manage approach can be taken in tandem with the sustainable transport approach. This can assist in ensuring that there is not an over delivery of highway improvements, which could induce an increase in car trips.

South Wokingham Extension

2.7.11 The 2032 forecast assumes only some of the current SDL will be built and occupied but the SWDR will be complete. An analysis of the Reference Case and Scenario 1A outcomes revealed that the effects of the partial development growth in the South Wokingham Extension do not necessitate the implementation of extra mitigation measures to counterbalance the impact of the additional development trips on the network. Consequently, the assumptions for the South Wokingham Extension in Scenario 1B remain the same as those in Scenario 1A.

3 Key Metrics Used for Assessment

3.1 Introduction

3.1.1 Data extracted from different types of models for a number of assessment scenarios has been used to assess the transport impact of Local Plan Update development growth. This section describes and presents the key metrics used.

3.2 Growth in Demand

3.2.1 The assessment metrics and the results should be considered in the context of trip growth. Table 5 shows growth in demand across the WSTM4 modelled area between 2021 base and 2032 forecast scenarios. The WSTM4 modelled area covers a large area is bounded by the M40 in the north, by the M25 in the east, by the M3 in the south and by the A339 and A34 in the west.

3.2.2 It is estimated that in comparison with 2021 Base traffic will increase by 6.5% in the AM peak hour and by 5.9% in the PM peak hour in 2032 as a result of background growth, development happening outside of the borough, 2026 SDL sites in Wokingham, upgrade of the M4 to smart motorway, and accounting for a residual impact of Covid restrictions on data collection, which informed base year model refinement. It is worth noting that this projected growth for 2032 is less than the anticipated background growth for 2040, which is estimated to be around 19.9% in the AM and 19.1% in the PM, as detailed in the main report.

3.2.3 The LPU growth (in Scenarios 1A and 1B) accounts for a further increase of 1.1% and 0.9%, which is equivalent to an increase of 2,786 vehicles trips in the morning peak and 2,157 vehicle trips in the evening peak. For comparison, in 2040 the LPU development accounts for a growth of 7,419 vehicles trips in the AM peak and 5,780 vehicle trips in the PM peak.

Table 5: Traffic Growth in the Strategic Model.

Scenario	AM Peak	PM Peak
2021 Base	229,854	236,715
2032 Reference Case	244,841	250,572
Base vs Ref Case, Growth - vehicles	14,987	13,857
Base vs Ref Case, % Growth	6.5%	5.9%
2032 Scenario 1A/ 1B	247,627	252,729
Base vs Scenario 1A/ 1B, Growth - vehicles	17,773	16,014
Base vs Scenario 1A/ 1B, % Growth	7.7%	6.8%
Ref Case vs Scenario 1A/ 1B, Growth - vehicles	2,786	2,157
Ref Case vs Scenario 1A/ 1B, % Growth	1.1%	0.9%

3.2.4 Table 6 summarises how demand for travel is forecast to change in the microsimulation area covering a much smaller area including the M4, B3270 and A329(M). The table shows that there is an increase in total trips from base year to the 2032 Reference Case scenario of 22.2% in the AM peak hour and 23.8% in the PM peak hour, which is significantly higher than the demand increase across the wider WSTM4 modelled area. This is largely due to opening of the M4 smart motorway scheme from Spring 2022, which increases capacity on the M4, reduces congestion on the M4 and redistributes traffic to the M4 from the M3 and parallel local roads. For comparison, for the same area the growth from the base year to the 2040 Reference Case scenario, as described in the main report, is approximately one third higher. It stands at 38% during the morning peak hour and 38.2% during the evening peak hour.

3.2.5 The increase in trips due to the LPU growth in the area of microsimulation modelling is forecast to be higher (at 3.9% in the AM and 2.6% in the PM) than in the wider modelled area (1.1% and 0.9% respectively) thus highlighting the area where the impact is likely to be the greatest. LPU growth and infrastructure improvements are estimated to introduce additional 1,266 vehicles to the area of microsimulation modelling in the AM peak hour and 856 vehicles in the PM peak hour with other LP development trips travelling outside of the area. There will also be existing traffic that traverses through the microsimulation area in the Reference Case but will find alternative quicker routes outside of the area and avoid travelling through the microsimulation area all together.

Table 6: Traffic Growth in the Microsimulation Model.

Scenario	AM Peak	PM Peak
2021 Base	26,268	26,567
2032 Reference Case	32,099	32,885
Base vs Ref Case, Growth - vehicles	5,831	6,318
Base vs Ref Case, % Growth	22.2%	23.8%
2032 Scenario 1B	33,365	33,741
Base vs Scenario 1B, Growth - vehicles	7,097	7,174
Base vs Scenario 1B, % Growth	27.0%	27.0%
Ref Case vs Scenario 1B, Growth - vehicles	1,266	856
Ref Case vs Scenario 1B, % Growth	3.9%	2.6%

3.3 Strategic Modelling

3.3.1 Consistent with the 2040 assessment, to assess the impact of the development proposal the following metrics have been considered and extracted from the model:

- Actual flows and actual flow differences
- Delays and delay differences
- Journey times on selected routes
- Maximum junction turn V/C (Volume over Capacity)

3.3.2 Using such metrics provide an indicative high-level understanding of impacts of developments, in comparison to the Base and to the Reference case at a strategic level, and therefore should not be taken as a definitive precise value of the impacts at a local level. Microsimulation and junction modelling has been undertaken in order to understand impacts more precisely at a local level.

Actual Flows and Actual Flow Differences

3.3.3 Appendix D presents actual flows for the 2021 Base and all the assessment scenarios. All flows are displayed in vehicles.

3.3.4 The actual flow differences provide a comparison between the traffic flows on a link in two different scenarios. In the case of this assessment the comparison is between 2021 Base and 2032 Reference Case (the 2032 Forecast scenario with no Local Plan Update development), and the Reference Case against the scenarios including forecast Local Plan Update developments. When reviewing these outputs, it should be noted that new links added to the model are likely to show up as significant flow increases as there are no flows in the reference case to compare to.

3.3.5 Appendix E presents the Flow difference output plots reported. Increases in flow are shown in green whereas decreases in flow are shown in blue.

Delays and Delay Difference

3.3.6 Appendix F presents actual delays forecast by the strategic model in each of the assessment scenarios. Delays of less than 30 seconds are shown in green, the values, which are between 30 seconds and two minutes, are shown in amber and those, which are greater than two minutes are shown in red. The values are displayed in seconds. The colour coding used is to allow differentiation of flow differences, there is no inference of severity, as this will be dependent on circumstances at each location as set out in Section 1.5.

3.3.7 Delay difference provides a comparison between the delay per vehicle on a link (in seconds) in the Reference Case and the two Local Plan Update Scenario 1A (without mitigation) and Scenario 1B (with mitigation). In the case of this assessment the comparison is between 2021 Base and 2032 Reference Case (the 2032 Forecast scenario with no Local Plan Update development), and the Reference Case against the scenarios including forecast Local Plan Update developments. Appendix G includes the delay difference output plots.

3.3.8 Increases in delays of less than 30 seconds and decreases in delays are shown in green. Increases in delays, which are between 30 seconds and less than two minutes, are shown in amber and those, which are greater than two minutes are shown in red. The delays are displayed in seconds.

Journey Times

3.3.9 Travel times provide a representation of network performance that is easier for a wide audience of readers to understand. A series of eight routes, which are shown in Figure 4, were identified to assess journey times across the network. These are the same routes used int the validation of the strategic model.

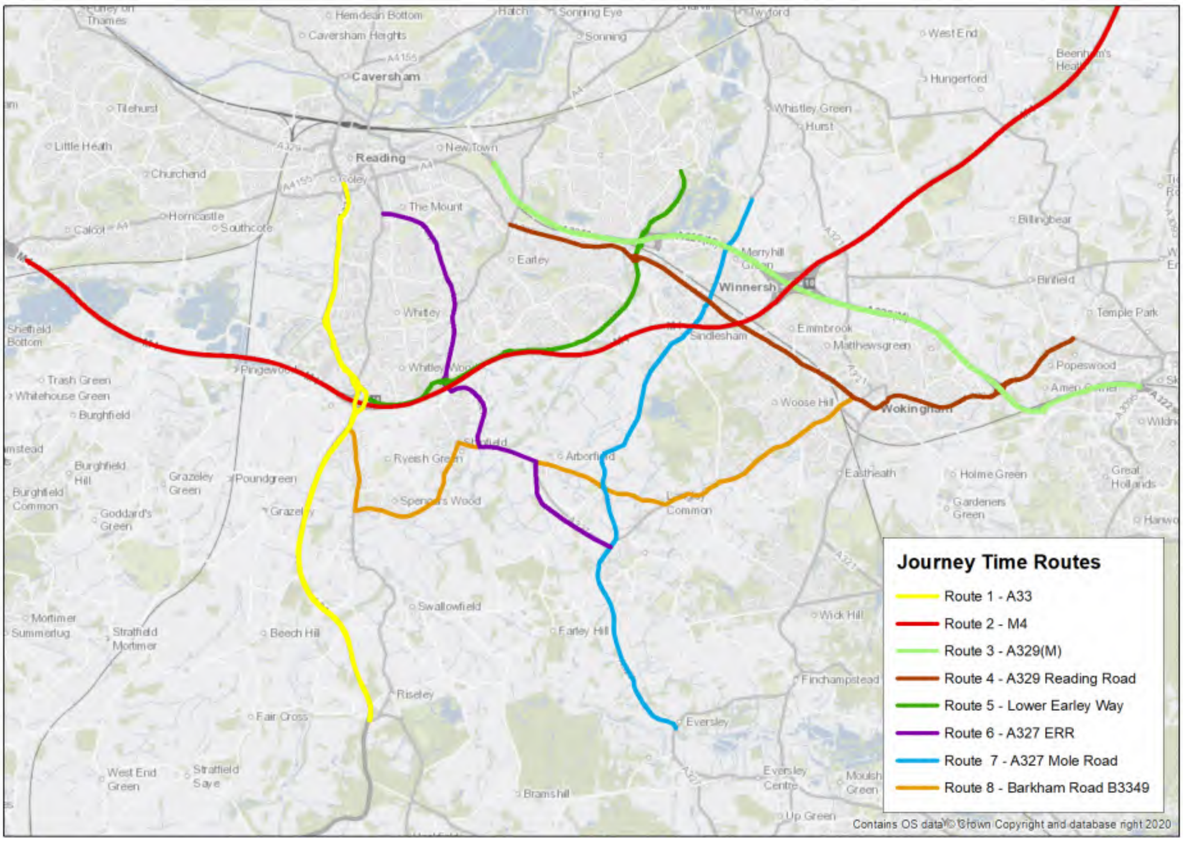

Figure 4: Journey Time Validation Routes

3.3.10 Appendix H presents the results of the journey time routes in each of the scenarios, as well as comparisons between the different scenarios. The tables included in Appendix H demonstrate the absolute difference (in seconds) and percentage difference between 2021 Base and 2032 Reference Case, and between Scenario 1A/1B and the Reference Case.

Volume to capacity (V/C) for the worst performing turn at a junction

3.3.11 Volume to capacity (V/C) for the worst performing turn at a junction is a bespoke parameter produced that highlights volume to capacity constraints at a junction/node. This is able to determine particular turning movements and where capacity constraint is being reached and therefore the movement at the junction will exhibit congestion.

3.3.12 Values of between 0.9 and 1.0 (i.e., between 90% and 100% of capacity utilised) are considered to be approaching capacity and characteristically have a light-to-moderate levels of queued traffic flows. If an arm exhibits a ratio of 1.00 or greater (i.e., over 100% of capacity utilised), it is an indication that it may be over capacity and could experience queuing and delay.

3.3.13 Appendix I includes the V/C output plots produced for this assessment.

3.4 Microsimulation Modelling

3.4.1 Consistent with the 2040 assessment, microsimulation modelling has focused on the assessment of the Reference Case and Scenario 1B. Scenario 1A was not considered to be suitable for the assessment due to being an unrealistic scenario with additional growth but no additional infrastructure required to mitigate the development.

3.4.2 To assess the impact of the development proposal the following metrics has been considered and extracted from the model:

- Journey times on selected routes
- Relative delays, and
- Flow, delays, average queue length and average delays on junction approaches

Journey Times

3.4.3 Journey time information has been extracted from the VISSIM model for key routes covering the whole microsimulation area as shown in Figure 5.

3.4.4 Appendix J presents journey time results for each of the modelled scenarios, as well as their comparison (Table 34 and Table 35 for the AM and PM peaks). The tables demonstrate the absolute difference (in seconds) and percentage difference between 2032 Reference Case and Scenario 1B.

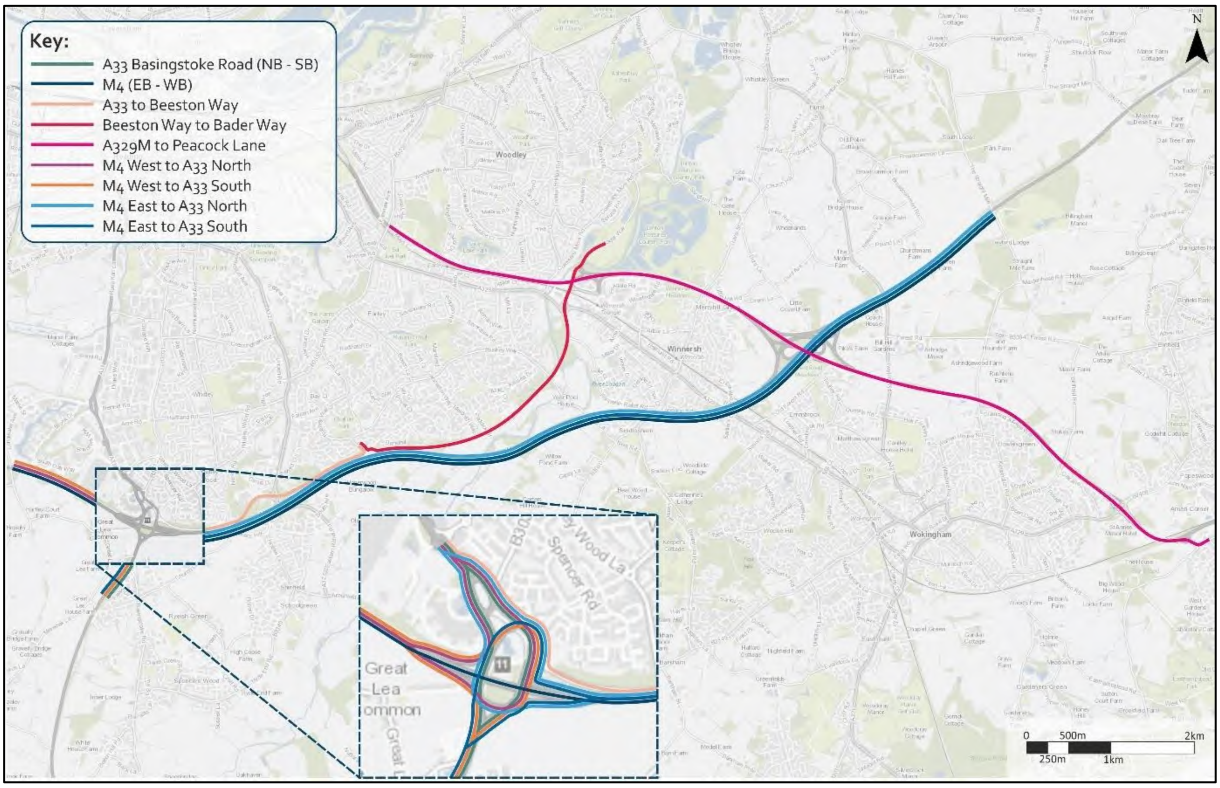

Figure 5: Microsimulation Assessment. Journey Time Routes

Delay Heatmaps

3.4.5 In order to draw a visual comparison between the congestion of the Reference Case scenario and Scenario 1B, delay heatmaps have been extracted from the VISSIM modelled scenarios and presented within Appendix K of this report.

