Wokingham Local Plan Update

Addendum to Transport Assessment Report

Comparison of Alternative Strategic Site Options

August 2024

On behalf of **Wokingham Borough Council**

WOKINGHAM BOROUGH COUNCIL

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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 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 (3,930 homes), South Wokingham Extension (1,150 homes) and a number of smaller residential sites around the Borough (3,762 homes). The assessment was presented for a forecast year of 2040 representing the forecast year of the LPU.

1.1.3 To support the preparation of the Local Plan Update (LPU), Stantec was also commissioned by WBC to assess and compare the impact of alternative strategic site options with broadly equivalent scales of development (2,500-3,000 homes):

- Hall Farm/ Loddon Valley – delivering 2,700 homes by 2040 (to reflect forecast delivery to represent balanced comparison with other strategic sites)
- Ashridge - 3,000 homes by 2040
- Castle End Gardens, Twyford - delivering 2,500 homes by 2040

1.1.4 The locations of the sites are shown in Figure 1 below.

Figure 1 Locations of Alternative Growth Options

1.1.5 Each option has also considered all other developments, including the South Wokingham Extension (1,150 homes) and several smaller residential sites around the Borough (3,762 homes), along with the accompanying infrastructure.

1.1.6 This report presents the assumptions used and results of the assessment of the impacts of alternative growth locations on the local and strategic highway networks.

1.2 Approach Overview

Modelling Approach

1.2.1 The assessment has been undertaken using the Wokingham Strategic Transport Model (WSTM4) developed in 2015 and subsequently refined in the areas along the M4, A329(M) and Twyford to represent November 2021 travel conditions.

1.2.2 The 2021 model refinement is documented in the "Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report", July 2024 (Attachment 5 – WSTM4 Local Model Validation Report).

1.2.3 In 2021, a model refinement was conducted with a specific focus on the Hall Farm / Loddon Valley development area. This refinement considered key strategic and local links within the immediate vicinity of this site. Given the close proximity of the Ashridge growth area to the Hall Farm / Loddon Valley development, it was determined that the same model could also be used to assess the impact of the Ashridge growth location on the highway network.

1.2.4 However, the Twyford growth area is situated outside the original focus area of the model refinement. Therefore, a review of the model's performance in the area local to Twyford was necessary, leading to a refinement of the area around Twyford. This refinement was successfully completed and documented in a separate technical note.

1.2.5 For the assessment contained in this document, it is important to note that there may be differences between the various Reference Case models used for assessing different options. These differences are primarily around Twyford. Negligible flow differences may also be observed in areas outside of Twyford, which is considered acceptable.

Forecast Scenarios

1.2.6 To enable the comparison of alternative growth options, With and Without development scenarios have been considered:

- Reference Case: includes planned development outside Wokingham borough, committed development and infrastructure in the borough (including 2026 LP) but neither of the 2040 growth locations within Wokingham
- Development Scenario with mitigation: This is based on the Reference Case but also includes:
  - One of the three strategic site options:
    - Hall Farm/ Loddon Valley
    - Ashridge, or
    - Castle End Gardens in Twyford.

    This also includes on-site and access infrastructure, as well as partial(?) mitigation measures.
  - South Wokingham SDL extension site which totals 1,150 houses
  - Other smaller Local Plan Update site allocations with a total quantum of 3,762 dwellings.

1.2.7 Forecast assumptions for each scenario are included in Section 2 'Assessment Scenarios' of this report.

1.2.8 The assessment has been undertaken for a forecast year of 2040 representing the forecast year of the Local Plan Update (LPU).

1.2.9 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 alternative major development options on the highway network using Wokingham strategic transport model. Following this Introduction section, the remainder of this report is structured as follows:

- Section 2 details assessment scenarios and their assumptions
- Section 3 details the metrics used in the impact assessment
- Section 4 presents highway network analysis the impact of the Hall Farm/ Loddon Valley development, whereas
- Section 5 and Section 6 include highway impact analyses of the Ashridge and Twyford growth options respectively.
- Section 7 summarises and concludes this report.

2 Assessment Scenarios

2.1.1 This section describes assessment scenarios adopted for this study and a range of trip generation, land use, infrastructure assumptions, which were adopted to develop them.

2.2 Forecast Scenarios

2.2.1 To undertake the assessment With and Without development scenarios have been considered:

- Reference Case: includes planned development outside Wokingham borough, committed development and infrastructure in the borough (including 2026 LP) but neither of the growth locations within Wokingham
- Development Scenario with mitigation: This is based on the Reference Case but also includes:
  - South Wokingham SDL extension site which totals 1,150 houses
  - Other smaller Local Plan Update site allocations with a total quantum of 3,762 dwellings, and
  - Either of the three strategic site options including on-site and access infrastructure as well as mitigation measures:
    - Hall Farm/ Loddon Valley growth area (Scenario 1B 'Hall Farm')
    - Ashridge growth area (Scenario 1B 'Ashridge'), and
    - Castle End Gardens in Twyford growing area (Scenario 1B 'Twyford').

2.2.2 The Development Scenarios for alternative growth options will be compared against the Reference Case scenario to understand the impacts of the Local Plan Update development proposals. The assessments undertaken in this study considers an end state with all development built out and all mitigation provided as reflected in respective Scenarios 1B.

2.2.3 In all the scenarios the positive borough-wide impact of sustainable transport measures on a car trip reduction has been considered. The impact of sustainable measures that will target either of the alternative growth areas and South Wokingham extension have also been considered in the Development Scenarios (Scenario 1B).

2.2.4 Table 1 summarises the forecast scenarios, which have been adopted.

Table 1 Summary of Forecast Scenarios

	Reference Case	**Scenario 1B** Hall Farm	**Scenario 1B** Ashridge	**Scenario 1B** Twyford
Development Growth				
Background growth	✓	✓	✓	✓
Planned development outside Wokingham borough	✓	✓	✓	✓
Committed development in Wokingham Borough (including 2026 SDLs)	✓	✓	✓	✓
South Wokingham SDL extension site (LPU quantum)		✓	✓	✓
Other smaller Local Plan Update site allocations (LPU quantum)		✓	✓	✓
Hall Farm/ Loddon Valley development (2,700 dwellings)		✓		

	Reference Case	Scenario 1B Hall Farm	Scenario 1B Ashridge	Scenario 1B Twyford
Ashridge development (3,000 dwellings)			✓	
Twyford development (2,500 dwellings)				✓
Infrastructure Changes				
M4 Smart Motorway	✓	✓	✓	✓
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)	✓	✓	✓	✓
Additional mitigation that may be required to deliver South Wokingham Extension development		✓	✓	✓
On-site infrastructure, site access locations and additional mitigation required to deliver Hall Farm		✓		
On-site infrastructure, site access locations and additional mitigation required to deliver Ashridge			✓	
On-site infrastructure, site access locations and additional mitigation required to deliver Twyford				✓
Sustainable Transport Measures				
Wokingham borough-wide impact of My Journey programme	✓	✓	✓	✓
South Wokingham Extension targeted sustainable transport measures		✓	✓	✓
Hall Farm / Ashridge/ Twyford targeted sustainable transport measures		✓	✓	✓

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 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 (Scenario 1B 'Hall Farm')

Land Use Assumptions

2.4.1 Table 2 shows a summary of the land use quanta for Hall Farm / Loddon Valley development, which will consist of a mix of housing and employment. These represent forecast delivery slightly lower than those assessed and presented in the "Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report," July 2024 (Attachment 5 – WSTM4 Local Model Validation Report). These ensure growth assumptions for the Hall Farm / Loddon Valley development are broadly comparable with other growth locations, such as Ashridge and Twyford.

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

Land Use	Local Plan Update quantum
Residential Dwellings	2,700 houses
Local Centres	community centre – 1,440m² food store - 2,500m² mixed retail/café etc.- 3,500 m²
Primary School	1 x 3FE
Secondary School	1 x 3FE (to reflect the phased opening of the school)
Sports provision and sports building (m2)	100,000 m² (2 x 3G artificial grass pitches and 4 grass pitches & a leisure centre 1,500m²)
R&D (m^2)	100,000m²

Highway Infrastructure Assumptions

2.4.2 Figure 2 shows on-site infrastructure and access locations for the Hall Farm / Loddon Valley Development as assumed in Scenario 1B 'Hall Farm'. The figure also shows a mitigation package that is deemed to be preferrable to accommodate residential and employment development at Hall Farm / Loddon Valley. 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 ICD increase if required

(3) New bridge over River Loddon

(4) New access to Mole Road

(5) Mill Lane closed to through traffic

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

(7) New access to Lower Earley Way landing at the B3270/Meldreth Way Roundabout

(8) Additional northbound lane on Lower Earley Way

(9) Upgrade to Lower Earley Way/ Hatch Farm Way junction

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

(11) Shinfield Road Gyratory - additional circulatory lane on Black Boy's roundabout

(12) 2 lanes westbound between Whitley Wood Lane and J11

(13) M4 J11 Optimisation and changes to lane markings to accommodate additional lane for traffic movement into B3270

2.4.3 Based on the forecast development delivery, the highway infrastructure package that was tested in Scenario 1B 'Hall Farm' is the same as the one used in 2040 Scenario 1B, which tested 3,930 dwellings at Hall Farm as documented in the 'Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report', July 2024.

2.4.4 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.

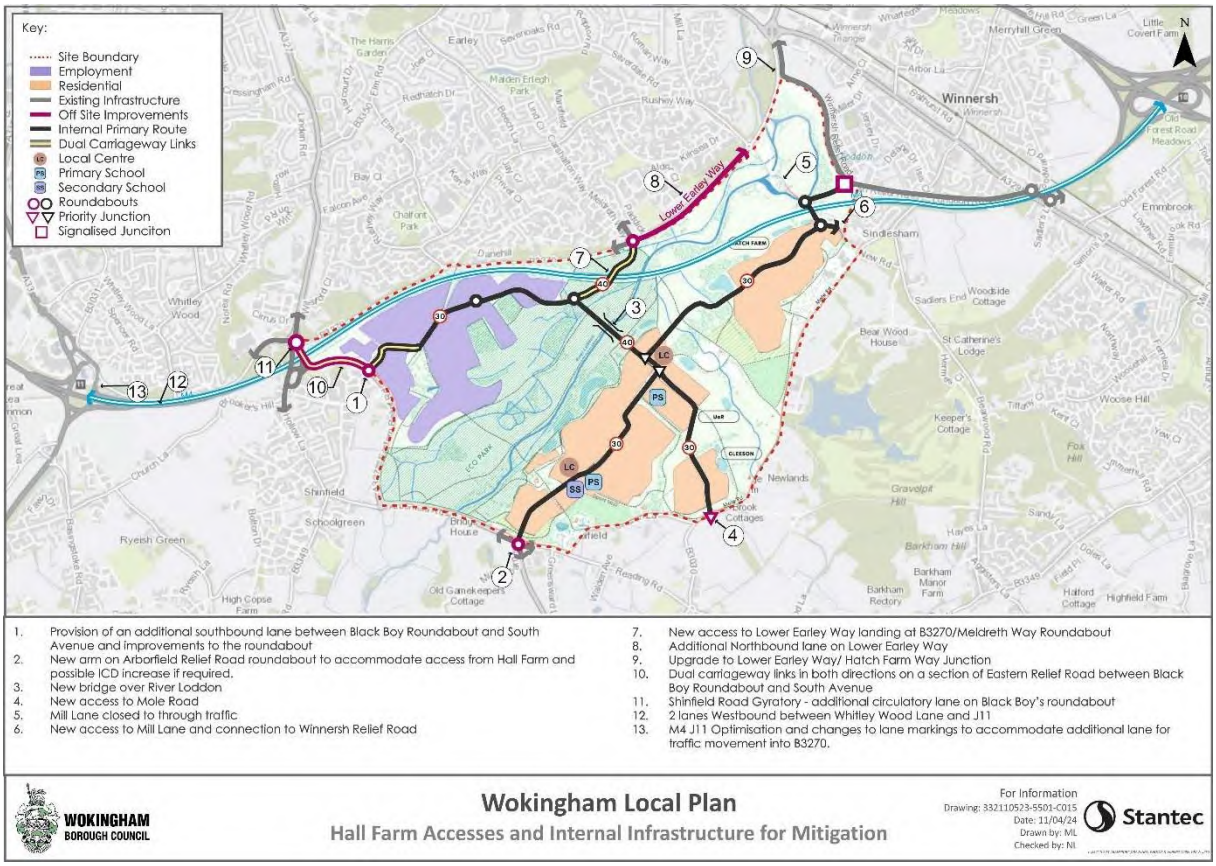


Figure 2 Hall Farm / Loddon Valley – Infrastructure Assumptions

2.4.5 Appendix A further details infrastructure assumptions for Hall Farm / Loddon Valley.

2.5 Ashridge

Land Use Assumptions

2.5.1 Table 3 shows a summary of the land use quanta for Ashridge development.

Table 3 Ashridge Land Use and Quantum (indicative)

Land Use	Quantum
Residential Dwellings	3,000 houses
Local Centres	1,700m²
Primary School	2 x 2FE
Commercial	30,000m²

Highway Infrastructure Assumptions

2.5.2 Figure 3 graphically shows highway infrastructure assumptions for Ashridge as assumed in Scenario 1B 'Ashridge'. The figure presents locations of on-site, access and mitigation infrastructure. These schemes are:

(1) Proposed Signalised Junction at Forest Rd / Warren House Rd

(2) Proposed 4 Arm Roundabout at Forest Rd / A321 Twyford Rd

(3) Proposed Grade Separated Junction on A329(M)

(4) Proposed Junction Improvement at Church Hill/Orchard Rd

(5) Potential Carriageway Widening on Lines Road

(6) A329(M) Coppid Beech Improvement

(7) Proposed Traffic Management on the A329(M)

2.5.3 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. Appendix B further details the schemes. The new junction on the A329(M) and its slip lanes would require agreement with National Highways.

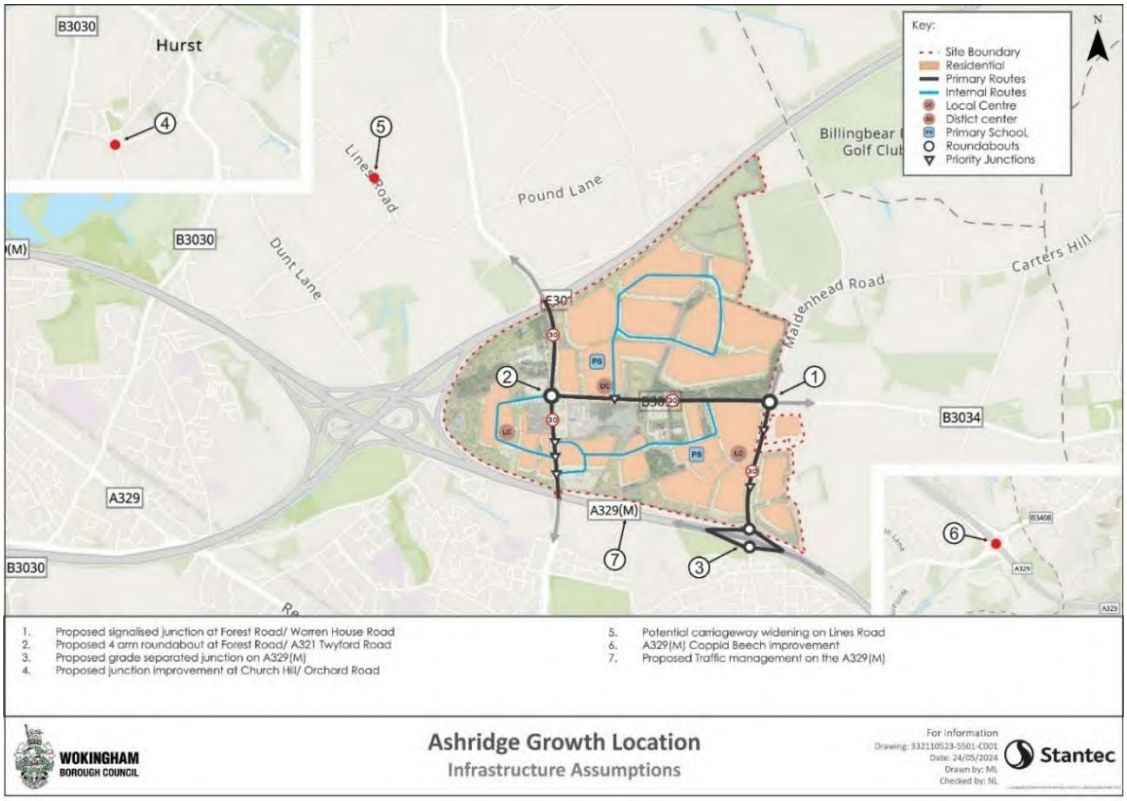


Figure 3 Ashridge – Infrastructure Assumptions

2.6 Castle End Gardens, Twyford

Land Use Assumptions

2.6.1 Table 3 shows a summary of the land use quanta for Twyford development.

Table 4 Twyford Land Use and Quantum (indicative)

Land Use	Quantum
Residential dwellings	2,500 houses
Community centre	2,500m²
Primary school	1 x 3FE

Highway Infrastructure Assumptions

2.6.2 Figure 4 graphically summarises highway infrastructure assumptions for Castle End Gardens development in Twyford as assumed in Scenario 1B 'Twyford'. These schemes are:

(1) Twyford Link Road

(2) New roundabout with New Bath Road

(3) New roundabout with London Road

(4) New roundabout with B3024 Waltham Road

(5) New roundabout with B3018 Waltham Road

(6) Access from/to A3032 to A4 Bath Road is closed

2.6.3 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. Appendix C further details the schemes.