3.4.6 The heatmap colour symbology is intended to reflect delays similar to that of Google Maps, where the darkest colour red reflects very slow moving to standing traffic, through to amber which represents slow moving traffic, and green which represents free flow conditions. The acceptability of any level of delay shown is, in Stantec's opinion, a judgement based on comparison of existing conditions and the acceptability of other factors such as positive and negative impact on sustainable transport users.

3.4.7 In VISSIM the symbology is derived from the "relative delay" function, which calculates link delay time as a share of total travel time.

Junction Metrics

3.4.8 Junction metrics have been extracted from each junction within the VISSIM modelled area. The outputs include the total flow and average queue length of each approach arm for the AM and PM peak hours. Appendix L presents junction metrics.

3.4.9 Delays at each approach arm are average delays calculated by aggregating delay estimates from individual turns weighted by associated traffic flows so that the average values are representative of traffic volumes. Comparably, average queue lengths are based on a flow weighted average of each lane of the approach to the junction.

3.5 Local Junction Modelling

3.5.1 The validated local junction models created in Junctions 10 and LinSig were used to model both the Reference Case as well as Scenario 1B.

3.5.2 The effect of the development has been assessed against the Reference Case scenario modelling. Appendix M presents results for the three junctions, which fall outside the VISSIM modelled area but are included within the area of interest. The results are detailed in Attachment 1. These junctions are:

- A327 / Arborfield Road / Eastern Relief Road
- A327 / Reading Road / Observer Way
- Winnersh Crossroads

3.5.3 Using the Junctions10 modelling program, the Ratio of Flow to Capacity (RFC) for each arm is typically reported to provide an understanding of junction performance. This value varies depending on two primary factors, namely the capacity of the arm and the level of traffic demand.

3.5.4 An RFC value of zero means that there is 100% spare capacity on the arm and an RFC value of 1.00 means that there is 0% theoretical spare capacity on the arm. Values of between 0.85 and 1.0 (i.e., between 85% and 100% of capacity utilised) mean the junction is above practical capacity, but below theoretical capacity. Practical capacity considers that there may be variations in traffic demand and disruptions to traffic flow such as vehicle breakdowns over the hour. This would mean that there would be periods within the peak hour that the arm is overcapacity. Therefore, if an arm is between 0.85 and 1.00 RFC, there may be periods within the hour with significant queueing, but other periods with low to moderate queuing. . If an arm exhibits a ratio of 1.00 or greater (i.e., over 100% of capacity utilised), it is an indication that it is over capacity and therefore will experience significant queuing and delay throughout the entire assessment hour.

3.5.5 In addition to RFC, the queues and delays are reported, which can be used to determine if there will be any implications from blocking back of queuing vehicles, or if there are any significant delays occurring at the junction. Queue lengths reported by the modelling software are the sum of all theoretical lanes at the give-way line, whilst the delay is reported as the maximum delay calculated over time segments of the average delay per arriving vehicle.

3.5.6 Using the LinSig modelling program, the Practical Reserve Capacity (PRC) value is typically referred to as an understanding of junction performance. Generally, the maximum desirable PRC value for new junctions is 90% on each arm, which provides a 10% capacity buffer. However, a PRC greater than 90% is not necessarily regarded as unacceptable, particularly for existing junctions.

3.5.7 Much like with Junctions 10, LinSig also produces calculated values for queue lengths and delay. The queue lengths generated by the software provide the mean max queue lengths for each long lane modelled for the junction. Where short flares exist with a long lane, these queue lengths are combined together to provide a single queue length value for that approach. The delay is also calculated per long lane approach on a junction, which can be provided as either the average delay per PCU on each arm, or the total delay per each individual PCU.

3.5.8 In all cases, capacity assessments should be weighed against a wider set of criteria than just the results of the assessment. Additional questions should be asked such as ‘Do queues block back through the next junction along?’ and ‘Does a junction improvement include significant benefits for active travel modes?’.

4 Local Highway Network Analysis

4.1 Introduction

4.1.1 This section considers the impact on the local highway network of the various scenarios modelled, presented in the context of the different assessment metrics described in Section 3.

4.1.2 The area of detailed analysis of the 2032 scenarios focusses on key junctions on the network which are located in proximity to the potential strategic allocations at Hall Farm / Loddon Valley and South Wokingham and the area of interest of this study.

4.2 Strategic Model Assessment Results

Flow Difference

4.2.1 Appendix E includes the flow difference outputs extracted from the WSTM4. These consider Scenarios 1A and 1B against the Reference Case. The Reference Case has also been compared against the Base. Where infrastructure changes take place between different scenarios, the modelling software cannot automatically identify the changes in network coding and therefore there may be instances where links show no changes in flows, interpretation of results is therefore provided.

AM Peak Hour

4.2.2 In the **Reference Case**, the morning peak hour is expected to see increases in traffic flow on key links within the model area. However, these increases are smaller than those reported for the year 2040 in the main report. The M4 and the A329(M) between Bracknell and Winnersh Triangle are forecast to experience significant traffic growth compared to the base scenario. This growth is attributed to the removal of traffic management measures on the M4 due to the completion of the smart motorway upgrade (which was finalised after the base scenario) and the ongoing growth outside of Wokingham Borough.

4.2.3 On the Local Road Network (LRN) there is also a notable increase in demand for routes to and from the south via the A33 and A327 corridors. Traffic flow is also forecast to increase on Old Wokingham Road and decrease on Easthampstead Road as a result of a committed upgrade of the Old Wokingham Road/ Peacock Lane/ Waterloo Road junction from a priority junction to a roundabout. New infrastructure in Wokingham planned to accommodate the 2026 Local Plan growth is also displaying an increase in traffic in the 2040 Reference Case when compared to the 2021 Base.

4.2.4 In Reading borough, a committed scheme that aims to provide a fully segregated cycle track along the A327 Shinfield Road is forecast to result in a local re-assignment to Northcourt Avenue, which runs parallel to the A327. Whereas provision of a bus lane on London Road at the end of the A3290 to Cemetery Junction is likely to lead to traffic avoiding A4 London Road and A3290 by finding alternative routes thus resulting in traffic reduction on these roads.

4.2.5 Under **Scenario 1A**, which considers a partial growth scenario for the 2032 LPU, an additional 2,786 vehicle trips are expected. This constitutes about 38% of the total growth anticipated for 2040.

4.2.6 The increase in vehicle trips between Reference Case and Scenario 1A/1B is predicted to lead to higher traffic volumes on several existing roads. These roads are mainly located around the outskirts of Hall Farm and Loddon Valley, including the A327, Eastern Relief Road, and Hatch Farm Way. The rise in traffic on Hatch Farm Way is primarily due to the closure of Mill Lane as a through route. Barkham Road, Mole Road and Church Lane will also see increased traffic. However, the impact on other parts of the network, such as the South Wokingham Extension area, is expected to be relatively minor.

4.2.7 Selected changes in flows are quantified below:

- A327 between Observer Way and Shinfield Eastern Relief Road – increase in flow by 285 vehicles in the westbound direction (up from 917 vehicles in the Reference Case) and by 173 vehicles in the eastbound direction (an increase from 688 vehicles in the Reference Case)
- Shinfield Eastern Relief Road – flow increases by 179 vehicles in the northbound direction and by 102 vehicles in the southbound direction (compared to 790 and 500 vehicles in the Reference Case)
- Hatch Farm Way – eastbound flow increases from 605 vehicles in the Reference Case to 898 vehicles in Scenario 1A, whereas the westbound flow increases from 824 vehicles in the Reference Case to 1,236 vehicles in Scenario 1A.
- Barkham Road between B3349 School Road and Barkham Ride – the eastbound direction has an estimated increase of 132 vehicles, while the westbound direction estimates an increase of 81 vehicles. For context, the average number of vehicles in the Reference Case is 538 in the eastbound direction and 481 in the westbound direction
- Observer Way – flow increases in the northbound direction range between 118-125 vehicles (from 534-622 vehicles in the Reference Case), and between 43 and 69 vehicles in the southbound direction (from 398-492 vehicles in the Reference Case)
- Mole Road - northbound flow increases by 125 vehicles in Scenario 1A from 735 vehicles in Scenario 1A, whereas the southbound flow increases by 146 vehicles in Scenario 1A from 518 vehicles in the Reference Case
- Church Lane – up by 134 vehicles in eastbound direction, and by 153 vehicles in the westbound direction (these are increases from 243 vehicles and 189 vehicles in the Reference Case)

4.2.8 **Scenario 1B** has the same level of LPU vehicular trips resulting from proposed development as Scenario 1A but includes additional northbound lane south of Black Boy roundabout (mitigation). The distribution and locations of traffic flow changes in Scenario 1B are similar to those in Scenario 1A with no notable differences observed.

PM Peak Hour

4.2.9 In the PM peak hour the impact of trips resulting from proposed development on flows is similar to that described for the AM peak hour. In the **Reference Case** there are flow increases forecast on key links in the model area. The M4 and A329(M) are forecast to have significant traffic growth in comparison to the base scenario, reflecting the significance of the removal of traffic management measures on the M4 due to smart motorway upgrade and the impact of planned growth outside of Wokingham borough.

4.2.10 Under **Scenario 1A**, which considers a partial growth scenario for the 2032 LPU, an additional 2,157 vehicle trips are expected. This constitutes about 37% of the total growth anticipated for 2040.

4.2.11 Similar to the AM results, this increase in vehicle trips is predicted to lead to higher traffic volumes on several existing roads including the A327, Eastern Relief Road, and Hatch Farm Way, Barkham Road, Mole Road and Church Lane. However, the impact on other parts of the network, such as the South Wokingham Extension area, is expected to be relatively minor.

4.2.12 Selected changes in flows are quantified below:

- A327 between Observer Way and Eastern Relief Road – increase in flow by 125 vehicles in the northbound direction (up from 869 vehicles in the Reference Case) and by 207 vehicles in the southbound direction (an increase from 926 vehicles in the Reference Case)

- Shinfield Eastern Relief Road – flow increases by 88 vehicles in the northbound direction and by 220 vehicles in the southbound direction (compared to 568 and 663 vehicles in the Reference Case)

- Hatch Farm Way – eastbound flow increases from 743 vehicles in the Reference Case to 1,070 vehicles in Scenario 1A, whereas the westbound flow increases from 553 vehicles in the Reference Case to 973 vehicles in Scenario 1A

- Barkham Road between B3349 School Road and Barkham Ride – the eastbound direction has an estimated increase of 116 vehicles, while the westbound direction estimates an increase of 87 vehicles. For context, the average number of vehicles in the Reference Case is 574 in the eastbound direction and 372 in the westbound direction

- Mole Road - northbound flow increases by 64 vehicles in Scenario 1A from 473 vehicles in Scenario 1A, whereas the southbound flow increases by 165 vehicles in Scenario 1A from 576 vehicles in the Reference Case

- Church Lane – up by 92 vehicles in eastbound direction, and by 132 vehicles in the westbound direction (these are increases from 198 vehicles and 234 vehicles in the Reference Case)

4.2.13 In **Scenario 1B**, which has the same level of additional Local Plan Update vehicular trips loaded onto the network as Scenario 1A but includes additional mitigation, the pattern of locations of flow increases and decreases is similar to Scenario 1A.

Local Highway Network Delay Difference

4.2.14 Appendix G presents delay difference plots between Scenario 1A, Scenario 1B and the Reference Case.

AM Peak Hour

4.2.15 In comparison with the base model, the **Reference Case** generally shows increases in delays. There are, however, no areas where there are substantial delay increases. This is different to the 2040 Reference Case forecasts, which showed significant differences in delays when compared to the base model.

4.2.16 **Scenario 1A** with the additional LPU growth in 2032 forecasts delay increases of over 30 seconds on:

- A327 northbound approach to Black Boy roundabout from the south (an increase of 36 seconds)

- B3030 Mole Road approach to the Mole Road/ Mill Road/ New Road junction (an increase of 34 seconds)

- Wokingham Road eastbound approach to Loddon Bridge/ Wokingham Road junction (36 seconds increase)

4.2.17 It is forecast that there will be delays exceeding 30 seconds at the minor arm of the new priority junction connecting to Mole Road. This junction serves as an access point from a development parcel at Hall Farm and the expected delay here is approximately 49 seconds. Furthermore, delays of over 30 seconds are anticipated at the southern and eastern arms of the new signalised junction, which connects Mill Lane and Hatch Farm Way (the respective delays are 33 seconds and 52 seconds).

4.2.18 **Scenario 1B** shows a similar level of delays when compared to the Reference Case. However, the introduction of an additional northbound lane leading to the Black Boy roundabout from the Science Park roundabout results in a lower increase in delays, which is 26 seconds compared to the Reference Case.

PM Peak Hour

4.2.19 As with the AM Peak Hour, the PM Peak Hour in the Reference Case in comparison with the base model shows a general increase in delays. There are, however, no areas where there are substantial delay increases.

4.2.20 **Scenario 1A**, with the additional Local Plan Update growth, forecasts delay increases of note and greater than 30 seconds on:

- A327 northbound approach to Black Boy roundabout from the south (an increase of 55 seconds)
- B3030 Mole Road approach to the Mole Road/ Mill Road/ New Road junction (an increase of 54 seconds)
- Northbound approach to the B3270/ Hatch Farm Way junction (33 seconds increase)

4.2.21 In addition, delays of 37 seconds are forecast at the eastern arms of the new signalised junction, which connects Mill Lane and Hatch Farm Way.

4.2.22 In **Scenario 1B**, the delay levels are similar to those in Scenario 1A. However, there is a reduction in delays on the northbound approach to the Black Boy roundabout, which is a result of dualling of the approach at this location in Scenario 1B.

Journey Times

4.2.23 To understand the impact of the development proposals on the performance of the LRN, journey times for select routes (as shown in Figure 6) have been obtained from the WSTM4. These selected routes cover not only the primary area of interest but also extend beyond it. Appendix H includes the complete set of journey time results.

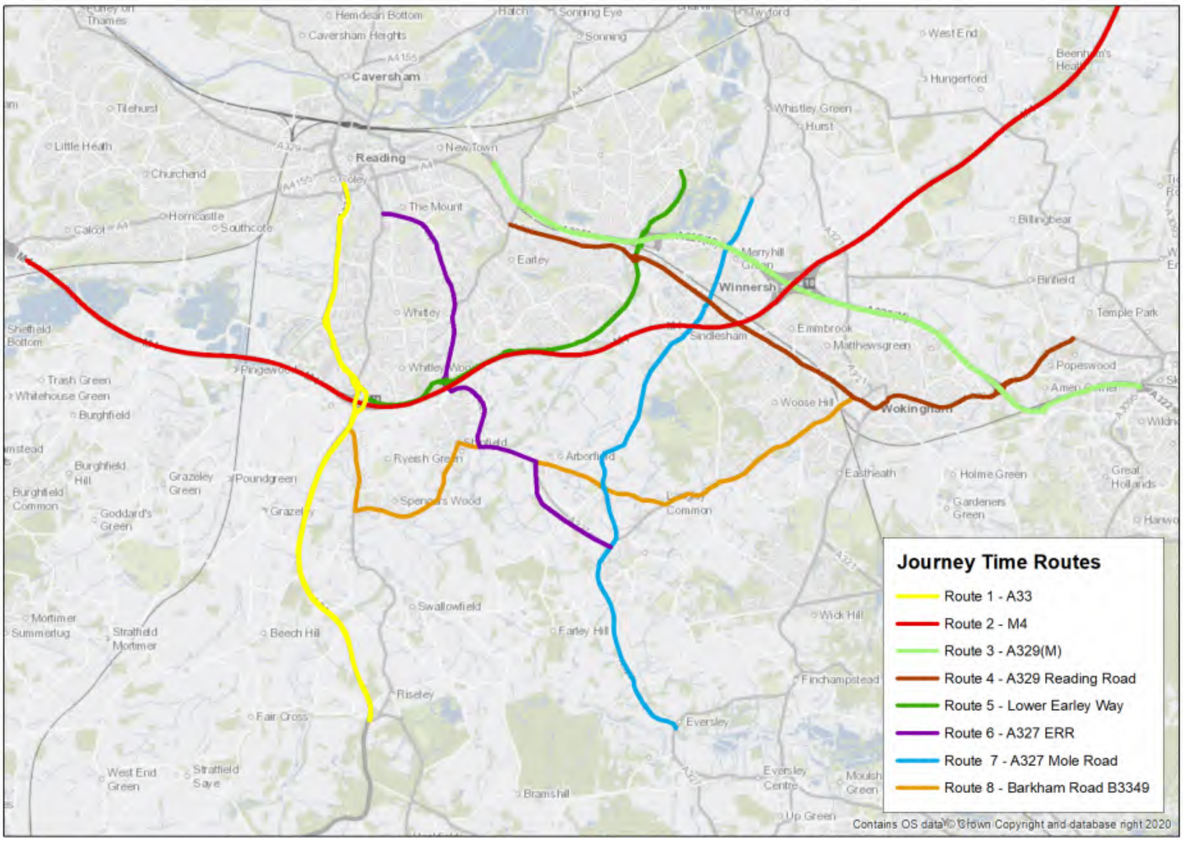

Figure 6: WSTM4 Journey Time Routes

AM Peak Hour

4.2.24 In the 2032 **Reference Case**, the average travel times across all examined routes are expected to increase by approximately 4.5%. For context, this increase is projected to be around 14% in the 2040 Reference Case. The majority of the routes show an increase in travel times. However, the eastbound B3270 Lower Earley Way route is an exception, where a decrease in travel times is forecast. This is likely due to a drop in local trips between M4 J11 and M4 J10, which could be a result of the smart motorway implementation since the modelled base year.

4.2.25 In the **Scenario 1A** analysis, the impact of strategic development is apparent in comparison to the Reference Case. All routes are forecast to see a journey time increase, which is on average 3.8%. for context, this increase is estimated to be on average 9.4% in 2040 Scenario 1A.

4.2.26 As would be expected, the immediate routes around Hall Farm / Loddon Valley are affected most. Increases slightly further away are less pronounced, for example on the A329(M).

4.2.27 It is estimated that in **Scenario 1B** the journey time changes are likely to be of the same level to those forecast in Scenario 1A.

PM Peak Hour

4.2.28 The **Reference Case** in the PM Peak Hour forecasts journey time increases on almost all routes and range between 12 seconds and 2 minutes 46 seconds observed on the A327 route in the northbound direction, which stretches between Arborfield and the Mount in Reading.

4.2.29 In **Scenario 1A** there are further increases in journey times on all routes, which are on average 3.7%.

4.2.30 With the addition of the dualling on the A327 section south of Black Boy roundabout, **Scenario 1B** forecasts slight improvements when compared to Scenario 1A.

Local Highway Network Maximum Turn V/C

4.2.31 Appendix I includes these outputs. It should be noted that the results do not highlight whether the capacity constraint is on a major or minor arm of each junction, or whether there are multiple arms with capacity constraint.

4.2.32 In the **Reference Case** in the morning peak hour, it is forecast that several junctions along the A327 Shinfield Road corridor, A33 corridor and at several junctions around M4 J11 will have a Volume over Capacity (V/C) ratio close to 1.0 or exceeding 1, which indicates that traffic issues are anticipated in the network before considering the additional traffic from strategic development in Wokingham. In addition, in the evening peak several junction around Showcase roundabout in Winnersh and junction around Coppid Beech are forecast to have a V/C close or exceeding 1.

4.2.33 Under **Scenario 1A**, many of the junctions previously identified as congested are predicted to experience further performance deterioration.

4.2.34 **Scenario 1B** generally predicts a similar level of the V/C ratios. This is expected considering there is little difference in assumptions between Scenario 1A and Scenario 1B.

4.2.35 The results in the PM peak hour show a similar pattern.

Strategic Model Assessment Summary

4.2.36 The strategic modelling results are in line with expectations, that planned growth in traffic generated inside and outside of Wokingham Borough creates a notable impact on highway network operation in the 2032 Reference Case Scenario. However, the impact is not as material as in the 2040 Reference Case scenario described in the main report.

4.2.37 Conditions worsen with introduction of Local Plan development at local points areas of Hall Farm / Loddon Valley as presented in Scenario 1A, noting that the new Mill Lane – Hatch Farm Link is considered as a site access scheme in S1A and therefore provide some relief to the Mill Lane Area . The additional highway capacity provided south of Black Boy roundabout in Scenario 1B will deliver local betterment to travel conditions when compared to Scenario 1A.

4.3 Microsimulation Model Assessment Results

4.3.1 Traditional strategic models including the WSTM4 are limited in their treatment of driver behaviour, signals and temporal segmentation. In the WSTM4 signals are modelled with fixed timings, representation of driver behaviour is simplified and represented as average across modelled morning and evening peak hours.

4.3.2 The microsimulation model developed for this project provides a much richer treatment of signals allowing for vehicle actuation. The model is based on the behaviour and interactions of individual drivers and vehicles. A microsimulation model can illustrate traffic dynamics, such as lane changes/weaving, gap acceptance, car-following and signal control, thereby capturing 'real world' delays.

4.3.3 Therefore, for this study a hybrid approach has been adopted, which is a method that integrates microsimulation and macrosimulation models. The strategic model generates traffic demand, assigns it to routes and an output provides an indication of congestion hotspots, changes in flows and delays. The microsimulation model aims to refine the results of the strategic model by considering a greater level of detail in which it represents the highway network and driver behaviour.

4.3.4 The outputs associated with the microsimulation modelling are included at the appendices referenced in each subsection below. The outputs of the microsimulation model are presented in the context of the development impact produced by the strategic model but represent a more detailed analysis on the modelled area, which stretches between M4 J11 (west) and A329 Berkshire Way (east) in Bracknell.

Journey Times

4.3.5 To understand the impact of the development proposals on the performance of the LRN, journey times for select routes have been extracted from the VISSIM model. Table 7 below compares the 2032 Reference Case and 2032 Option 1B LRN journey times. Appendix J includes the full set of results.

Table 7: Local Road Network – Microsimulation Vehicle Travel Time Results for 2032 Ref Case vs 2032 Scenario 1B.

ID	Route	2021 Base Year	2032 Ref Case	2032 Opt 1b	Difference (2032 Ref - Base)	Difference (2032 Opt 1B - 2032 Ref)
AM Peak						
1	A33 Basingstoke Road - SB	03:48	04:06	04:51	00:18	00:44
2	A33 Basingstoke Road - NB	03:15	03:48	08:20	00:33	04:32
5	A33 to Beeston Way	06:27	06:50	10:06	00:23	03:16
6	Beeston Way to A33	08:14	08:29	07:10	00:15	-01:18
7	Beeston Way to Bader Way	09:38	09:37	09:02	-00:01	-00:35
8	Bader Way to Beeston Way	09:08	09:10	09:05	00:02	-00:06
9	A329M to Peacock Lane	08:10	08:11	08:19	00:01	00:08
10	Peacock Lane to A329M	08:25	08:46	09:21	00:21	00:34
11	M4 West to A33 North	02:49	02:54	03:48	00:05	00:55
12	A33 North to M4 West	03:21	03:52	04:38	00:31	00:46
13	M4 West to A33 South	05:31	05:50	06:08	00:19	00:18
14	A33 South to M4 West	03:03	03:07	05:17	00:03	02:10
AVERAGE		**05:59**	**06:13**	**07:10**	**00:14**	**00:57**
PM Peak						
1	A33 Basingstoke Road - SB	04:03	06:49	06:35	02:46	-00:14
2	A33 Basingstoke Road - NB	03:24	04:01	03:56	00:37	-00:05
5	A33 to Beeston Way	06:52	08:23	08:55	01:31	00:32
6	Beeston Way to A33	07:16	10:54	07:37	03:38	-03:17
7	Beeston Way to Bader Way	08:09	09:20	08:29	01:11	-00:51
8	Bader Way to Beeston Way	08:01	08:43	08:56	00:42	00:14
9	A329M to Peacock Lane	08:29	08:27	08:54	-00:02	00:27
10	Peacock Lane to A329M	08:29	10:20	11:03	01:51	00:44
11	M4 West to A33 North	02:37	02:31	02:54	-00:06	00:23
12	A33 North to M4 West	04:08	06:50	06:29	02:42	-00:21
13	M4 West to A33 South	05:41	05:23	06:02	-00:18	00:39
14	A33 South to M4 West	02:58	03:10	03:21	00:12	00:10
AVERAGE		**05:51**	**07:04**	**06:56**	**01:14**	**-00:08**

AM Peak Hour

4.3.6 During the morning peak hour, the **Reference Case** forecasts an average delay increase of 14 seconds across all routes on the local highway network, compared to the Base. Although 13 of the 14 routes show an increase, the increase for all routes is low. The greatest increase is 33 seconds on the A33 Basingstoke Road - Northbound.

4.3.7 When comparing **Scenario 1B**, which includes additional trips in 2032 from the Local Plan Update and mitigation measures to the Reference Case, an average increase of 57 seconds is forecast across all routes on the LRN. The most substantial increase is expected on Route 2, the A33 Basingstoke Road - Northbound, where the additional development contributes an extra delay of 4 minutes and 32 seconds to the previously forecasted delay of 3 minutes and 48 seconds in the Reference Case. The A33 to Beeston Way and A33 to M4 (West) also show large increases in travel time exceeding two minutes. These three routes all pass through the A33 (south) approach of the M4 J11. Green time on the A33 (south) approach to the M4 Junction 11 has been restricted to allow more green time to be provided to the M4 J11 slip roads to ensure that the queue does not extend back onto the mainline. Hence journey times increase on the A33 (South) through M4 J11.

4.3.8 As further analysis at the M4 J11, shows a 60 second increase in delay and a 99-metre increase in queue lengths on the A33 (south) approach. This queue extends to the Basingstoke Road / Three Mile Cross Junction. At this junction, there is a 72 second increase in delay and 139 metre increase in queue length on the A33 (south) approach.

4.3.9 The proposals to convert the current mini roundabout at the Three Mile Cross junction (Church Lane/Basingstoke Road) to a signalised T junction, does not provide additional capacity, but allows the flows through this junction to be better managed and to balance out the queues on the approaches and will allow better management of this corridor between the A33.

PM Peak Hour

4.3.10 The PM Peak Hour forecast shows an average increase across all journeys of 1 minutes 14 seconds in the **Reference Case** when compared to the Base.

4.3.11 There is a notable increase in delays of over 2 minutes for the A33 southbound, Beeston Way to A33 and A33 North to M4 West. These routes all pass through the M4 Junction 11.

4.3.12 When comparing **Scenario 1B** with the Reference Case, there is an estimated average reduction of 8 seconds in delays across all routes. The optimisation of signals at M4 J11 result in a significant reduction in delays along Route 6 'Beeston Way to A33' moving westbound, which was previously identified as a congestion hotspot in the Reference Case. This route is estimated to experience a 3 minute and 17 second decrease in journey times.

4.3.13 The greatest increase in travel time experienced in the PM peak hour is from Peacock Lane to the A329 (M) which experiences an increase in travel times of 44 seconds. This is primarily due to a 45 second increase in delay on the Peacock Lane (East) arm of the Peacock Lane / Osprey Avenue junction.

Delay Heatmaps

4.3.14 Appendix K includes the delay heatmap outputs. These outputs graphically illustrate modelled network performance and the analysis presented in this section describes results based on a visual comparison of the Reference Case and Scenario 1B figures. Quantitative results are presented in the next section of this report.

AM Peak Hour

4.3.15 The Reference Case and Scenario 1B show similar patterns in terms of where delays occur on the highway network.

4.3.16 Option 1B shows more delays on the A33 south of the M4 J11 compared to the Reference Case. In Option 1B, significant delay is shown extending to the Three Mile Cross junction, whereas in the Reference Case, significant delay only extends about a quarter the way to this junction. The M4 J11 eastbound off-slip however shows slightly less delay in Option 1B compared to the Reference Case. The other approaches to the M4 J11 are similar in Option 1B compared to the Reference Case.

4.3.17 Moving further east, all approaches except the southern approach to the Black Boy roundabout show major delays in Scenario 1B.

4.3.18 The closure of Mill Lane to through traffic in Scenario 1B leads to improved operation of the Lower Earley Way North/Rushey Way roundabout, which had significant queues and delays in the Reference Case.

4.3.19 Visually, the Hatch Farm Way/Lower Earley Way junction is expected to operate with the same efficiency in Scenario 1B as it did in the Reference Case.

4.3.20 At the Showcase Roundabout (A3290 / Reading Road / B3270), option 1B considers the LPU development. As development increase north-south flows on the B3270, when the model re-optimises the junction it gives more green-time to this traffic. The model therefore forecast greater delays on the Reading Road (east) arm.

4.3.21 The heatmaps show the approach from the east to the Peacock Lane/Vigar Way roundabout and Berkshire Way (east) at Jennett's Park Roundabout is predicted to experience delays and queuing in Scenario 1B.

PM Peak Hour

4.3.22 In the Reference Case, delays are forecast on both the southbound and northbound approaches of the A33 to M4 J11, coming from Reading and Basingstoke respectively. Scenario 1B presents a similar pattern.

4.3.23 The Reference Case forecasts delays at the Black Boy roundabout, mainly on the eastbound approach, with lesser delays on the gyratory. In Scenario 1B, these delays are more pronounced, especially on the eastbound approach.

4.3.24 The Hatch Farm Way/Lower Earley Way junction is visually expected to operate as efficiently in Scenario 1B as it did in the Reference Case.

4.3.25 Delays are predicted on the westbound approach on London Road at the Coppid Beech roundabout in the Reference Case. These delays are reduced in Scenario 1B due to signal optimisation.

4.3.26 At Jennett's Park roundabout, Scenario 1B forecasts an increase in delays on the A329 Berkshire Way approach compared to the Reference Case.

Average Queue Length and Delay

4.3.27 Appendix L presents results of this analysis. Not all junctions are included due to the large number of junctions in the model.

AM Peak Hour

4.3.28 Table 8 below shows the weighted average queue length and delay for selected junctions. In a microsimulation model, the weighted average queue length is a measure of traffic congestion. The weighted average queue length represents the average length of the queue across all junction arms weighted by flow estimated on those arms. The weighted average delay is another measure used to assess traffic congestion. It represents the average delay experienced by vehicles at the junction, with the average being weighted based on the volume of traffic on each arm of the junction. In other words, arms with higher traffic volumes will contribute more to the average delay than those with lower volumes.