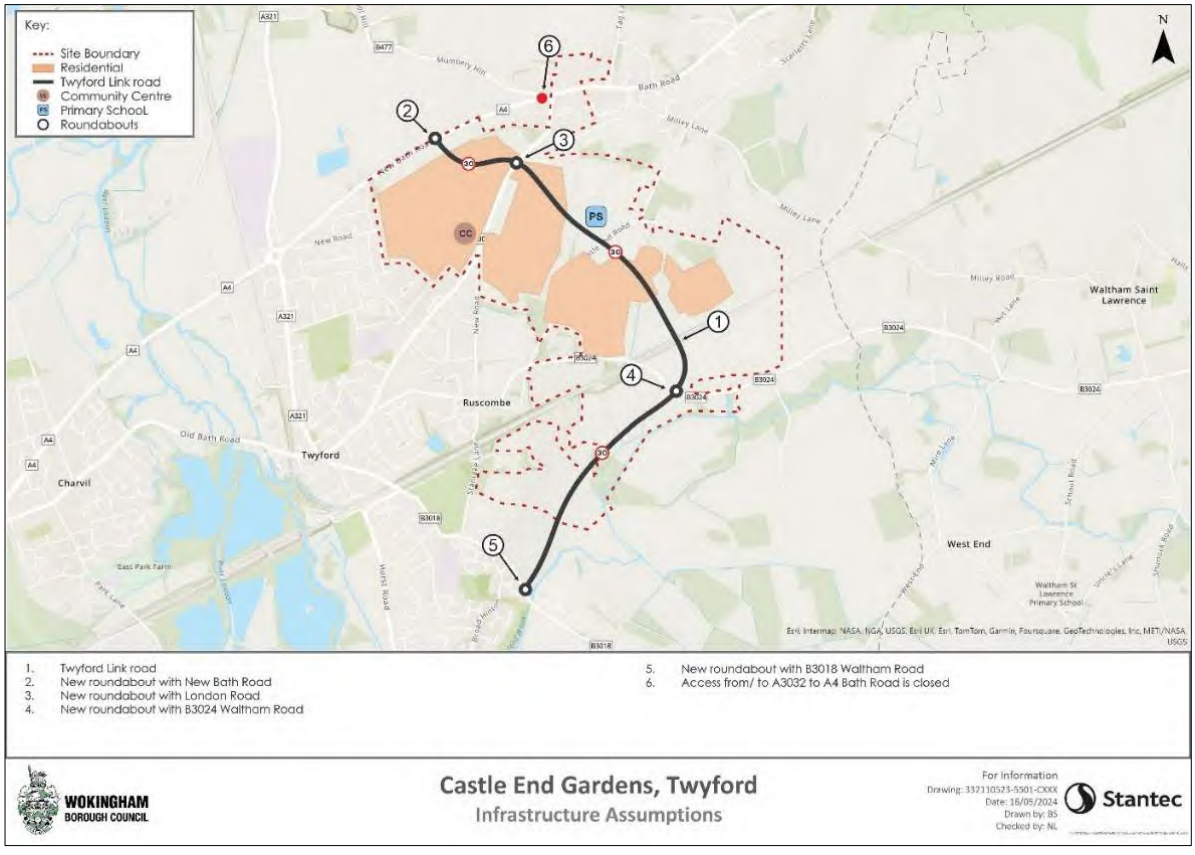


Figure 4 Twyford – Infrastructure Assumptions

2.7 South Wokingham Extension

2.7.1 Each of the alternative growth scenarios includes growth at a location south of the South Wokingham SDL known as South Wokingham extension. The land uses, quanta and transport infrastructure assumed for this site are detailed below.

Land Use Assumptions

2.7.2 Table 5 sets out the land uses, quanta and transport infrastructure assumed for South Wokingham Strategic Site extension.

Table 5 South Wokingham Extension Land Use and Quantum

Land Use	Quantum
Residential Houses (dwellings)	1,150
Local Centres (m^2)	500m²
Primary School	2 x 1FE

Highway Infrastructure Assumptions

2.7.3 Site access and mitigation schemes for this location are graphically shown in Figure 5 and include:

(1) New priority junction to provide access from the site to South Wokingham Distributor Road

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

(3) Turn into/ out of Easthampstead Road is banned (Junction Closed)

(4) Signal optimisation on SWDR

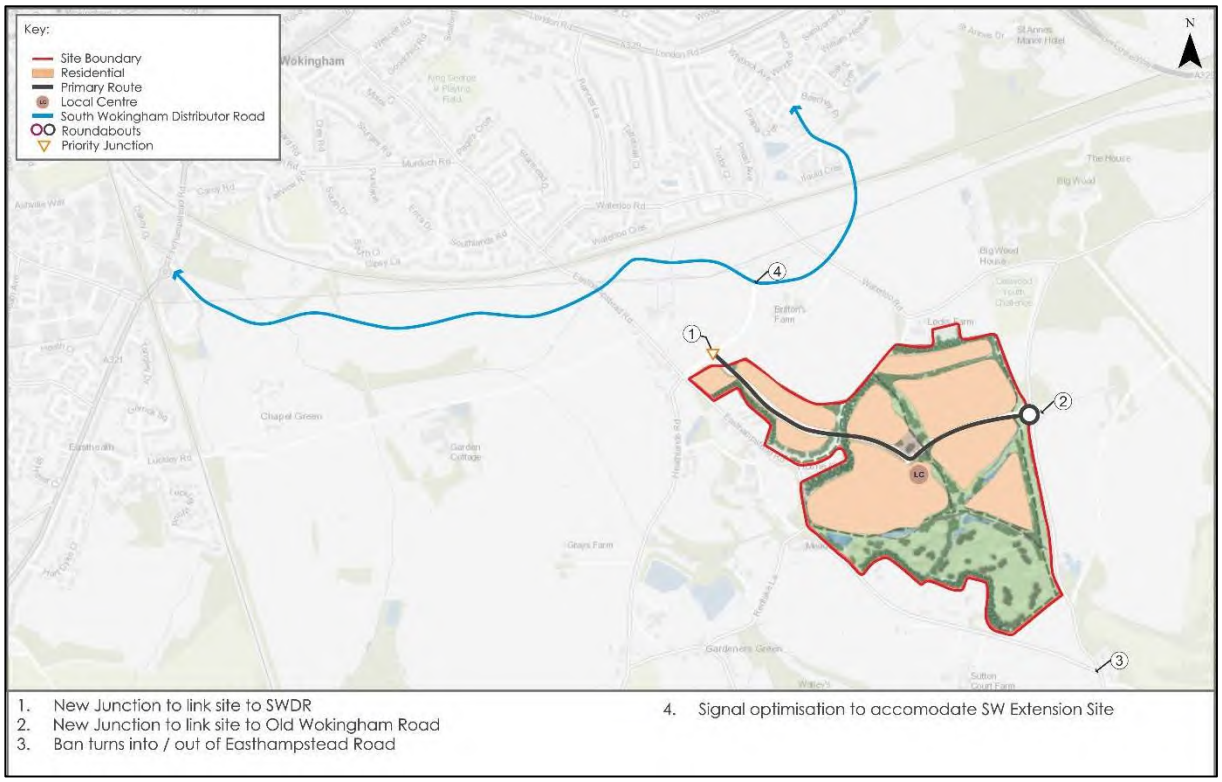


Figure 5 South Wokingham Extension – Infrastructure Assumptions

2.7.4 **Appendix D** 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.

2.7.5 The highway infrastructure package that is included in Scenarios 1B is identical to the one used in 2040 Scenario 1B, which assessed the LPU growth as documented in the 'Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report', July 2024.

2.8 Additional Smaller Sites

2.8.1 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 is provided in Table 6. The list of sites used is indicative of options to enable testing. The list is not necessarily reflective of proposed allocations. The list of sites is the same as the one, which was documented in the 'Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report', July 2024. It should also be noted that some sites may have now been granted planning permission, however at the time of the assessment this was not the case. It should also be noted that not all sites will necessarily be proposed for allocation through the Local Plan Update.

Table 6 Additional Smaller Sites

Site address	Site reference	Indicative No. of Dwellings
Arborfield SDL additional capacity		300
Woodlands Farm, Wood Lane	5BA013	
24 Barkham Ride	5BA032	30
High Barn Farm, Commonfield Lane, Barkham	5BA036	
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	115
Hillside, Lower Wokingham Road, Finchampstead	5FI024	15
Westwood Yard, Sheerlands Road	5FI028	20
Honeysuckle Lodge, Commonfield Lane	5FI032	
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	220
Land north of Arborfield Road	5SH025	191
Rustlings, The Spring and Land to rear of Cushendell, Shinfield Road	5SH031	10
Land at Sonning Farm	5SO001	25
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

Site address	Site reference	Indicative No. of Dwellings
Land south of Gipsy Lane	5WK006	
Station Industrial Estate	5WK029	40
Woodside Caravan Park, Blagrove Lane	5WK042	
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	100
Wokingham Town Centre (general area of search)	N/A	200
Barkham Square	5BA010	500
Land east of Trowes Lane	5SW005	85
Land off Maidensfield (Winnersh Farms)	5WI006	234
Land to the rear of Bulldog Garage and BP Triangle, Reading Road	5WI012, 5WI021	34
Rosery Cottage and 171 Evendons Lane	5WK023	
Land at Blagrove Lane	5WK028, 5WK032, 5WK034, 5WK039	350
Ravenswood Village	5WW009	135
Total		**3,762**

2.9 Other Assumptions

2.9.1 For each Scenario 1B, the assumptions regarding trip generation, internalisation, and trip distribution for all development sites are consistent and are based on those detailed in the 'Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report' from July 2024.

2.10 Summary of Land Use Assumptions

2.10.1 The table below summarises the land use assumptions for each of the alternative growth locations, i.e. Hall Farm, Ashridge and Twyford.

Table 7 Summary of Land Use and Quantum Assumptions (indicative)

Land Use	Scenario 1B 'Hall Farm'	Scenario 1B 'Ashridge'	Scenario 1B 'Twyford'
Residential Dwellings	2,700 houses	3,000 houses	2,500 houses
Local Centres	community centre – 1,440m² food store - 2,500m² mixed retail/café - 3,500 m²	community centre – 1,700m²	community centre – 2,500m²
Primary School	1 x 3FE	2 x 2FE	1 x 3FE
Secondary School	1 x 3FE		
Sports provision and sports building (m2)	100,000 m² (2 x 3G artificial grass pitches and 4 grass pitches & a leisure centre 1,500m²)		
R&D (m²)	100,000m²		
Commercial		30,000m²	

3 Key Metrics Used for Assessment

3.1 Introduction

3.1.1 Data extracted from different scenarios has been used to assess transport impacts on the highway network under alternative development growth assumptions. 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 8, Table 9 and Table 10 present growth in demand between 2040 Reference Case and each of the Alternative Growth Scenarios (noting that the Twyford Reference Case has been adjusted due to the base year local area model refinement around the Twyford area).

3.2.2 The total number of additional development trips is broadly the same for the 'Hall Farm' and 'Ashridge' growth scenarios, particularly in the AM peak. However, the 'Twyford' growth scenario has about 30% fewer additional development trips. It should be noted that the growth in the number of trips has been reported for the level of development overall as opposed to individual alternative growth location sites.

Table 8 Traffic Growth. 2040 Reference Case vs Scenario 1B 'Hall Farm'

Scenario	AM Peak	PM Peak
Reference Case	275,623	281,865
Scenario 1B 'Hall Farm'	282,064	287,111
Ref Case vs Scenario 1B 'Hall Farm', % Growth	2.3%	1.9%
Ref Case vs Scenario 1B 'Hall Farm', vehicles	6,441	5,246

Table 9 Traffic Growth. 2040 Reference Case vs Scenario 1B 'Ashridge'

Scenario	AM Peak	PM Peak
Reference Case	275,623	281,865
Scenario 1B 'Ashridge'	282,217	286,514
Ref Case vs Scenario 1B 'Ashridge', % Growth	2.4%	1.6%
Ref Case vs Scenario 1B 'Hall Farm', vehicles	6,594	4,649

Table 10 Traffic Growth. 2040 Reference Case vs Scenario 1B 'Twyford'

Scenario	AM Peak	PM Peak
Reference Case	277,265	282,393
Scenario 1B 'Twyford'	282,217	286,514
Ref Case vs Scenario 1B 'Twyford', % Growth	1.8%	1.5%
Ref Case vs Scenario 1B 'Hall Farm', vehicles	4,952	4,121

3.3 Strategic Model Outputs

3.3.1 To assess the impact of the alternative 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 Reference Case at a strategic level. Consequently, they should not be regarded as an exact measurement of local impacts. To gain a more detailed and accurate assessment of local effects, microsimulation and/or junction modelling may need to be conducted.

3.3.3 **Appendix E** presents all the results for Hall Farm, whereas **Appendix F** and **Appendix G** present results for Ashridge and Twyford.

Actual Flows and Actual Flow Differences

3.3.4 All flows are displayed in vehicles.

3.3.5 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 2040 Reference Case and one of the Development Scenarios. Increases in flow are shown in green whereas decreases in flow are shown in blue. 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.

Delays and Delay Difference

3.3.6 The strategic model forecasts delays for each assessment scenario. These delays, expressed in seconds, are included in the results. Delays of less than 30 seconds are shown in green, the values, which are between 30 seconds and two minutes, are shown in orange and those, which are greater than two minutes are shown in red. 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.

3.3.7 Delay difference provides a comparison between the delay per vehicle on a link (in seconds) in the Reference Case and one of the Development Scenarios. 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 orange and those, which are greater than two minutes are shown in red. The delays are displayed in seconds.

3.3.8 For the purposes of visually representing delay a RAG (Red, Amber, Green) colour coding system has been adopted to highlight congestion impacts. This system is applied consistently throughout all scenario assessments and includes the following delay categorisation.

- Green - Less than 30 seconds delay
- Amber – Between 30 seconds and 2 minutes
- Red – Greater than 2 minutes

3.3.9 Accordingly, within this report and assessment, any delay difference of less than 30 seconds compared to the reference case is considered to have a minimal detrimental impact.

Journey Times

3.3.10 Travel times provide a representation of network performance that is easier for a wide audience of readers to understand. A series of 12 routes, which are shown in Figure 6, were identified to assess journey times across the network.

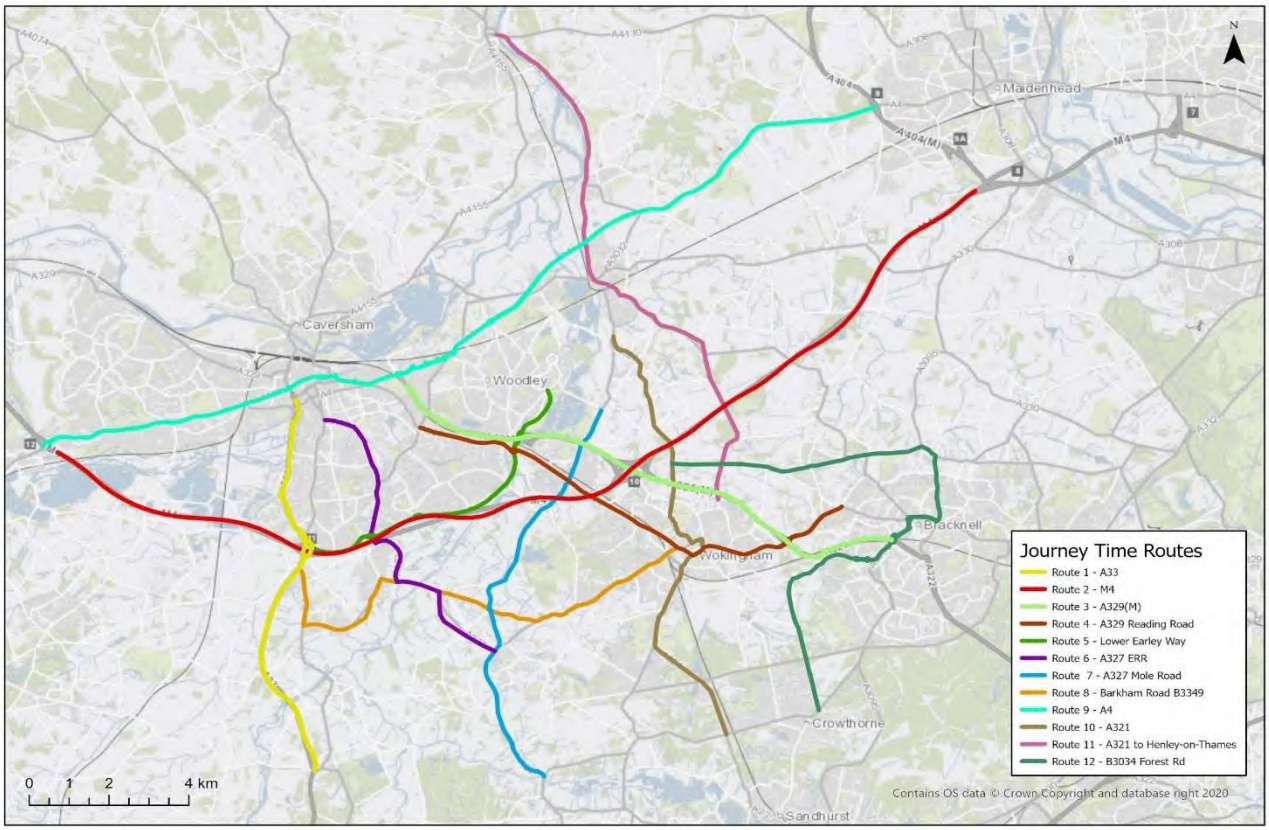


Figure 6 Journey Time Validation Routes

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 A categorisation for the maximum turn Volume to Capacity (V/C) ratio has been established, with only V/C ratios exceeding 85% being shown and those over 100% shown as red. This threshold was considered appropriate for visually identifying areas of the network where junction turn delay is likely to occur. The following categorisation is used to visualise the maximum turn V/C.

- Blue - Greater than 0.85 V/C and less than 0.9 V/C
- Amber – Between 0.9 V/C seconds and 1 V/C
- Red – Greater than 1 V/C

4 Hall Farm/ Garden Village – Highway Network Analysis

4.1 Introduction

4.1.1 This section considers the impact on the local and strategic highway networks of the Hall Farm development scenario.

4.2 Local Road Network Analysis

Flow Difference

4.2.1 Appendix E includes the flow difference outputs extracted from the WSTM4. These consider Scenarios 1B 'Hall Farm' against the Reference Case.

AM Peak Hour

4.2.2 Scenario 1B 'Hall Farm' will see additional 6,441 vehicle trips added to the network, which is forecast to result in material flow increases on a number of existing roads. As would be expected, these are primarily roads on the periphery of Hall Farm / Loddon Valley, including the Observer Way, Eastern Relief Road, A327 north and south of Black Boy roundabout, Lower Earley Way North, Hatch Farm Way, A329 Reading Road, Barkham Road and B3349 Hyde End Road.