4.3.29 Appendix L provides more detailed analysis, including queue and delay results for each individual junction arm.

Table 8: AM Peak weighted average queue lengths and delay for selected junctions

Junction	Weighted Average Queue Lengths (metres)			Weighted Delay (seconds per vehicle)		
	2032 Ref Case	2032 Scenario 1B	Difference (Scenario 1b - Ref Case)	2032 Ref Case	2032 Scenario 1b	Difference (Scenario 1b - Ref Case)
M4 Junction11	73.2	105.2	32.0	61.7	93.3	31.6
M4 Junction10	15.1	12.6	-2.5	16.9	1.7	-15.2
Basingstoke Road / Three Mile Cross	40.4	79.2	38.8	44.1	124.4	80.3
Basingstoke Road / Church Lane	20.3	26.4	6.1	33.4	53.6	20.2
Black Boy Junction	52.0	96.0	44.0	14.2	42.8	28.6
Eastern Relief Road / Hawthorn	3.5	2.2	-1.3	0.1	0.1	0.0
B3270 / Meldreth Way	5.2	6.4	1.2	0.9	2.2	1.3
B3270 / Rushey Way / Mill Lane	44.3	26.1	-18.3	163.3	88.3	-75.0
B3270 / Hatch Farm Way	30.8	32.8	1.9	28.9	34.0	5.2
A329 / B3270 / A3290	48.0	54.6	6.6	36.9	78.2	41.3
A3290 / Wharfedale Rd	15.2	15.7	0.5	11.7	13.9	2.2
Wharfedale Rd / A329M	20.8	12.8	-8.0	12.2	9.2	-3.0
A3290 / A329M / Bader Way	27.0	27.2	0.2	27.0	26.4	-0.6
Brookers Hill / Shinfield Road / Hollow Lane	14.6	15.7	1.1	5.8	6.1	0.3
Coppid Beech Roundabout	24.3	26.9	2.6	21.2	29.1	8.0
A329 London Road / Oak Avenue	22.8	16.3	-6.5	18.8	13.0	-5.8
Jannett's Park Roundabout	15.6	25.2	9.6	10.0	30.4	20.4
Peacock Lane / Vigar Way	10.1	15.6	5.5	11.0	26.0	15.0
Peacock Lane / Osprey Avenue	4.4	19.7	15.3	0.7	2.5	1.7
Peacock Lane / Sparrowhawk Way	3.8	3.4	-0.3	1.5	2.0	0.5
A329 London Road / William Heelas Way	30.4	23.8	-6.7	39.5	29.0	-10.4
A329 London Road / Plough Lane	3.9	4.5	0.6	1.6	3.7	2.1
B3408 London Road / Russell Chase / John Nike Way	32.2	33.0	0.8	27.8	29.1	1.3
B3270 / Beeston Way	16.3	23.8	7.5	18.5	35.0	16.5
B3270 / Cutbush Lane	8.0	7.1	-0.9	3.4	2.7	-0.7

4.3.30 Locations with notable comparative changes between the scenarios include:

- Basingstoke Road / Three Mile Cross signalised junction

  Overall junction delay is predicted to increase by 80 seconds. The average queue length on the northbound A33 approach is forecast to increase from 24m in the Reference Case to 163m in Scenario 1B and the average delay is estimated to increase from 28 seconds to 100 seconds. These findings align with the results presented earlier.

- Black Boy roundabout

  Overall junction delay is predicted to increase by almost 29 seconds. This is due to increased delays on A327 Shinfield Road (north) and B3270 (west) arms.

  The average delay on the A327 Shinfield Road arm (north) is forecast to increase from 42 seconds in the Reference Case to 173 seconds in Scenario 1B and the average queue is estimated to increase from 9m to 177m respectively.

  The average delay on the B3270 (west) arm is forecast to increase from 65 seconds in the Reference Case to 180 seconds in Scenario 1B. However, the increases in delays do not result in material changes in queues between the two scenarios, thus indicating that there may be sufficient stacking capacity on the approach.

  The changes on the other arms are insignificant.

- Showcase cinema roundabout.

  Overall delay at this junction increases by 41 seconds.

  Queues on the A329 Reading Road approach (east) are forecast to increase from 61m in the Reference Case to 381m in Scenario 1B, whereas delays are forecast to increase from 71 seconds to 149 seconds. These forecasts are a result of the signal optimisation at this location, which have prioritised the A3290 and B3270 movements in the Scenario 1B with the 2032 LPU trips included. The A3290 and B3270 movements have been prioritised to reduce the likelihood of queues extending to the A329 (M) / A3290 and the Lower Earley Way / Hatch Farm Way junctions. Therefore, queuing traffic on the A329 Reading is necessary to ensure that the A329(M) / A3290 junctions operate efficiently. The Reading Road link, shows an increase in queues which fluctuates subject to timeline and wider mitigation, therefore would be monitored as mitigation can only be provided locally at the junction.

PM Peak Hour

4.3.31 Table 9 below shows the weighted average queue length and delay for selected junctions. Appendix L includes full queue and delay results.

Table 9: PM Peak weighted average queue lengths and delay for selected junctions

Junction	Weighted Average Queue Lengths (metres)			Weighted Delay (seconds per vehicle)		
	2032 Ref Case	2032 Scenario 1B	Difference (Scenario 1b - Ref Case)	2032 Ref Case	2032 Scenario 1b	Difference (Scenario 1b - Ref Case)
M4 Junction11	122.7	111.7	-11.0	84.2	79.9	-4.3
M4 Junction10	13.0	13.6	0.6	18.9	30.1	11.2
Basingstoke Road / Three Mile Cross	39.2	48.2	8.9	37.9	55.8	17.9
Basingstoke Road / Church Lane	8.5	16.2	7.7	13.8	42.2	28.5
Black Boy Junction	48.3	65.6	17.3	15.0	16.7	1.7
Eastern Relief Road / Hawthorn	6.6	12.1	5.5	0.9	18.6	17.7
B3270 / Meldreth Way	5.3	4.9	-0.4	0.8	0.8	0.0
B3270 / Rushey Way / Mill Lane	23.6	16.9	-6.7	28.1	8.3	-19.8
B3270 / Hatch Farm Way	26.3	30.8	4.5	23.3	24.4	1.1
A329 / B3270 / A3290	45.4	50.0	4.6	26.1	34.0	7.9
A3290 / Wharfedale Rd	19.1	17.9	-1.2	12.5	13.2	0.7
Wharfedale Rd / A329M	24.9	22.2	-2.7	20.2	18.2	-2.0
A3290 / A329M / Bader Way	45.2	44.0	-1.2	78.5	67.3	-11.3
Brookers Hill / Shinfield Road / Hollow Lane	13.2	13.6	0.4	4.9	4.8	-0.1
Coppid Beech Roundabout	30.5	32.8	2.3	31.7	39.3	7.7
A329 London Road / Oak Avenue	17.1	18.2	1.1	13.6	16.0	2.4
Jannett's Park Roundabout	22.7	48.7	26.0	18.4	75.5	57.1
Peacock Lane / Vigar Way	21.2	27.4	6.3	22.9	51.4	28.5
Peacock Lane / Osprey Avenue	44.0	59.1	15.2	34.6	58.8	24.2
Peacock Lane / Sparrowhawk Way	5.2	4.8	-0.5	4.7	4.7	0.0
A329 London Road / William Heelas Way	22.0	22.2	0.3	28.4	28.6	0.1
B3408 London Road / Russell Chase / John Nike Way	32.5	37.7	5.2	33.4	44.2	10.9
Basingstoke Road / Tabby Drive	17.0	25.8	8.8	30.2	71.6	41.4
B3270 / Beeston Way	13.5	13.7	0.2	11.5	14.1	2.7
B3270 / Cutbush Lane	8.4	8.0	-0.4	3.4	3.2	-0.2

4.3.32 Locations with notable comparative changes between the scenarios include:

- In Bracknell, Jennett's Park roundabout is forecast to have increased queues and delays on Berkshire Way (east) arm, which leads to a 57 second overall increase in delay at the roundabout. The average queue on this approach is forecast to reach 198m in Scenario 1B (an increase from 38m in the Reference Case). The delays on the same arm increase from 32 to 102 seconds. The delay on this approach exceeds the cycle time for this junction, which is less than a minute. This means traffic on this arm could expect to wait for the second or third cycle to clear the junction. The increase in delay on this arm is due to signal optimisation at this roundabout, which aimed to prioritise the flow on the Berkshire Way (west) arm, the queue from which can otherwise block Coppid Beech roundabout. A merge / diverge assessment has been undertaken for the Coppid Beech / A329 (M) southbound merge. This merge / diverge assessment shows that the current arrangement can accommodate the future option 1b traffic. Some junctions in Bracknell located south of the Jennett's Park Roundabout (e.g. Peacock Lane / Vigar Way roundabout, and Peacock Lane / Osprey Avenue, Peacock Lane / Butler Drive junction), will experience an increased queueing and congestion in Scenario 1B.

Microsimulation Model Assessment Summary

4.3.33 The microsimulation assessment completed for this study has aimed to complement the assessment using the WSTM4 by allowing a much richer treatment of signals and travel behaviour. Changes in journey times, delays and average queue lengths have been considered.

4.3.34 Overall, the analysis presented has demonstrated that the 2032 network with additional Local Plan Update development and mitigation can operate reasonably well despite a slight deterioration on some local routes when Scenario 1B (with Local Plan update growth) is compared to the Reference Case.

4.3.35 Changes in queues and delays have been quantified at a number of locations across the area of interest. There is no overarching trend to which locations are affected more or less by the addition of strategic development. At some junctions and junction approaches average queue and delays increase when comparing Scenario 1B to the Reference Case. At other junctions some arms are forecast to experience a reduction in delay and queuing.

4.4 Local Junction Modelling Results

4.4.1 Three junctions falling outside of the microsimulation modelled area have been assessed using standalone junction models created in the industry standard software packages respectively noted below. These are:

- A327 / Arborfield Road / Eastern Relief Road (Junctions 10)
- A327 / Reading Road / Observer Way (Junctions 10)
- Winnersh Crossroads (LinSig)

4.4.2 The effect of proposed strategic development and the mitigation package in Scenario 1B has been assessed against the Reference Case.

Junction A327 / Arborfield Road / Eastern Relief Road

4.4.3 The A327 / Arborfield Road / Eastern Relief Road junction has been modelled to include the improvement scheme which has been recently implemented as part of an existing permitted local application. As seen from the results presented in Appendix M the junction in 2032 Scenario 1B, with the partial LPU growth included, operates well within acceptable parameters, despite all the approaches experiencing minor increases in delays due to additional development trips.

Junction A327 / Reading Road / Observer Way

4.4.4 A scheme has been prepared for the A327 / Reading Road / Observer Way junction which provides an additional arm serving the Hall Farm / Loddon Valley development as well as an increased ICD (to 60m) to provide additional capacity.

4.4.5 The results in Appendix M show that, under the 2032 Scenario 1B, all the junction arms continue to function well within the acceptable limits despite all the approaches expected to see minor increases in delays due to the addition of trips from new development.

Winnersh Crossroads

4.4.6 The A329/B3030 Winnersh Crossroads junction model is considered to provide the optimal traffic capacity whilst preserving active travel connections. The model was allowed to reoptimise the cycle times and signal timings for each scenario, as it is expected that wider mitigation proposals will redistribute some traffic thereby supporting some reallocation of green times to other movements within the junction.

4.4.7 The data presented in Appendix M for the A329/B3030 Winnersh Crossroads junction indicates that the Degree of Saturation (DoS) is expected to stay under 66.8% during the morning (AM) peak and under 86.5% during the evening (PM) peak in the Reference Case scenarios. In the case of Scenario 1B, the DoS is forecast to stay under 74.7% during the AM peak and under 88.9% during the PM peak.

4.4.8 Significantly, the results of the assessments do not change materially between the Reference Case and Scenario 1B.

5 Strategic Road Network Analysis

5.1 Introduction

5.1.1 This section presents an analysis of the Strategic Road Network (SRN) in the vicinity of the proposed strategic developments.

5.2 M4 Mainline Operation

5.2.1 The WSTM4 assessment outputs show there to be immaterial changes in flows or journey times along the M4 within any of the development scenarios in comparison to the Reference Case within the AM and PM Peaks.

5.2.2 Appendix E includes the flow difference outputs extracted from the WSTM4. These consider Scenario 1A and 1B against the Reference Case. The Reference Case has also been compared against Base.

5.2.3 In the Reference Case in the AM Peak hour there are substantial flow increases forecast on the M4 mainline in comparison to the base scenario, reflecting the significance of the smart motorway upgrade since the 2021 Base scenario.

5.2.4 Scenario 1A (with LPU growth) will see an additional 2,786 vehicles trips added to the model network in the AM peak hour. However, the flow increases on the M4 mainline between J11 and J10 will be immaterial, the eastbound flow is forecast to increase by 52 vehicles on the M4 between J10 and J11 and westbound flow is forecast to increase by 49 vehicles. In the PM peak hour with the addition of 2,157 vehicle trips on the model network, the flow increase on the same section of the M4 is forecast to be 12 vehicles in the eastbound direction and 34 vehicles in the westbound direction.

5.2.5 In Scenario 1B, which has the same level of LPU vehicular trips loaded onto the network as Scenario 1A but includes the additional northbound lane south of Black Boy roundabout, the magnitude of flow changes is similar to those in Scenario 1A. In the AM peak hour, the flow changes on the M4 mainline between J11 and J10 range between 53 vehicles and 59 vehicles, and in the PM peak, the flow changes are up to 35 vehicles.

5.2.6 To understand the impact of the development proposals on the performance of the M4 mainline, journey times have been extracted from the WSTM4. The M4 routes cover the section of motorway between M4 J12 and J8/9. Appendix H includes the full results.

5.2.7 The impact of the removal of traffic management measures for smart motorway roadworks is apparent, as in both peak hours the model is forecasting a material decrease in journey times in both directions in the Reference Case when compared to the base.

5.2.8 In the Scenario 1A or Scenario 1B analysis, the impact of strategic development on travel times on the M4 mainline is less than one second in comparison to the Reference Case.

5.2.9 More detailed assessment of the M4 mainline operation was undertaken using the microsimulation model with journey time results presented in Appendix J (routes 3 and 4). The results show that in Scenario 1B (with the development and mitigation included) journey times are lower than Reference Case modelled journey times, which is largely the impact of further optimisation of M4 J11 in Scenario 1B to manage queueing at this location.

5.3 M4 Junction 11 Operation

5.3.1 In the WSTM4 Reference Case models, J11 is forecast to have a maximum turn V/C of 0.94 in the AM Peak Hour and 0.97 in the PM peak hour. The max V/Cs across the junction are shown as being tidal to Reading, with the AM Peak A33 northbound approach nodes being flagged, whilst PM Peak southbound approach nodes are flagged. This indicates that parts of the junction will be approaching capacity before the introduction of the LPU development and there is a likelihood of queuing and delay.

5.3.2 With the introduction of additional traffic in 2032 from LPU development in Scenario 1A or Scenario 1B, the V/Cs at J11 are predicted to slightly worsen, with no locations showing a V/C exceeding 1.0.

5.3.3 The WSTM4 results indicate that the junction is close to capacity across all scenarios, however the LP scenario 1B does not show any significant net detriment in comparison to the Reference Case due to significant level of mitigation included in Scenario 1B.

5.3.4 The VISSIM microsimulation model shows that during the morning peak hour, the overall junction delay is predicted to increase by 32 seconds in Scenario 1B when compared to the Reference Case with the A33 (South) and M4 (West) approaches being affected the most (60 and 43 seconds increases from 69 and 65 seconds in the Reference Case). During the evening peak hour, the changes are not as high as they are in the morning with the overall junction delay in Scenario 1B being very close to the Reference Case.

5.4 M4 Junction 10 Operation

5.4.1 Junction 10 shows no issues with Max V/C or absolute delay at any of the merges within the WSTM4 model in the Reference Case or any of the assessment scenarios. Within the VISSIM model the delay heatmaps indicate the model operating within capacity and predominantly free flow conditions being observed within the Reference case and the Scenario 1B model.

5.5 Section Summary

5.5.1 The analysis conducted using the strategic model and the microsimulation model has shown that the proposed level of development could be accommodated on the SRN.

5.5.2 There are immaterial changes in flows or journey times along the M4 within any of the development scenarios in comparison to the Reference Case in both peaks.

5.5.3 The M4 J11 improvements (2004) were developed to support growth to 2026 so it is unsurprising these are forecast to operate close to capacity in the Reference Case. The LPU scenarios do not show any significant net detriment on the junction performance in comparison to the Reference Case.