4.2.3 Selected changes in flows are quantified below:

- Observer Way – flow increases in the northbound direction range between 147-179 vehicles (from 546-637 vehicles in the Reference Case), and between 96 and 114 vehicles in the southbound direction (from 409-500 vehicles in the Reference Case)
- A327 between Observer Way and Shinfield Eastern Relief Road – increase in flow by 141 vehicles in the northbound direction (up from 943 vehicles in the Reference Case) and by 81 vehicles in the southbound direction (an increase from 736 vehicles in the Reference Case)
- Shinfield Eastern Relief Road – flow increases by 228 vehicles in the northbound direction and by 193 vehicles in the southbound direction (compared to 813 and 540 vehicles in the Reference Case)

4.2.4 Flow increases are also forecast on roads further away from Hall Farm / Loddon Valley site on:

- A329(M) between M4 J10 and Winnersh Triangle by 175 vehicles in the northbound direction (from 3,227 vehicles in the Reference Case).
- Peacock Lane between the Old Wokingham Road/ Peacock Lane/ Waterloo Road junction and Peacock Lane/Vigar Way roundabout – flow is forecast to increase by 20 vehicles in the eastbound direction, and by 176 vehicles in the westbound direction (an increase from 1,139 and 821 vehicles in the Reference Case)

4.2.5 Certain links are forecast to show a reduction in flow in Scenario 1B when compared to the Reference Case including:

- a section of Lower Earley Way between Black Boy roundabout and A327/Beeston Way roundabout,

- Easthampstead Road and A329 Berkshire Way east of Jennett's Park roundabout due to traffic reassigning to Peacock Lane.

PM Peak Hour

4.2.6 In the PM peak the impact of trips resulting from Scenario 1B 'Hall Farm' development on flows is similar to that described for the AM peak hour.

4.2.7 Scenario 1B 'Hall Farm' (with LPU growth) will see additional 5,246 vehicle trips added to the network, which is forecast to result in notable flow increases on a number of existing roads. As would be expected, these are primarily roads on the periphery of Hall Farm / Loddon Valley, including the Observer Way, A327, Shinfield Eastern Relief Road, Lower Earley Way North, Hatch Farm Way and Barkham Road. Selected changes in flows are quantified below:

- Observer Way – flow increases in the northbound direction range between 77-88 vehicles (from 462-516 vehicles in the Reference Case), and between 78 and 109 vehicles in the southbound direction (from 555-638 vehicles in the Reference Case).
- A327 between Observer Way and Shinfield Eastern Relief Road – increase in flow by 192 vehicles in the southbound direction (an increase from 975 vehicles in the Reference Case)
- Shinfield Eastern Relief Road – flow increases by 261 vehicles in the southbound direction (compared to 675 vehicles in the Reference Case)
- Barkham Road between B3349 School Road and Barkham Ride – the eastbound direction has an estimated increase of 82 vehicles, while the westbound direction estimates an increase of 238 vehicles. For context, the average number of vehicles in the Reference Case is 640 in the eastbound direction and 408 in the westbound direction

Local Highway Network Delay Difference

4.2.8 **Appendix E** also presents delay difference plots between Scenario 1B 'Hall Farm' and the Reference Case.

AM Peak Hour

4.2.9 In comparison with the Reference Case, Scenario 1B 'Hall Farm' generally shows increases in delays as opposed to reductions. There are, however, very few areas where there are delay increases of over 30 seconds but because the development is forecast to deliver only 2,700 of the 3,930 planned delays are less than 2 minutes. These are isolated locations as opposed to entire movement corridors. Notable increases in delays over 30 seconds are:

- The westbound and eastbound M4 J11 off-slip
- Northbound approach to Black Boy roundabout
- B3030 King St Ln northbound approach to the B3030 King St Ln/ Hatch Farm Way junction
- A329(M) Coppid Beech southbound off slip
- Westbound approach to Jennets Park roundabout

PM Peak Hour

4.2.10 As with the AM Peak Hour, the PM Peak Hour shows isolated locations where delay increases are forecast. There is generally less delay impact shown within the PM model in comparison to the AM Peak model. The most material of these are:

- Southern approach to Black Boy roundabout (M4 overbridge??)
- Coppid Beach eastbound and westbound slips
- Westbound Peacock Lane approach to the Old Wokingham Road/ Peacock Lane roundabout.

Journey Times

4.2.11 To understand the impact of the development proposals on the performance of the LRN, journey times for selected routes have been extracted from the WSTM4. The routes cover a wide area of interest. **Appendix E** includes the full set of results.

AM Peak Hour

4.2.12 In Scenario 1B 'Hall Farm' AM journey time 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 4.2%.

4.2.13 The most pronounced increases in journey times are forecast on:

- A329 Reading Road route (Route 4) – an increase of 1 minute 59 seconds in the northbound direction.
- B3349 Barkham Road (Route 8) – the westbound direction is estimated to have an increase of 2 minutes 33 seconds.
- B3034 Forest Road (Route 12) – the northbound direction is forecast to have an increase of 2 minutes 14 seconds.

PM Peak Hour

4.2.14 In the 'Hall Farm' Scenario 1B PM journey time analysis, all routes are forecast to see a journey time increase, which is on average 3.4%, therefore highlighting the impact being slightly lower than the AM Peak.

4.2.15 The most notable increase in journey times is observed on the B3349 Barkham Road (Route 8). The journey times along the westbound direction of this route are forecast to increase by 2 minutes 20 seconds.

Local Highway Network Maximum Turn V/C

4.2.16 **Appendix E** includes these outputs for the Hall Farm development option. 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.

AM Peak Hour

4.2.17 In Scenario 1B 'Hall Farm', the A33 corridor in Reading is forecast to show the majority of junctions being close to a V/C of 1, which is similar to the Reference Case with acute tidal pressures.

4.2.18 The V/C ratios at numerous junctions around M4 J11 and in the Wokingham area near the Showcase roundabout are close to 1.0, again similar to the Reference Case. In other locations, several junctions in Bracknell are forecast to have a V/C ratio of exactly 1, including at Jennett's Park Roundabout.

4.2.19 The Coppid Beech junction is estimated to have a turn with a V/C ratio greater than 1, which is higher than the Reference Case (slightly less than 1).

PM Peak Hour

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

Local Highway Network Assessment Summary

4.2.21 The strategic modelling results are in line with expectations, that introduction of additional growth at Hall Farm / Loddon Valley, South Wokingham extension and other sites spread across the borough in Scenario 1B 'Hall Farm' will add additional trips to the local road network with flows increasing largely on the roads, which are close to the development locations. However, strategic interventions like the link through Hall Farm between the A327 and B3270 Lower Earley Way and Hatch Farm Way, along with a package of mitigation intended to offset the adverse effects enable traffic to redistribute away from congested areas. By adopting a monitor and manage approach WBC expect to work with neighbouring authorities to manage residual effects on the network, to be explored further as part of the IDP and viability assessments.

4.3 Strategic Road Network Analysis

M4 Mainline Operation

4.3.1 The WSTM4 assessment outputs show there to be immaterial changes in flows or journey times along the M4 in Scenario 1B 'Hall Farm' in comparison to the Reference Case within the AM and PM peaks. Appendix E includes the complete set of results.

M4 Junction 11 Operation

4.3.2 In the WSTM4 Reference Case models, J11 is forecast to have a maximum turn V/C ranging from 0.87 to 0.98 on certain sections of the junction in the AM Peak Hour and 0.87 to 0.99 in the PM peak hour, indicating the junction being congested. With the combination of increased throughput traffic, optimisation and the addition of the extra turn lane onto the B3270 of the junction in Scenario 1B 'Hall Farm', maximum turn V/C is shown to be similar.

4.3.3 The analysis of delay changes between the Reference Case and Scenario 1B 'Hall Farm' indicates that during the morning peak hour, the average delay on the eastbound and westbound off-slips from the M4 increases by approximately 1 minute.

M4 Junction 10 Operation

4.3.4 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 Scenario 1B 'Hall Farm'.

Section Summary

4.3.5 The analysis conducted using the strategic model has shown that the proposed level of development at 'Hall Farm' could be accommodated on the SRN with no significant adverse impact.

5 Ashridge – Highway Network Analysis

5.1 Introduction

5.1.1 This section considers the impact on the local and strategic highway networks of the Ashridge development scenario. A key part of these proposals is the potential to introduce a new interchange on the A329(M). Based on Core Strategy consultation with (the then Highways Agency; now National Highways) it is generally accepted that the introduction of a new interchange would require a change to the motorway status of the road, probably converting this to A3290 as was done west of J10, M4.

5.2 Local Road Network Analysis

Flow Difference

5.2.1 **Appendix F** includes the flow difference outputs extracted from the WSTM4. These consider Scenarios 1B 'Ashridge' against the Reference Case.

AM Peak Hour

5.2.2 Scenario 1B 'Ashridge' will see additional 6,594 vehicle trips added to the network, which is forecast to result in material flow increases and decreases across the wider network of existing roads. As would be expected, these are primarily roads in proximity to the Ashridge development site, including North Wokingham Distributor Road (NWDR), Bearwood Road, B3030 Davis Street, B3018 and Binfield Road as well as A329 Berkshire Way in Bracknell. Increases are also shown on the A329(M) and the M4 in all directions around the M4 Junction 10 interchange. Specifically, the following flow differences are most prominent with the Ashridge Scenario on the LRN:

- Due to the proposed new intersection on the A329(M) and in combination with the Ashridge development traffic, significant changes in flow are observed along the NWDR. To the west of the new A329(M) intersection, NWDR flow increases by circa 1,000 vehicles 2-way as the net effect of reassigned traffic and Ashridge development trips route onto the new A329(M) intersection. Whilst to the east of the new intersection on the A329(M), the NWDR flow decreases by circa 600 trips 2-way as traffic reassigns to the new A329(M) junction avoiding the Coppid Beech junction.