5.5.4 The analysis of the M4 J10 demonstrates that it would operate within capacity with predominantly free flow conditions forecast within the Reference case and the Scenario 1B models.

6 Summary and Conclusion

6.1 Summary

6.1.1 Wokingham Borough Council (WBC) is reviewing its development plan policy and preparing a new local plan (Local Plan Update) for 2040. Stantec was commissioned to provide transport and highways support for this plan, focusing on the impact of future housing and employment growth options. A study reported in the "Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report", July 2024 assessed the cumulative impact of several development sites, with a forecast for 2040. This report includes an interim assessment for 2032 to understand the phased development implications and necessary highway mitigations.

6.1.2 Three assessment scenarios have been considered: Reference Case, Development Scenario (Scenario 1A) and Development Scenario with mitigation (Scenario 1B).

6.1.3 A three-tier modelling framework has been adopted, which included strategic modelling using WSTM4, microsimulation modelling using a VISSIM model and local junction modelling thus leveraging the strengths of each modelling tier.

6.2 Local Highway Network Analysis

Strategic Model Assessment Summary

6.2.1 The results from the strategic modelling align with expectations and indicate that the increase in traffic originating both within and outside the Wokingham Borough in 2032 affects the operation of the highway network in the 2032 Reference Case Scenario. However, this impact is less significant compared to the 2040 Reference Case scenario detailed in the main report.

6.2.2 The addition of the partial Local Plan development is estimated to impact local roads especially in the vicinity of Hall Farm / Loddon Valley as depicted in Scenario 1A. The extra highway capacity introduced south of the Black Boy roundabout in Scenario 1B is projected to bring about some local improvements in travel conditions compared to Scenario 1A.

Microsimulation Model Assessment Summary

6.2.3 The microsimulation assessment completed for this study has aimed to complement the assessment using the WSTM4 by allowing a much richer treatment of signals and travel behaviour. Changes in journey times, delays and average queue lengths have been considered.

6.2.4 In general, the analysis indicates that the 2032 network, with the inclusion of additional Local Plan Update development and mitigation, can function reasonably well, even though there is a minor decline on some local routes when comparing Scenario 1B (with LPU growth) to the Reference Case.

6.3 Strategic Road Network Analysis

6.3.1 The analysis conducted using the strategic model and the microsimulation model has shown that the proposed level of development could be accommodated on the SRN. There are immaterial changes in flows or journey times along the M4 within any of the development scenarios in comparison to the Reference Case in both peaks.

6.3.2 M4 J11 is forecast to operate close to capacity in the Reference Case, where the RBC LP considered mitigations in WBC through enhanced Park & Ride and other mode shift mitigation. The LPU scenarios do not show any significant net detriment on the junction performance in comparison to the Reference Case, which is largely due to signal optimisation of the junction.

6.3.3 The analysis of M4 J10 forecasts that it would operate within capacity with predominantly free flow conditions forecast the Reference case and the Scenario 1B models.

6.4 Conclusions

6.4.1 The extensive transport assessment conducted for the Wokingham Local Plan Update (LPU) for an interim year of 2032 has provided a thorough analysis of the potential impacts on both the Local Road Network (LRN) and the Strategic Road Network (SRN). This assessment, utilising a robust three-tier modelling approach that includes strategic modelling, microsimulation, and local junction modelling, has been pivotal in understanding the implications of the phased development delivery and identifying necessary mitigation measures.

6.4.2 From the assessment of the LRN, it is evident that the proposed development, particularly around Hall Farm / Loddon Valley, would result in increased traffic volumes and potentially increased congestion at key junctions. However, overall, the network is forecast to function reasonably well, even though there is a minor decline in performance on some local routes.

6.4.3 The following LRN infrastructure may be required to achieve the performance forecast by the modelling exercise:

- Provision of a dual carriageway between Black Boy Roundabout and South Avenue
- New arm on Observer Way roundabout to accommodate access from Hall Farm / Loddon Valley and ICD increase to 60m
- New access to Mole Road from a Hall Farm development parcel
- Mill Lane closure to through traffic.
- New access to Mill Lane from a Hall Farm development parcel and a connection to Hatch Farm Way
- New roundabout on Old Wokingham Road to provide access from the South Wokingham extension
- Signal optimisation across a number of junctions including the M4 J11.

6.4.4 Based on the completed assessment, it is not suggested that additional mitigation measures considered in the 2040 assessment - such as the construction of an M4 bridge that would link the Hall Farm development with the B3270 Lower Earley Way - are necessary in 2032.

6.4.5 The 2032 assessment suggests that improvements to the A327 Eastern Relief Road may be necessary. However, it might be possible to limit the scale of development at Hall Farm, such as reducing employment, to maintain broadly acceptable conditions. These options could be further explored during the application process.

6.4.6 The SRN analysis, with a primary focus on the M4 corridor, indicates that the proposed developments are unlikely to cause significant changes in traffic flows or journey times on the M4 mainline. The existing infrastructure at M4 Junctions 11 and 10 is forecast to operate close to capacity; however, the LPU development scenarios (both Scenario 1A and Scenario 1B) do not significantly change conditions on these junctions when compared to the Reference Case. With signal optimisation at M4 Junction 11 modelled for 2032, it is suggested that the capacity at both M4 Junction 11 and Junction 10 will be sufficient to handle the forecasted traffic volumes up to 2032.

6.4.7 In summary, the findings of the 2032 transport assessment suggest that with the planned mitigation measures in place, the proposed level of development within the Wokingham LPU can be supported from a transport perspective. The assessment has also highlighted the significance of sustainable transport strategies and the need for ongoing monitoring to ensure that the transportation network remains functional and efficient as the developments progress. This will ensure that WBC can meet its objectives for growth while maintaining a sustainable and resilient transport system for the future. Adopting a "monitor and manage" approach in conjunction with these sustainable transport initiatives may prevent an over-delivery of highway improvements that could counterintuitively induce additional car trips.

Appendix A Hall Farm / Loddon Valley On-site 2032 Infrastructure Assumptions (Scenario 1A)

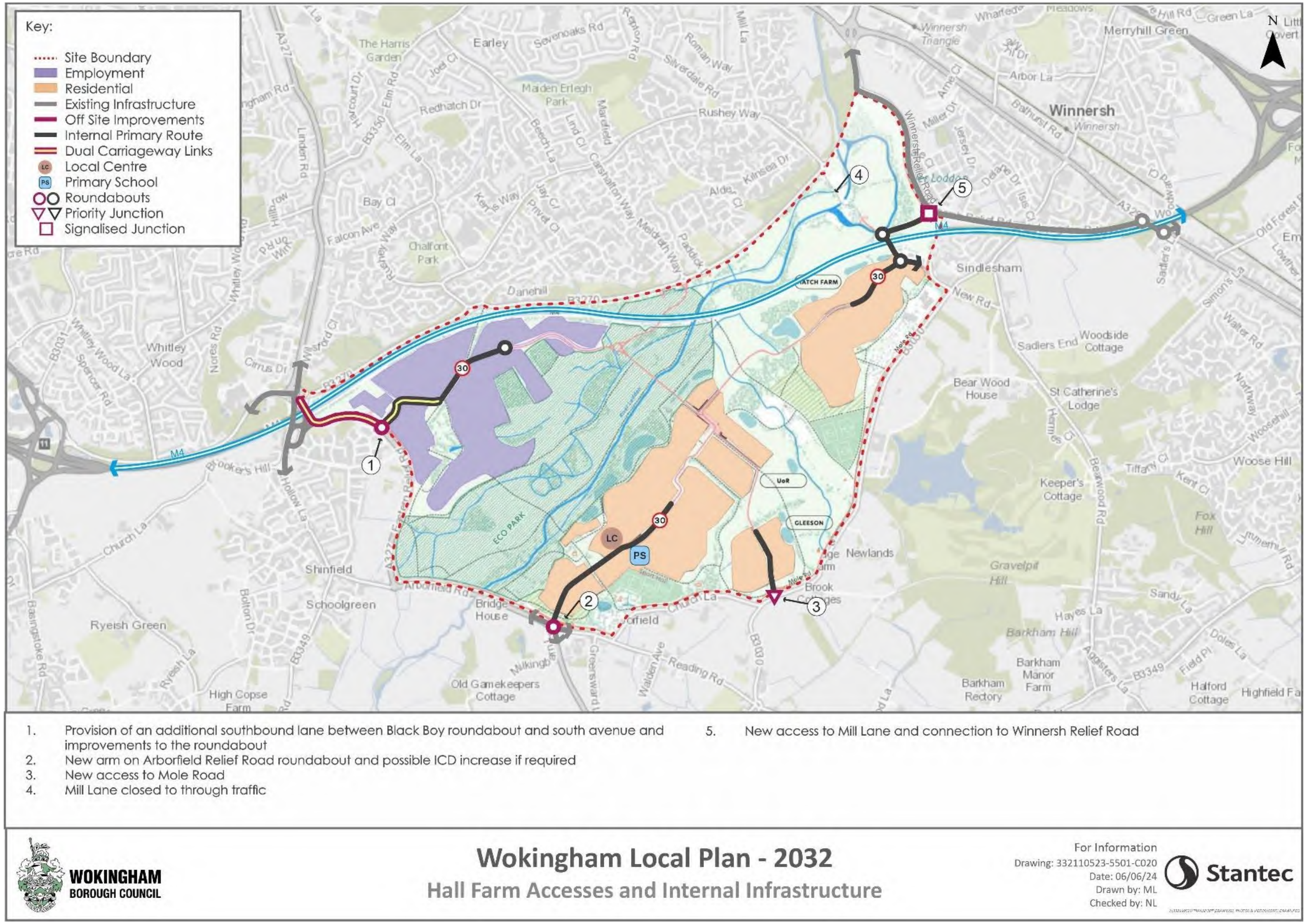

Figure 7: Hall Farm / Loddon Valley – Access and Internal Infrastructure

Table 10: Hall Farm / Loddon Valley – Access and Internal Infrastructure

	Infrastructure	Further Information
1	Provision of an additional southbound lane between Black Boy Roundabout and South Avenue and improvements to the roundabout.	As part of the recent Shinfield Studios planning application, land was identified to enable increased capacity at the roundabout and internal links within the TVSP in order to help safeguard the delivery of the Local Plan Update aspirations for Hall Farm / Loddon Valley. Provision of an additional southbound lane along the Shinfield Eastern Relief Road, which would form a segregated left turn leading to a dual lane section of internal road within the TVSP. Adoption of the existing speed limit of 40mph. Refer to Figure 8.
2	New arm on Arborfield Relief Road roundabout to accommodate access from Hall Farm / Loddon Valley and possible ICD increase if required.	Increased ICD from 51m to 60m. Single lane approach with a flare.
3	New access to Mole Road	Priority junction with access from Hall Farm / Loddon Valley being a minor arm.
4	Mill Lane closed to through traffic.	Access to Sindlesham roundabout is severed.
5	New access to Mill Lane and connection to Winnersh Relief Road	See Figure 9.

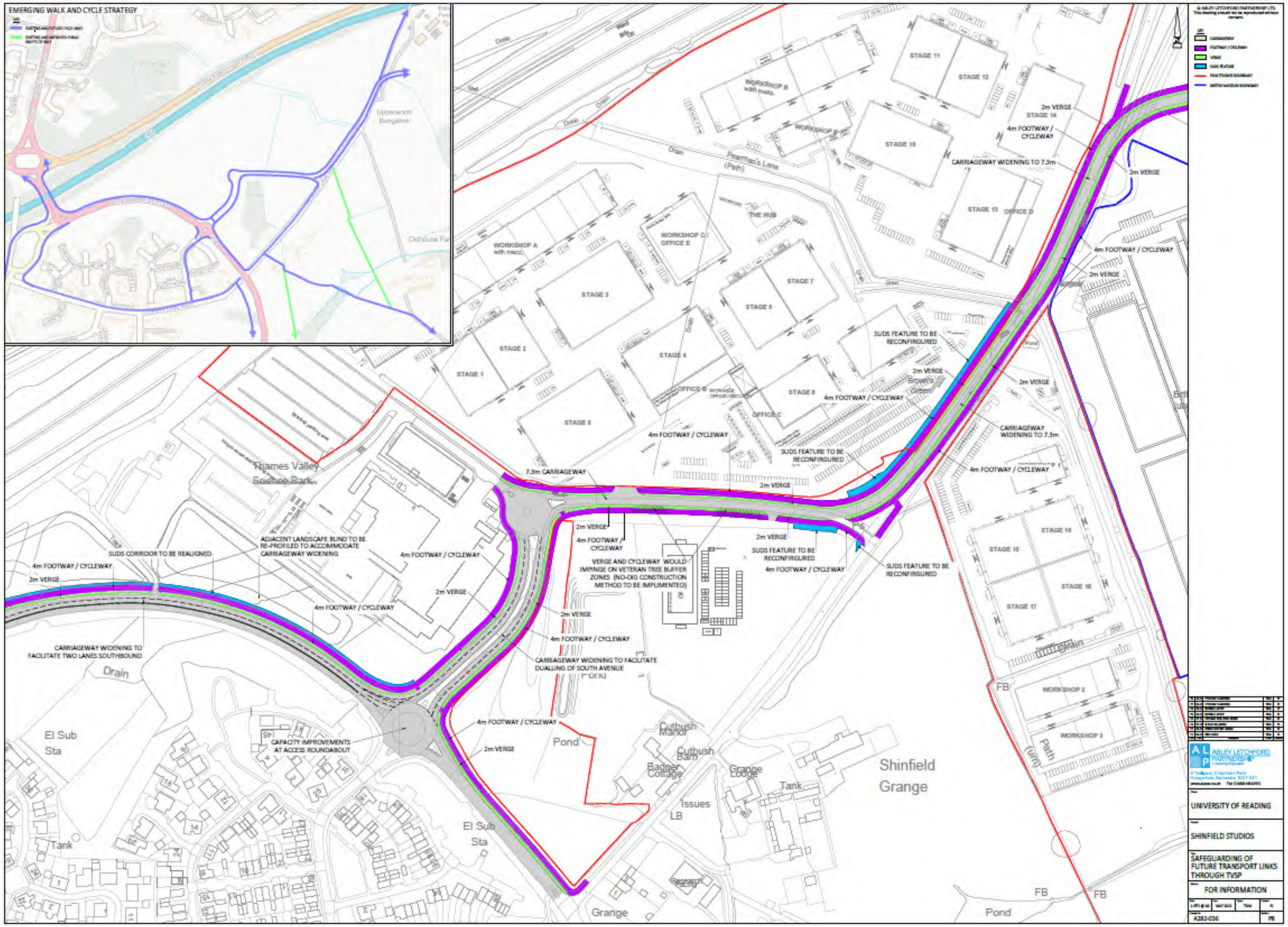

Figure 8: Provision of an additional southbound lane along the Shinfield Eastern Relief Road

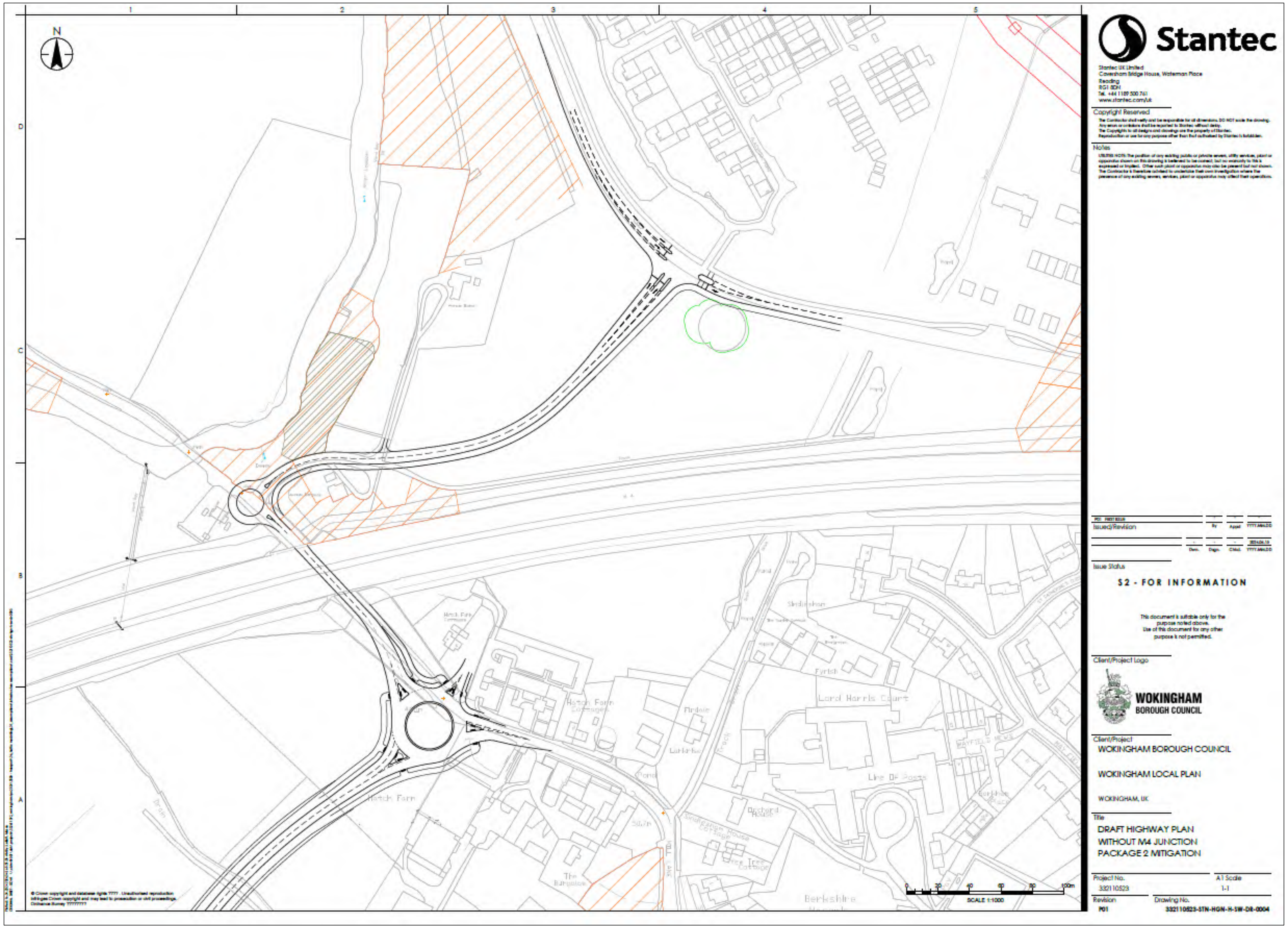

Figure 9: New access to Mill Lane and Connection to Winnersh Relief Road

Appendix B Hall Farm / Loddon Valley – 2032 Off-site Highway Mitigation Package

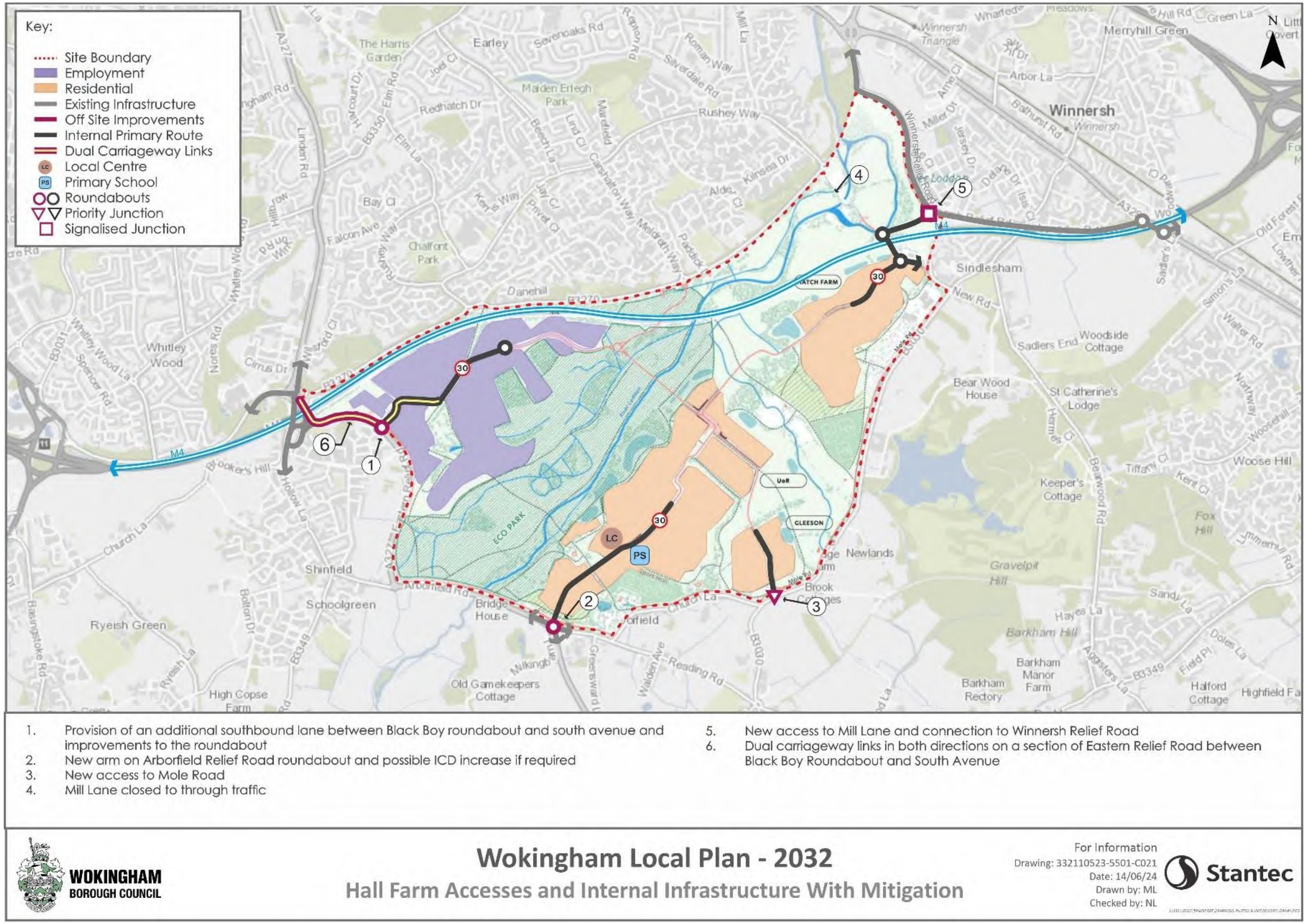

Figure 10: Hall Farm / Loddon Valley – Access and Internal Infrastructure & Mitigation Package

Table 30: Hall Farm / Loddon Valley –Schemes Additional to Access and Internal Infrastructure Included in Mitigation Package

No.	Infrastructure	Further Information
6	Dual carriageway links in both directions on a section of Eastern Relief Road between Black Boy Roundabout and South Avenue	Adoption of the existing speed limit of 40mph.

Appendix C South Wokingham Extension On-site Infrastructure Assumptions (Scenario 1A Assumptions)

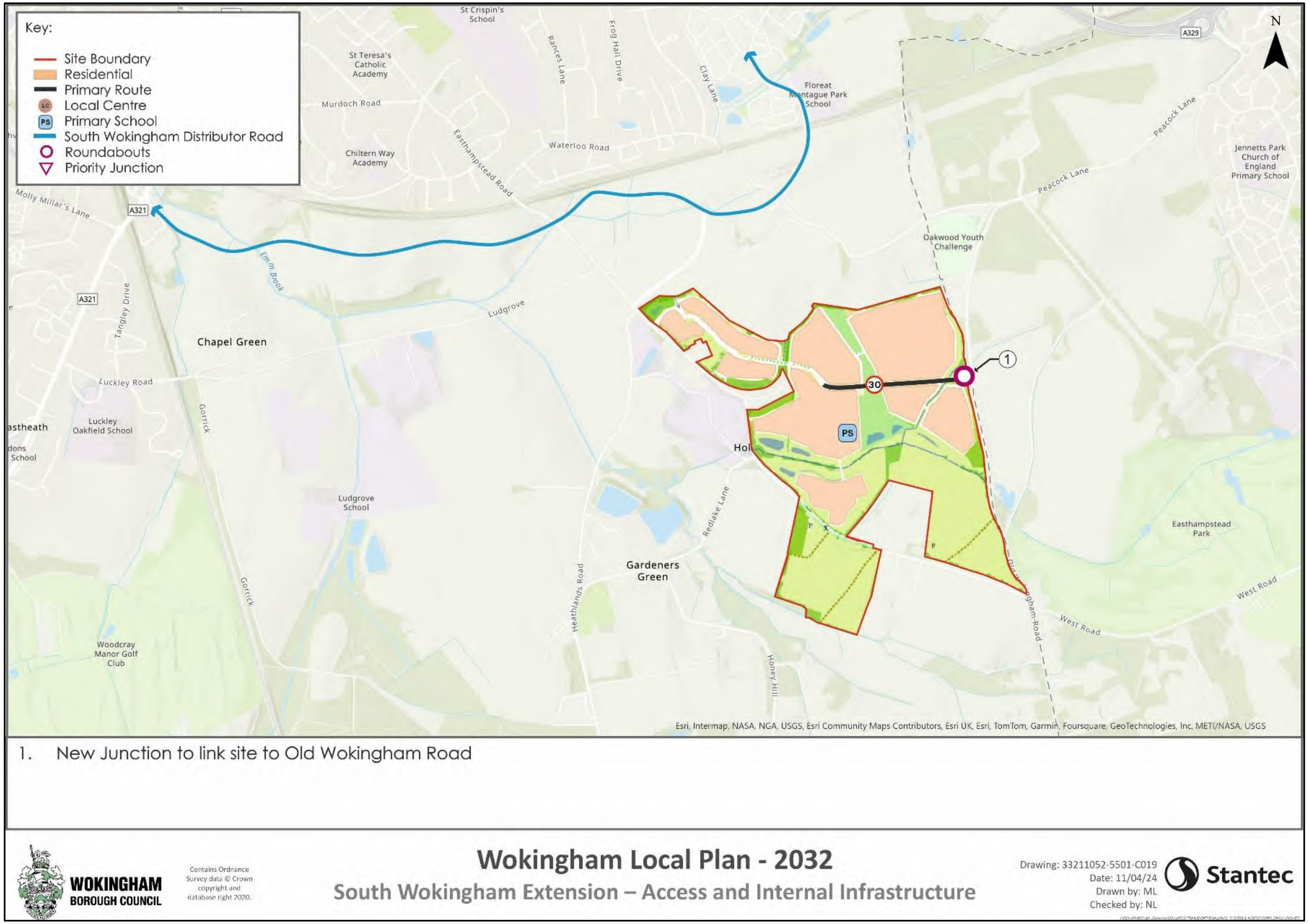

Figure 11: South Wokingham Extension – 2032 Access and Internal Infrastructure

Table 11: South Wokingham Extension – 2032 Access and Internal Infrastructure

	Infrastructure	Further Information
1	New roundabout to provide access from the site to Old Wokingham Road.	Single lane approaches on all arms of the roundabout (ICD 40m).