- Binfield Road shows an increase of 128 vehicles in the northbound direction and an increase of 99 vehicles in the southbound direction, as traffic to/from Binfield redistributes using the new A329(M) junction and avoiding the Coppid Beech Roundabout.

- A329 Berkshire Way in Bracknell shows an increase in the eastbound flows ranging from 306 to 548 vehicles (a change from 2,447 to 3,566 vehicles in the Reference Case)

- Peacock Lane – flow changes by 100 vehicles in the westbound direction and -10 vehicles in the eastbound direction on Peacock Lane.

- An increase of 350 vehicles in two-way traffic flow is noted north of the Ashridge site on the B3018.

- Bearwood Road – northbound flow increases by 187 vehicles (from 901 vehicles in the Reference Case), whereas southbound flow increases by 53 vehicles (from 497 vehicles in the Reference Case).

- B3030 Davis Street – northbound flow increases by 82 vehicles (from 402 vehicles in the Reference Case), and southbound flow increases by 174 vehicles (from 324 vehicles in the Reference Case).

- Heathlands Road – flows increase by up to 124 vehicles in the northbound direction and up to 55 vehicles in the southbound direction.

5.2.3 Additional development trips in Scenario 1B 'Ashridge' are also estimated to result in flow increases of not more than 100 vehicles on various roads within Wokingham town centre. These changes highlight the subtle journey time differences across (North) Wokingham, where the model suggests traffic might redistribute to use the new interchange but might also adopt subtly shorter or faster route which this junction would generate.

PM Peak Hour

5.2.4 In the PM peak hour, Scenario 1B 'Ashridge' will see additional 4,649 vehicle trips added to the PM peak network. Similar to the AM peak hour results, the PM forecast results in material flow increases on several existing roads within the vicinity of Ashridge.

5.2.5 Selected changes in flows are quantified below:

- Due to the proposed new intersection on the A329(M) and in combination with the Ashridge development traffic, significant changes in flow are observed along the NWDR. To the west of the new A329(M) intersection, NWDR flow increases by circa 1,260 vehicles 2-way as the net effect of reassigned traffic and Ashridge development trips route onto the new A329(M) intersection. To the east of the new intersection on the A329(M), the NWDR flow decreases by circa 650 trips 2-way as traffic reassigns to the new A329(M) junction avoiding the Coppid Beech junction.

- Binfield Road shows an increase of 57 vehicles in the northbound direction and an increase of 240 vehicles in the southbound direction.

- A329 Berkshire Way in Bracknell shows an increase in the westbound flows ranging from 145 to 275 vehicles (a change from 1,469 to 2,686 vehicles in the Reference Case). However, the flow reduces in the eastbound direction.

- An increase of 300 vehicles in two-way traffic flow is noted north of the Ashridge site on B3018.

- Bearwood Road – northbound flow increases by 70 vehicles (from 602 vehicles in the Reference Case), whereas southbound flow increases by 92 vehicles (from 646 vehicles in the Reference Case).

- B3030 Davis Street – northbound flow increases by 35 vehicles (from 406 vehicles in the Reference Case), and southbound flow increases by 160 vehicles (from 505 vehicles in the Reference Case).

5.2.6 In Scenario 1B 'Ashridge,' additional development trips are also estimated to increase traffic flow by no more than 100 vehicles on various roads within Wokingham town centre.

Local Highway Network Delay Difference

5.2.7 **Appendix F** also presents delay difference plots between Scenario 1B 'Ashridge' and the Reference Case.

AM Peak Hour

5.2.8 Compared to the Reference Case, Scenario 1B 'Ashridge' indicates significant delay increases at two junctions: the Warren House Road/Forest Road signalised junction and the Warren House Road/Diamond Jubilee Way roundabout located south of the new intersection. Delays are expected on almost all arms of these junctions, often increasing by 1-2 minutes.

5.2.9 An increase in delays of 48 seconds is shown on the northbound approach to the Mole Road roundabout.

5.2.10 Increases in delays of over 30 seconds are observed on the northbound approach to Peacock Lane/ Vigar Way roundabout and on the westbound A329 approach to the Jennett's Park roundabout.

PM Peak Hour

5.2.11 As with the AM Peak Hour, the PM Peak hour shows isolated locations where delay increases are forecast in proximity to the site.

5.2.12 All approaches of the Warren House Road/Forest Road signalised junction are forecast to have increases in delays of 1-2 minutes in Scenario 1B when compared to the Reference Case.

5.2.13 An increase in delays of 59 seconds is shown on the northbound approach to the Mole Road roundabout, Sindlesham.

5.2.14 Increases in delays of over 30 seconds are observed on the northbound approach to Peacock Lane/ Vigar Way roundabout and on the westbound A329 approach to the Jennett's Park roundabout.

5.2.15 During the PM peak hour, delays exceeding 2 minutes are forecast on the A329(M) mainline in the eastbound direction as vehicles approach the new intersection. These delays are forecast on the eastbound off-slip probably because the interchange roundabout has not yet been designed to serve demands. The congestion on the off-slip road causes queueing, which obstructs the mainline flow on the A329(M), could potentially be avoided but might also result in congestion elsewhere in North Wokingham. Journey Times

5.2.16 To understand the impact of the development proposals on the performance of the LRN, journey times for selected routes have been extracted from the Reference Case and Scenario 1B 'Ashridge'. The routes cover the entire area of interest and more. **Appendix F** includes the full set of results.

AM Peak Hour

5.2.17 In the Ashridge Scenario 1B AM peak journey time analysis, the vast majority of the routes are forecast to see a journey time increase, which is on average 7.5%.

5.2.18 Significant journey time increases are shown on:

- A329 Reading Road (Route 4), with an increase of 3 minutes 46 seconds to the Reference Case in the northbound direction. This is predominantly attributed to increased delay across the showcase roundabout and the Wokingham Road/Loddon Bridge Road junction.

- A327 Arborfield to Reading route (Route 7) and B3349 Barkham Road route (Route 8) are also showing an increase in journey times (in the northbound and westbound directions respectively) of around 2 minutes against the Reference Case.

5.2.19 The most significant journey time increases ranging between 2 minutes 47 seconds and 4 minutes 44 seconds are forecast on A321 (Route 10 and Route 11) and B3034 Forest Road (Route 12), which cover road sections around Ashridge growth locations in comparison to reference case.

PM Peak Hour

5.2.20 In the PM, similar to the AM, all the routes are forecast to see a journey time increase. In the PM this is on average 6.2%.

5.2.21 The most significant journey time increases are shown on the A329(M), with an increase of 1 minute 52 seconds in the eastbound direction and 1 minute 2 seconds in the westbound direction. This is largely attributed to queues on the eastbound off-slip blocking back from the new A329(M) intersection, causing congestion on the A329(M) mainline.

5.2.22 The B3030? Mole Road route (Route 7) is also showing significant increases in journey time in the northbound direction of 3 minutes 44 seconds.

5.2.23 Similar to the AM peak results, significant journey time increases ranging between 2 minutes 24 seconds and 3 minutes 23 seconds are forecast on A321 (Route 10 and Route 11) and B3034 Forest Road (Route 12), which cover road sections around Ashridge growth location.

Local Highway Network Maximum Turn V/C

5.2.24 **Appendix F** includes output plots for the Maximum Turn volume/capacity for the Ashridge development scenario. 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.

AM Peak Hour

5.2.25 Within the vicinity of Ashridge, the V/C at the Coppid Beech roundabout shown within the Reference Case are alleviated in Scenario 1B due to vehicles re-routing to the proposed Ashridge A329(M) intersection, falling from X to Y

5.2.26 Whilst the introduction of the Ashridge Interchange relieves congestion and delay at Coppid Beech the forecasts suggests these would be replicated at the Forrest Road/Warren House Road junction at the edge of the SDL. This junction has been designed to support the development, but the forecast shows a high level of max turn V/C of 1.0 in Scenario 1B, whilst no high V/C was shown at this location in the Reference Case. An alternative arrangement could be developed however this might result in congestion elsewhere.

5.2.27 Across the wider study area, minor V/C increases against the Reference case are observed at Black Boy roundabout, Winnersh Triangle and the Showcase roundabout. This is likely due to low level reassignment of traffic across the network due to new A329 (M) junction which is changing turning movements at specific locations which are already at or close to capacity and this is resulting in a minor change to V/C's.

PM Peak Hour

5.2.28 Within the vicinity of Ashridge in the PM Peak, the high levels of V/C at the Coppid Beech roundabout shown within the Reference Case are alleviated due to vehicles re-routing to the proposed Ashridge A329(M) intersection, this is in line with the impact of the AM Peak.

5.2.29 The Forrest Road/Warren House Road within vicinity of the Ashridge development is shown to have a high level of max turn V/C of 1.0 in Scenario 1B, whilst no high markedly worse than the Reference Case.