Appendix D WSTM4 Outputs. Actual Flows

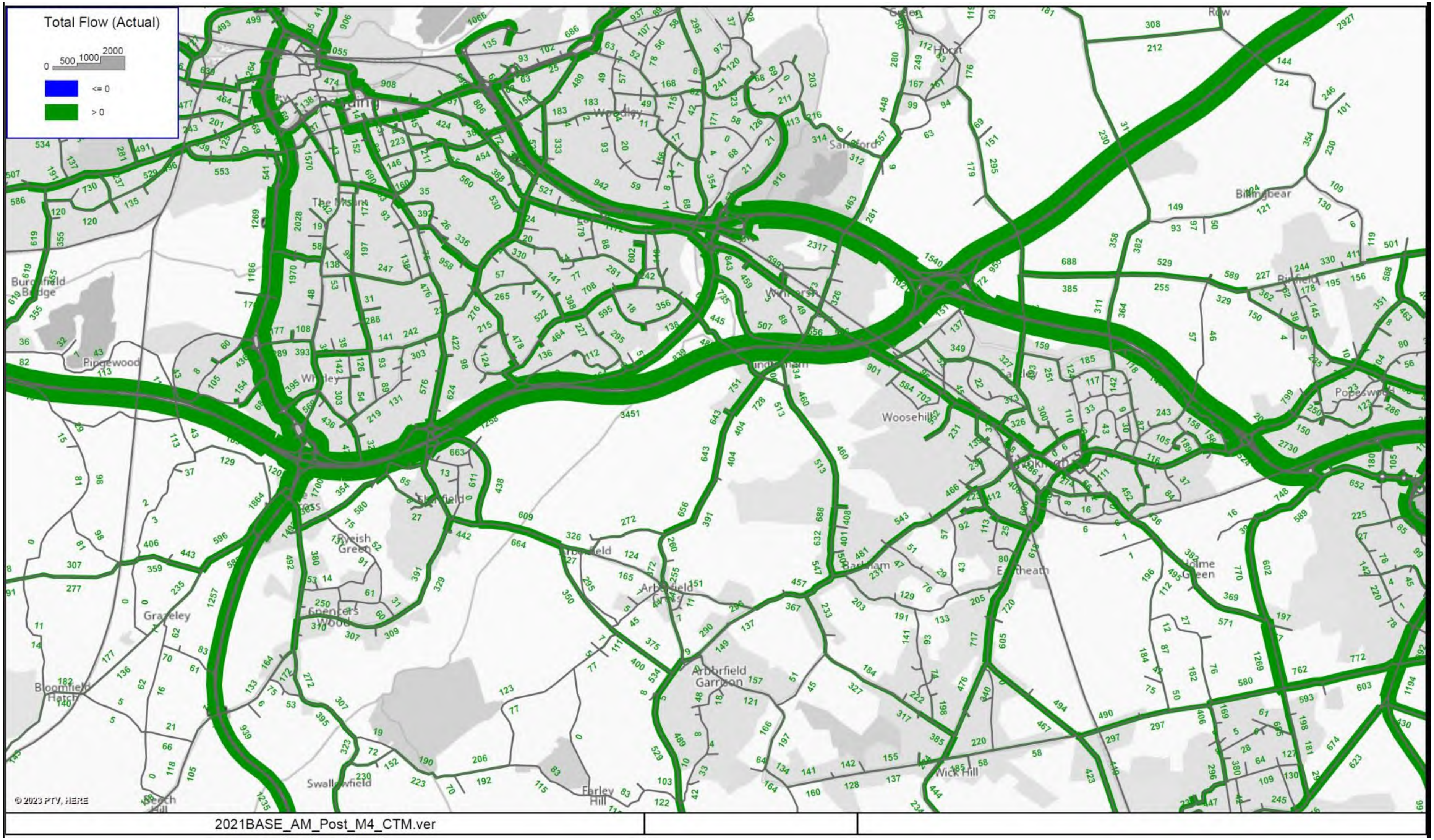

Figure 12: WSTM4. Actual Flows, vehicles – Base. AM Peak

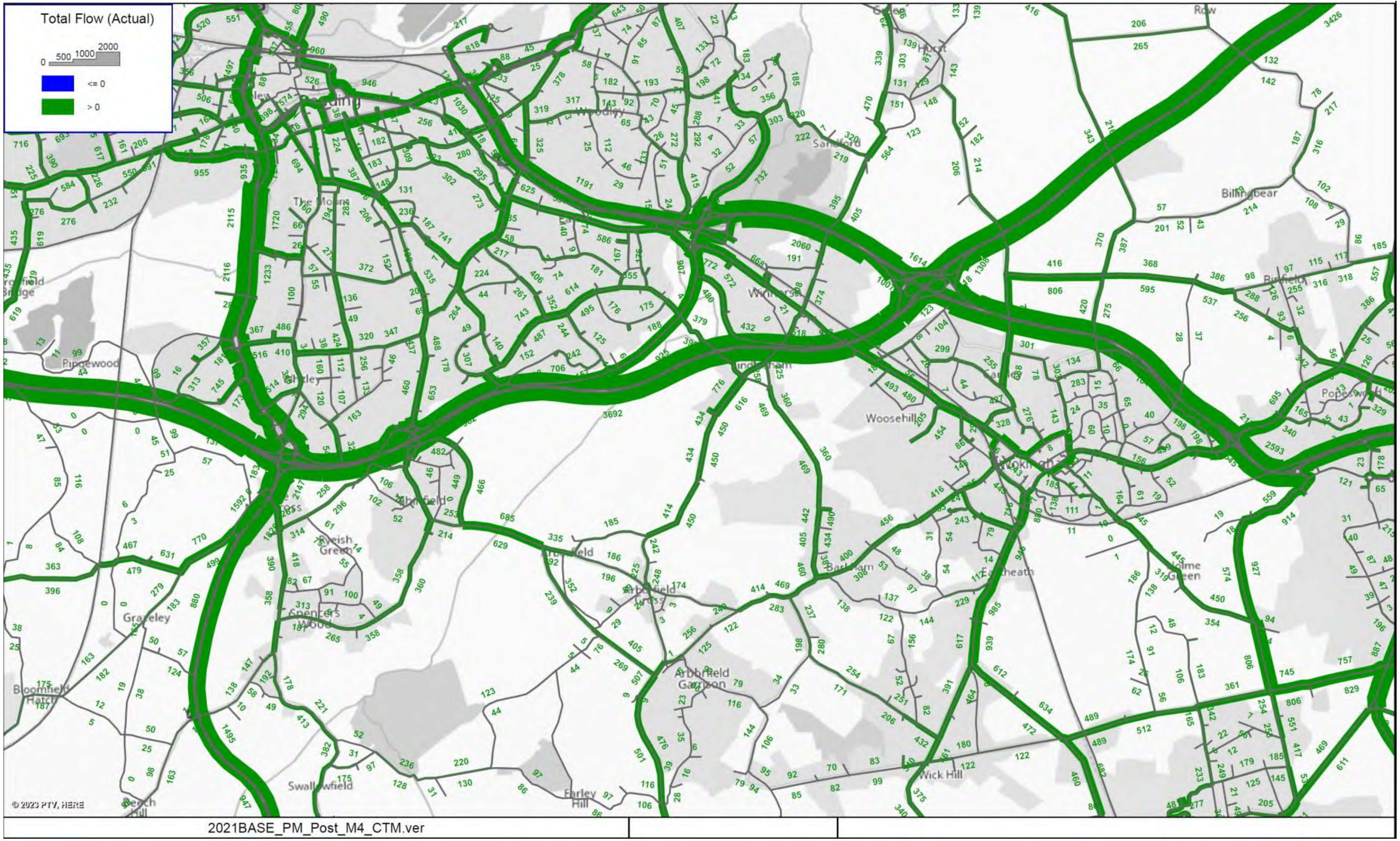

Figure 13: WSTM4. Actual Flows, vehicles – Base. PM Peak

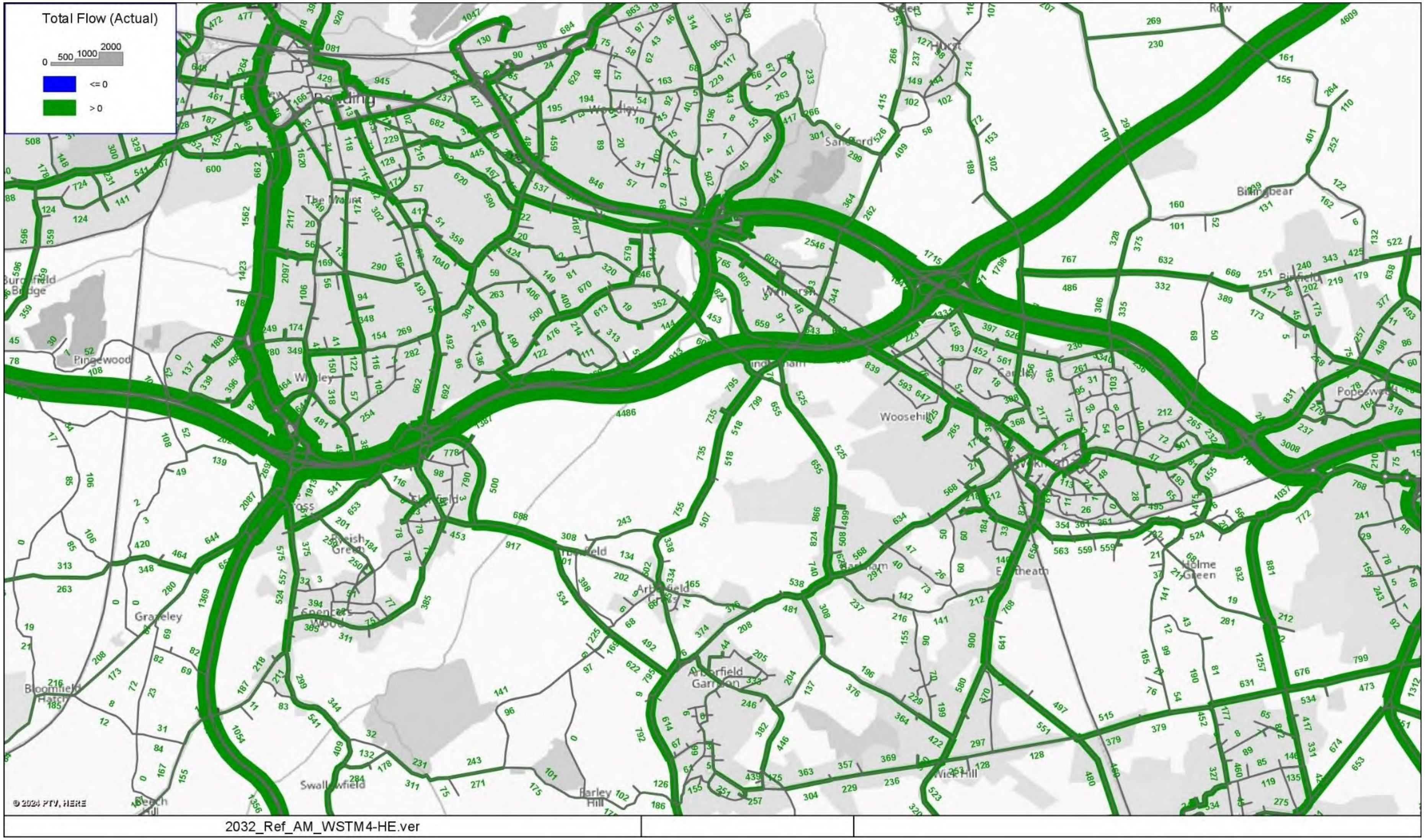

Figure 14: WSTM4. Actual Flows, vehicles – 2032 Reference Case. AM Peak

Figure 15: WSTM4. Actual Flows, vehicles – 2032 Reference Case. PM Peak

Figure 16: WSTM4. Actual Flows, vehicles – 2032 Scenario 1A. AM Peak

Figure 17: WSTM4. Actual Flows, vehicles – 2032 Scenario 1A. PM Peak

Figure 18: WSTM4. Actual Flows, vehicles – 2032 Scenario 1B. AM Peak

Figure 19: WSTM4. Actual Flows, vehicles – 2032 Scenario 1B. PM Peak

Appendix E WSTM4 Outputs. Actual Flow Differences