5.2.30 Across the wider study area, minor V/C increases against the Reference case are observed at Black Boy roundabout, and the Showcase roundabout. This is likely due to low level reassignment of traffic across the network due to new A329 (M) junction which is changing turning movements at specific locations which are already at or close to capacity and this is resulting in a minor change to V/C's.

Local Highway Network Assessment Summary

5.2.31 The strategic modelling results align with expectations, indicating that additional growth at Ashridge, the South Wokingham extension, and other sites across the borough in Scenario 1B impacts the highway network operation.

5.2.32 There are three main impacts from the additional development trips tested in Scenario 1B 'Ashridge' and the associated proposed infrastructure:

- The new A329(M) Ashridge intersection significantly re-routes existing traffic within the Wokingham area and villages to the north. The interchange alleviates congestion and delays at Coppid Beach but creates congestion at the Warren House Road/Diamond Jubilee Way roundabout on the NWDR.
- During the PM peak hour, the model forecasts delays exceeding 2 minutes on the A329(M) mainline in the eastbound direction as vehicles queueing on the approach the new intersection. It is likely this could be addressed but may add to congestion/delay elsewhere.
- Significant delays of over 30 seconds are forecast on all arms of the Warren House Road/Forest Road junction, which provides access from one of the Ashridge growth location development parcels.

5.2.33 This model test considers the Ashridge SDL with a new A329(M) interchange. The combination of development and infrastructure results in multiple changes that are likely to prove both positive and negative to growth options. To ensure adverse effects can be avoided it will be necessary to refine the infrastructure package which supports this SDL thus any direct comparison with alternative SDL's should be held in abeyance. The new interchange on the A329(M), influenced flow patterns on the adjacent road network within Wokingham and Bracknell, as shown it leads to traffic being reassigned and changes in junction to junction patterns along Berkshire Way, SDL's and Forest Road areas of the network.

Strategic Road Network Analysis

M4 Mainline Operation

5.2.34 **Appendix F i**ncludes the flow difference outputs extracted from the WSTM4. These consider the Ashridge Scenario 1B against the Reference Case.

5.2.35 Comparing the Ashridge Scenario 1B AM peak hour against the Reference Case between M4 junction 10 & 11, the flow changes by 255 vehicles in the eastbound direction and 183 vehicles in the westbound. Within the PM peak the flow changes are 89 in the eastbound and 181 vehicles in the westbound.

5.2.36 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 with results presented at **Appendix F** . In the Ashridge scenario, the impact of strategic development on travel times on the M4 mainline is immaterial in comparison to the Reference Case, being less than 4 seconds.

M4 Junction 11 Operation

5.2.37 In the WSTM4 Reference Case models, M4 J11 is forecast to have a maximum turn V/C ratio ranging from 0.87 to 0.98 on certain sections during the AM peak hour and from 0.87 to 0.99 during the PM peak hour, indicating high congestion. In Scenario 1B 'Ashridge,' the maximum turn V/C ratio worsens, reaching values of 1.03 and 1.01 in the AM and PM respectively.

5.2.38 The analysis of delay changes between the Reference Case and Scenario 1B 'Hall Farm' shows that during the morning peak hour, the average delay on the westbound off-slip from

the M4 increases by 50 seconds, while other approaches experience much smaller changes in delays. In the PM peak hour, the changes in delays are negligible.

M4 Junction 10 Operation

5.2.39 Junction 10 shows no issues with maximum turn V/C or absolute delay at any of the merges within the Ashridge scenario. However, there is a significant increase in flow across the junction due the Ashridge development, particularly during the morning peak. This results in an increase in delays of 22 seconds on the A329(M) in the westbound direction, at a point where it diverges to a single lane leading to the M4 North.

A329 (M) Operation

5.2.40 The section of the A329 (M) between Junction 10 to the west and Coppid Beach to the east is affected by the new Interchange linked to the Ashridge SDL. This causes increased delays along this section, contributing to the overall rise in journey times on the A329(M) between Bracknell and Reading, with delays reaching up to 60 seconds during the AM peak and up to 1 minute 52 seconds during the PM peak. As noted above it should be possible to mitigate this delay.

Section Summary

5.2.41 The analysis of the M4 mainline operation reveals that additional trips in Scenario 1B 'Ashridge' result in increases in vehicle flow compared to the Reference Case. The impact on journey times between M4 Junctions 12 and 8/9 is negligible, with differences of less than 4 seconds.

5.2.42 At M4 Junction 11, the Reference Case indicates high congestion levels with maximum turn V/C ratios ranging from 0.87 to 0.99 during peak hours, which slightly worsen in Scenario 1B.

5.2.43 Meanwhile, M4 Junction 10 does not materially alter the V/C or delays in the Ashridge scenario, however there is a notable increase in flow through the junction which impacts certain links such as leading to a 22-second delay on the A329(M) westbound during the morning peak, .

5.2.44 The new junction on the A329 (M) does not have a significant adverse impact in isolation, but it does materially change traffic patterns in the area and results in the adjacent local road network witnessing major increasing in delay and queueing at key junction.

6 Castle End Gardens, Twyford – Highway Network Analysis

6.1 Introduction

6.1.1 This section considers the impact on the local and strategic highway networks of the Twyford SDL scenario incorporating a new A4-B3018 link road.

6.2 Local Road Network Analysis

Flow Difference

6.2.1 **Appendix G** includes the flow difference outputs extracted from the WSTM4. These consider Scenario 1B 'Twyford' against the Reference Case.

AM Peak Hour

6.2.2 Scenario 1B 'Twyford' will see an additional 4,952 vehicle trips added to the network, which is forecast to result in material flow increases on a number of existing roads. However, these flow increases are not as profound as those described in Scenario 1B 'Hall Farm' or Scenario 1B 'Ashridge', which is thought to be due to a greater dispersion of trips across the local network and a lower number of additional trips assessed in the Twyford growth scenario.

6.2.3 As would be expected, the roads that primarily show increases in flow are in proximity to Twyford and include the A4 New Bath Road, Castle End Road to the east of Twyford, and Hinton Road south of Twyford. Increases are also forecast on the A329(M) and A3290 between Bracknell and Reading and B3024 Hurst Road east of White Waltham. Specifically, the following flow differences are most prominent with the Twyford Scenario.

- A4 Bath Road west of the A321 interchange shows an increase of 44 vehicles in the eastbound direction (from 1,081 in the Reference Case) and a 194 increase in the westbound direction (from 1,054 in the Reference Case), predominantly stemming from the additional travel demand to/from the Castle End Gardens development site.
- Castle End Road to the east of Twyford shows an increase of 88 – 98 vehicles in the northbound direction (from 45-128 vehicles in the Reference Case) whilst showing an increase of 117-131 vehicles across the route in the southbound direction (from 54-161 vehicles in the Reference Case), noting that this road intersects the new Link Road proposed as part of the Castle End Garden development.
- Hinton Road shows an increase of 50 vehicles in the northbound direction and 140 vehicles in the southbound direction (from 146 and 140 vehicles in the Reference Case respectively), with travel demand increases along Hinton Road stemming from travel demand between Wokingham and the Castle End Gardens development in Twyford.
- B3024 Waltham??? Road shows an increase of 148 vehicles eastbound vehicles heading out Twyford, whilst a smaller 19 vehicle increase of westbound trip (from 362 and 225 vehicles in the Reference Case).

PM Peak Hour

6.2.4 Scenario 1B 'Twyford' will add 4,121 vehicle trips to the network in the PM peak hour, leading to noticeable increases in traffic flow on several existing roads. However, similar to the AM peak analysis, these increases are less significant compared to those in Scenario 1B 'Hall Farm' or Scenario 1B 'Ashridge'.

6.2.5 Within the PM peak hour forecasts, the impact from the Castle End Garden development on flows is similar to that described for the AM peak hour with flow increases showing on the main routes in the vicinity of Twyford. Selected changes in flows are quantified below:

- A4 Bath Road west of the A321 interchange shows an increase of 134 vehicles in the eastbound direction (from 920 in the Reference Case) and an 86 increase in the westbound direction (from 1,173 in the Reference Case).
- Castle End Road to the east of Twyford shows an increase of 72 – 110 vehicles in the northbound direction (from 30-205 vehicles in the Reference Case) whilst showing an increase of 118-135 vehicles across the route in the southbound direction (from 152-243 vehicles in the Reference Case), noting that this road intersects the new Link Road proposed as part of the Castle End Garden development.
- Hinton Road shows an increase of 82 vehicles in the northbound direction and 81 vehicles in the southbound direction (from 155 and 200 vehicles in the Reference Case respectively).
- B3024 Hurst Road shows an increase of 18 vehicles eastbound vehicles heading out Twyford, whilst a smaller 243 vehicle increase of westbound trip (from 201 and 354 vehicles in the Reference Case).

Local Highway Network Delay Difference

6.2.6 **Appendix G** presents delay difference plots between Scenario 1B 'Twyford' and the Reference Case.

AM Peak Hour

6.2.7 Within the vicinity of Twyford, the Twyford scenario, in comparison with the Reference Case, the delay difference plots shows no areas where delays increase over 30 seconds. Referring to the RAG threshold, impacts in the vicinity of Twyford can be deemed as minimal.

6.2.8 It should be note that the Twyford signalised crossroads is not materially impacted by delay increases, with only minor increases in delay due to additional development trips in Scenario 1B. This is attributed to the new link road through the development site, which creates a bypass route of the Twyford crossroads.