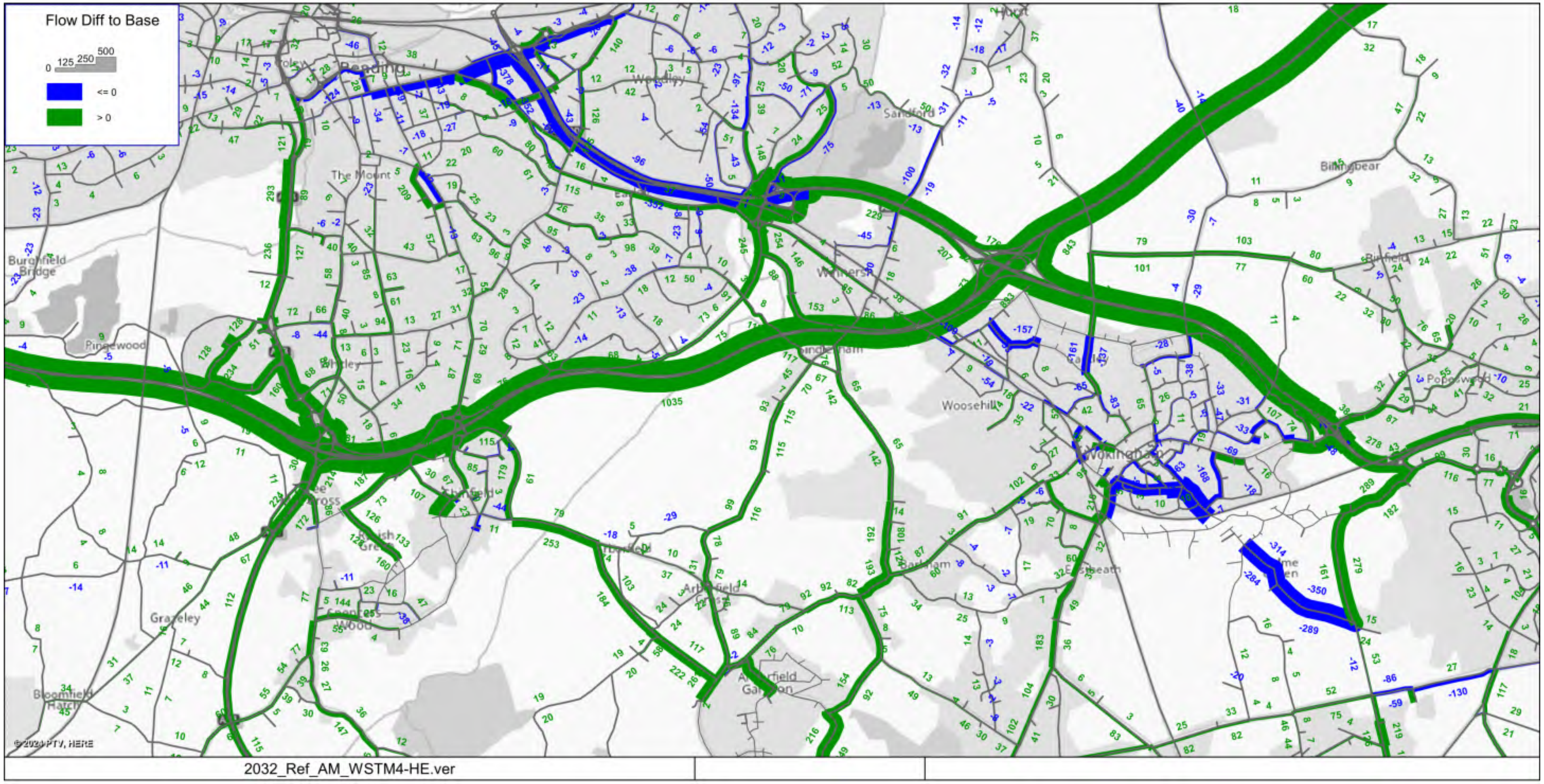

Figure 20: WSTM4. Actual Flow Differences. Reference Case minus Base. AM Peak

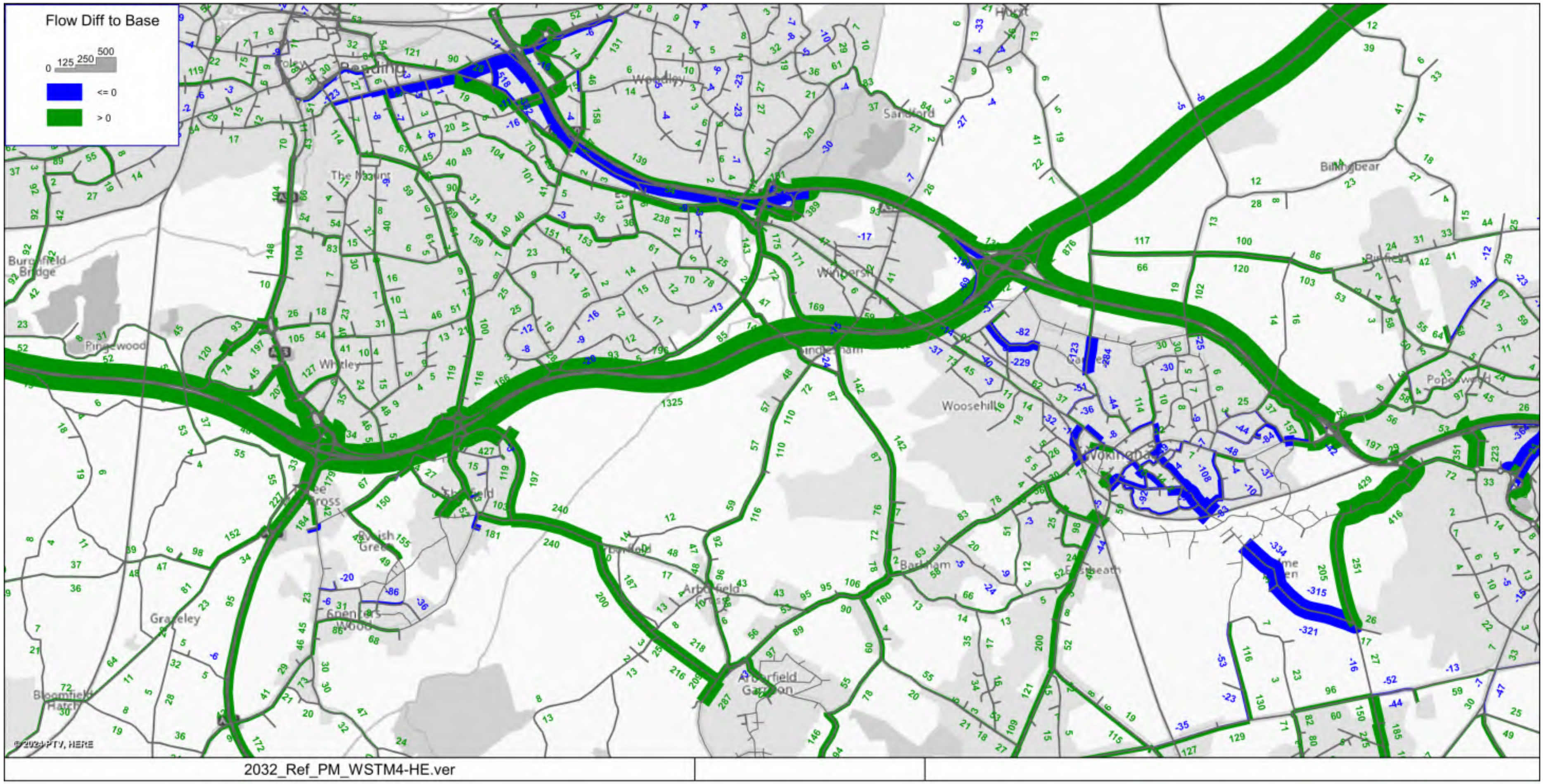

Figure 21: WSTM4. Actual Flow Differences. Reference Case minus Base. PM Peak

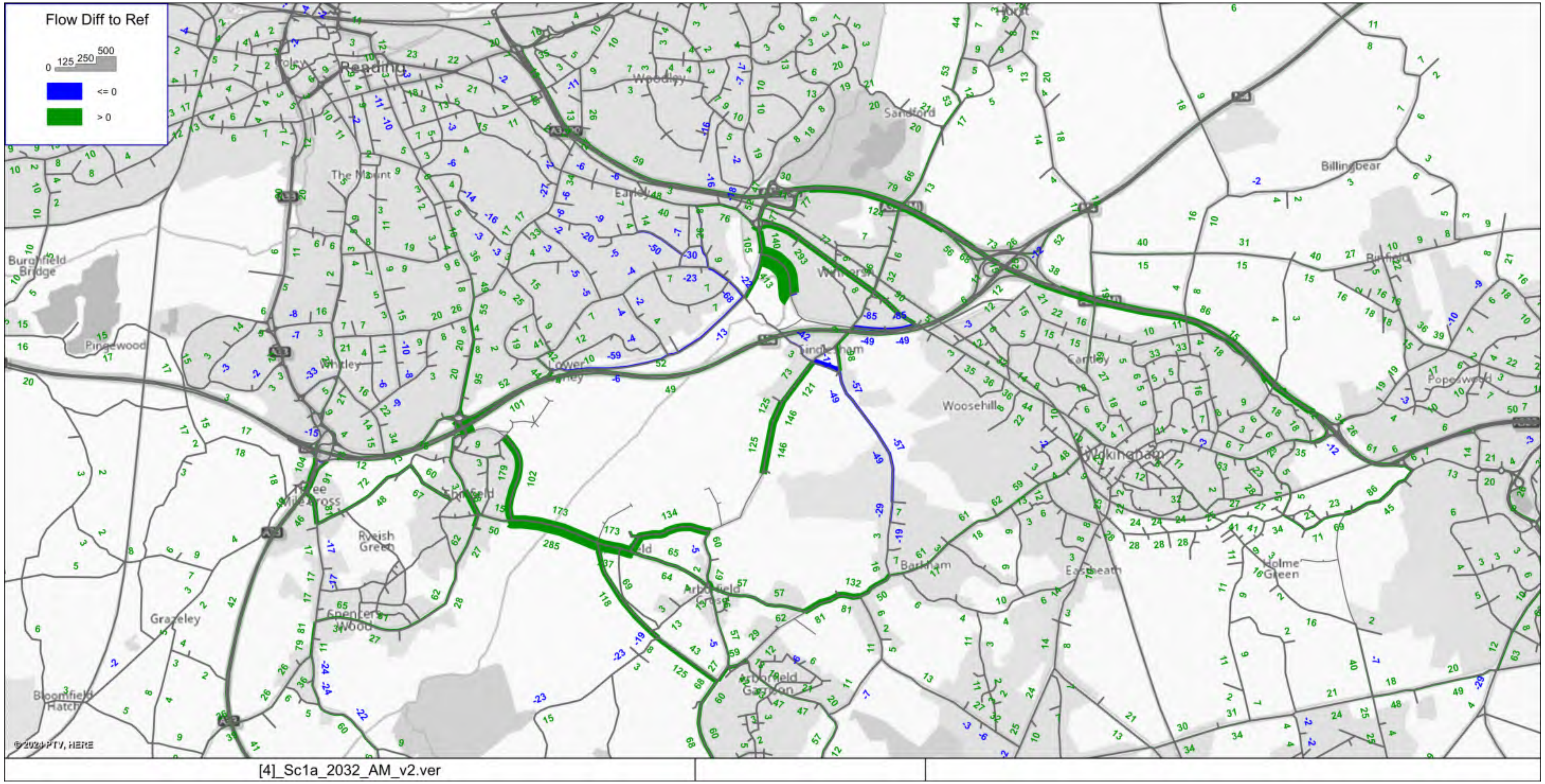

Figure 22: WSTM4. Actual Flow Differences. 2032 Scenario 1A minus Ref Case. AM Peak

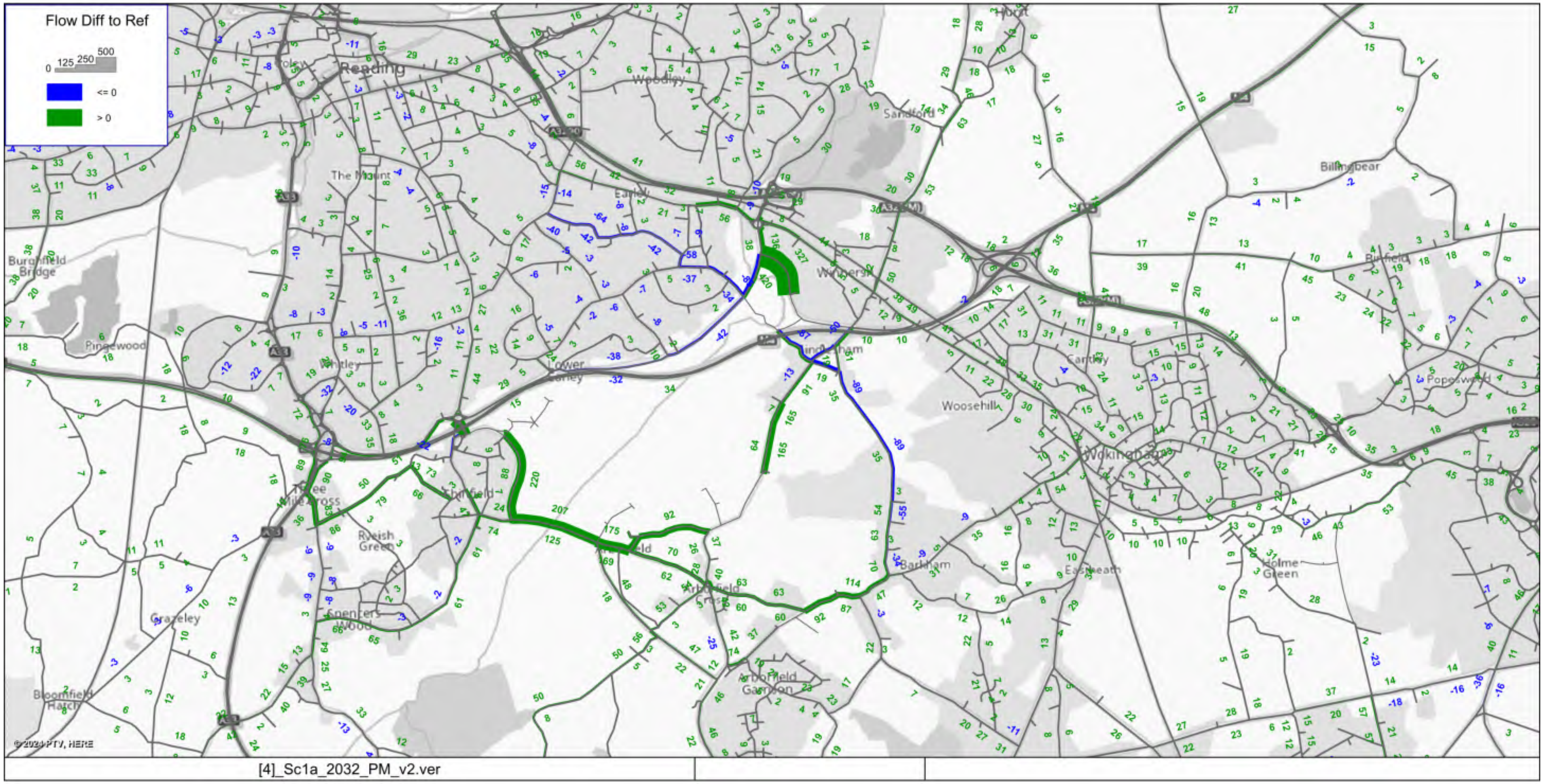

Figure 23: WSTM4. Actual Flow Differences. 2032 Scenario 1A minus Ref Case. PM Peak

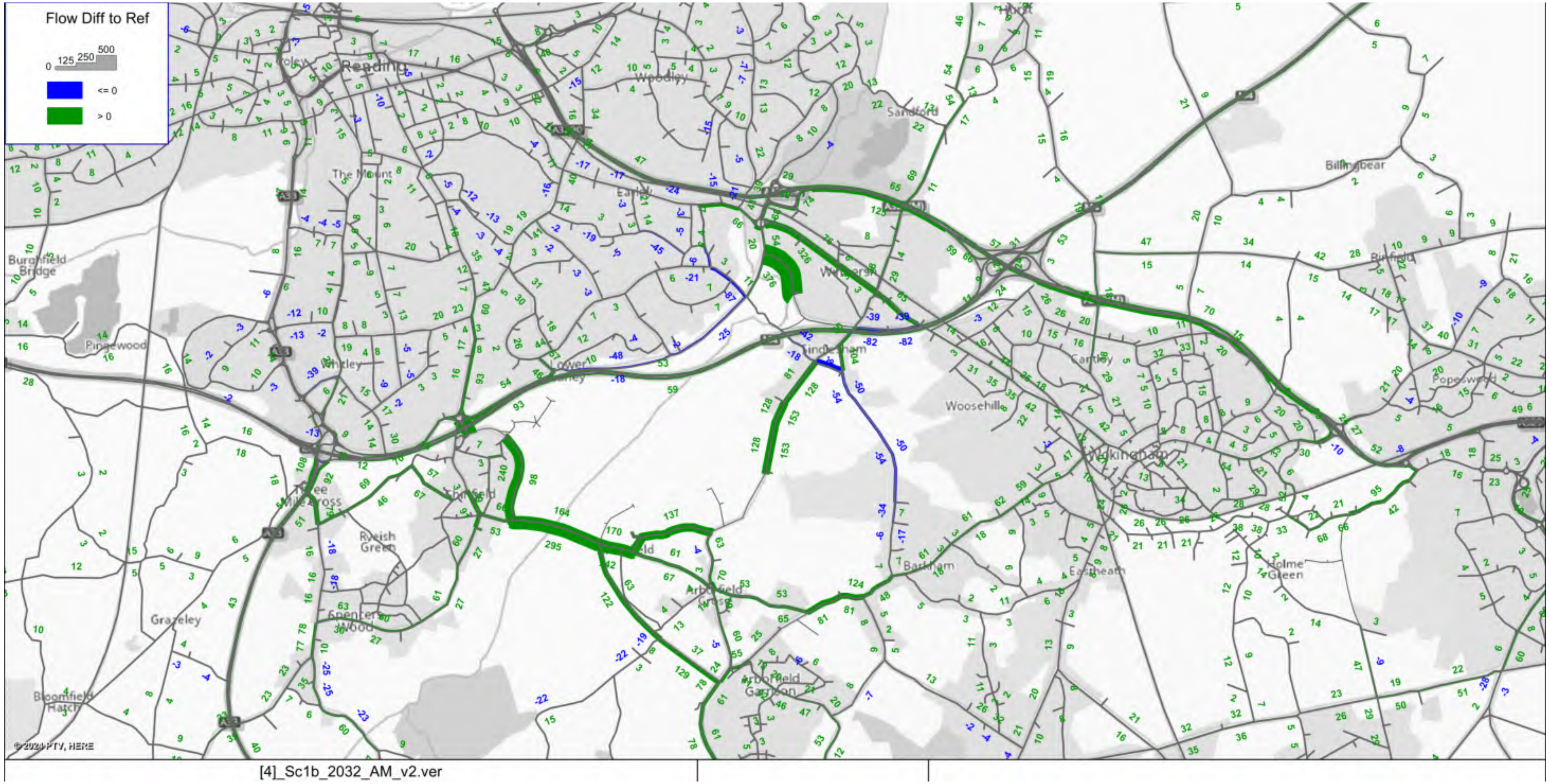

Figure 24: WSTM4. Actual Flow Differences. 2032 Scenario 1B minus Ref Case. AM Peak

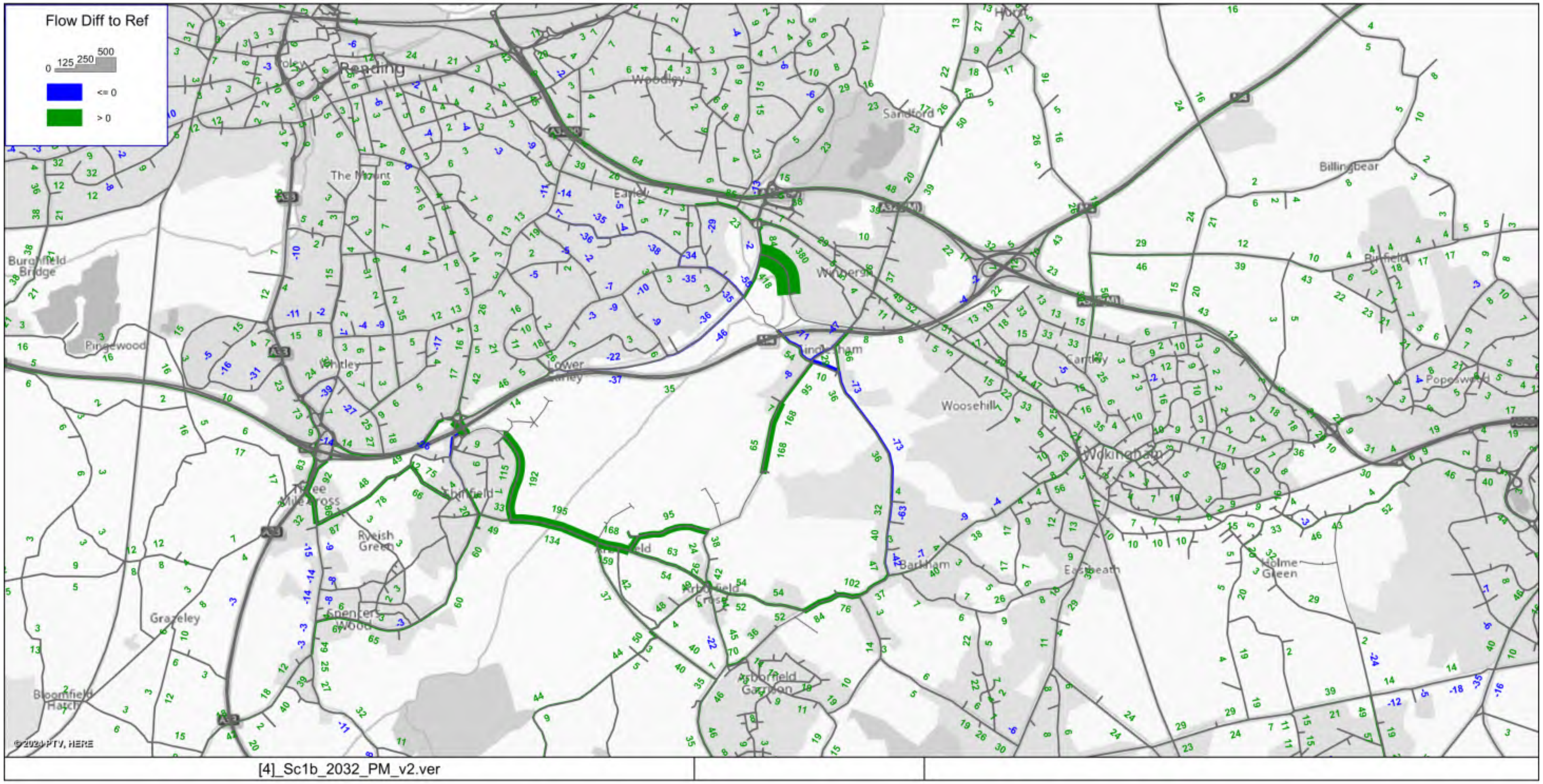

Figure 25: WSTM4. Actual Flow Differences. 2032 Scenario 1B minus Ref Case. PM Peak