6.2.9 Increase in delay of greater than 30 seconds is shown at Mole Road roundabout, Hatch Farm Way/ King St Lane signalised junction and Black Boy roundabout as well as at Peacock Lane/ Vigar Way roundabout in Bracknell. These increases in delay can be attributed to traffic demand increases from the additional smaller sites, most notably the Barkham Square and Blagrove Lane developments having an impact at the Mole Road and Black Boy roundabout, whilst the South Wokingham sites having an impact on Peacock Lane/Vigar Way roundabout.

PM Peak Hour

6.2.10 As with the AM Peak hour, the PM Peak hour shows isolated locations where delay increases are forecast, and likewise show minimal delay increase around the Twyford area and the Twyford crossroad junction. The largest increase in delay of 38 seconds is observed on the southbound approach from New Bath Road to the A4/A321 New Bath Road roundabout.

6.2.11 Within the PM Peak, the isolated areas of delay away from Twyford are shown to be similar to the AM Peak, this includes delay of over 60 seconds at Mole Road roundabout and a delay of 85 seconds on the southbound approach to the Old Wokingham/ Peacock Lane roundabout. Similar to the AM, the increases in delay can be attributed to the additional smaller sites, predominantly Barkham Square, Blagrove Lane and South Wokingham development site impacting the Old Wokingham/Peacock Lane roundabout

Journey Times

6.2.12 To understand the impact of the development proposals on the performance of the LRN, journey times for select routes have been extracted from the WSTM4. The routes cover a wider area and provide a combination of routes, which pass via LRN and SRN. **Appendix G** includes the full set of results.

AM Peak Hour

6.2.13 In the 'Twyford' Scenario 1B AM peak journey time analysis, the impact of strategic development is apparent in comparison to the Reference Case. Routes are forecast to see a journey time increase, which are on average 4.3%.

6.2.14 The most significant journey time increases are shown on:

- A327 Eastern Relief Road northbound route through Shinfield (Route 6), with an increase of 2 minutes 31 seconds to the Reference Case
- A327 Mole Road northbound route (Route 7) showing an increase in journey time of 2 minutes 9 seconds.
- B3349 Barkham Road westbound route (Route 8) showing an increase in journey time of 2 minutes 18 seconds.
- B3034 Forest Road northbound route (Route 12) showing an increase in journey time of 1 minute 50 seconds.

6.2.15 It can be presumed that the increased journey times are attributed to such growth areas as the Land at Blagrove/Barkham Square development rather than the Twyford development, because this scenario does not delivery additional infrastructure to support north/south movement southeast of Reading.

PM Peak Hour

6.2.16 In the 'Twyford' Scenario 1B PM journey time analysis, the impact of strategic development is evident when compared to the Reference Case. The forecast indicates that across all the routes considered journey times will on average increase by 3.9%.

6.2.17 The most significant journey time increases are shown to be similar to the AM peak, with the A327 ERR northbound route through Shinfield, with an increase of 2 minutes 28 seconds to the Reference Case and the A327 Mole Road northbound route showing an increase in journey time of 2 minutes 13 seconds. Again, these changes can be attributed to growth in the south of the Borough because additional infrastructure to support north/south movement southeast of Reading is not provided in this scenario.

Local Highway Network Maximum Turn V/C

6.2.18 **Appendix G** includes output plots for the Maximum Turn Volume/Capacity (V/C) for the Reference Case and Twyford development scenario. 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.

AM Peak Hour

6.2.19 In the Twyford area, there are no significant changes in maximum turn V/C ratios between the Reference Case and the Twyford AM peak scenario, except at Twyford crossroads. At this junction, the maximum turn V/C increases from 0.89 in the Reference Case to 1.06 in Scenario 1B 'Twyford'. Given the minor changes in delays on the junction approaches, it can be concluded that the noticeable increase in the maximum turn V/C value is likely due to a

single turn with low traffic volume being affected. Across the wider study area, a notable V/C increase against the Reference Case is observed at Coppid Beech roundabout (which is possibly due to the South Wokingham development).

PM Peak Hour

6.2.20 Similar to the AM peak hour findings, in Twyford, maximum turn V/C ratios are mostly unchanged between the Reference Case and the Twyford scenario in the PM peak, except at Twyford crossroads. Here, the ratio increases from 0.91 to 0.95 in Scenario 1B 'Twyford'. This increase is likely to be associated with a single turn carrying low traffic volume.

6.2.21 Across the wider study area notable V/C increase against the Reference case are observed at Black Boy roundabout.

Local Highway Network Assessment Summary

6.2.22 The strategic modelling results meet expectations, showing that the additional development at Twyford, the South Wokingham extension, and other locations throughout the borough in Scenario 1B affect the local highway network's operation.

6.2.23 Within the Twyford area, the Cast End Gardens development causes increases in traffic levels, however no significant increases in delays or journey times are shown within either the AM and PM Peak models. In particular, the Twyford crossing congestion hotspot is noted to be minimally impacted by the development, predominantly due to the new Castle Ends Gardens link road providing additional capacity for alternative routes away from the crossing.

6.2.24 Across the wider Wokingham study area, the additional SDL developments impact upon already congested hotspots, particularly Black Boy roundabout, Mole Road roundabout, Coppid Beech junction as well as the area around Peacock Lane and the Jennets Park roundabout.

6.2.25 This model scenario assumes the Twyford Cross Roads junction is unchanged. Whilst further mitigation options have not been explored, it is noted that options to limit traffic on some arms or restrict turning movements could restore junction performance.

6.3 Strategic Road Network Analysis

M4 Mainline Operation

6.3.1 The WSTM4 assessment outputs show there to be immaterial changes in flows or journey times along the M4 within the Twyford scenarios in comparison to the Reference Case within the AM and PM peaks.

6.3.2 **Appendix G** includes the flow difference outputs extracted from the WSTM4. These consider Scenario 1B 'Hall Farm' against the Reference Case.

6.3.3 In the 'Twyford' Scenario 1B AM peak hour, the westbound flow changes by 81 vehicles, whereas in the PM peak the flow changes range between 11 and 112 vehicles with the largest increase mainly observed in the westbound direction.

6.3.4 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 (Route 2) cover the section of motorway between M4 J12 and J8/9. **Appendix G** includes a set of results for the defined junctions. In the Twyford Scenario 1B analysis, the impact of strategic development on travel times on the M4 mainline is immaterial in comparison to the Reference Case, being less than two seconds.

M4 Junction 11 Operation

6.3.5 In the WSTM4 Reference Case models, J11 is forecast to have a maximum turn V/C ranging from 0.87 to 0.98 on certain sections of the junction in the AM Peak Hour and 0.87 to 1.05 in the PM peak hour, indicating that parts of the junction will be approaching or exceeding capacity and there is a likelihood of queuing and delays. The max turn V/Cs across the junction are shown as being tidal to/from Reading in the AM and PM respectively, with more nodes along the A33 northbound approach being shown over the 85% VC threshold (shown with the VC plots of Appendix G), whilst within the PM peak more nodes of the southbound approach out of reading are highlighted and shown over the 85% VC threshold. This pattern is in part due to the management of the flows to and from the SRN on the slip lanes which influence the queues and delays on the local road network operations at the junction.

6.3.6 Within the Twyford scenario, the introduction of the further SDL trips pushes the northbound A33 approach to a V/C greater than 1 within the AM peak. No significant increase is observed in the Twyford PM peak scenario.

6.3.7 With the Twyford scenario, there are no significant delay increases shown at M4 Junction 11 against the Reference Case.

M4 Junction 10 Operation

6.3.8 From the Maximum turn V/C plots provided in Appendix G, Junction 10 shows no issues with Max V/C or absolute delay at any of the merges within Scenario 1B ‘Twyford’. Notably, none of the merges are highlighted above the 85% V/C, that is used as a threshold to identify when congestion could start occurring in any of the scenarios

Section Summary

6.3.9 The analysis conducted using the strategic model has shown that the proposed level of development at ‘Twyford’ alongside other additional development can be accommodated on the SRN.

6.3.10 There are immaterial changes in flows or journey times along the M4 within the scenario in comparison to the Reference Case in both peaks, as highlighted within the flow difference plots and the journey timetables shown in Appendix G. With journey time variance to the Reference Case being less than 5 seconds across the M4 routes and flow variance being no greater than 150 vehicles in one direction.

7 Summary and Conclusions

7.1 Summary

7.1.1 Wokingham Borough Council (WBC) is reviewing its development plan policy and preparing a new Local Plan Update (LPU), intended to guide spatial strategy and planning policies up to 2040. The LPU Transport Assessment, presented in the "Wokingham Local Plan Update: Local Highway Network and M4 Corridor - Transport Assessment Report" from July 2024, evaluates the potential cumulative impact of housing developments at Hall Farm/Loddon Valley, the South Wokingham Extension, and several smaller sites on the local highway network and the M4 corridor, with forecasts focused on the year 2040.

To inform the LPU, WBC also commissioned Stantec to evaluate alternative strategic site options with similar development scales, specifically Hall Farm/Loddon Valley (2,700 homes), Ashridge (3,000 homes), and Castle End Gardens in Twyford (2,500 homes). The assessment has utilised the Wokingham Strategic Transport Model (WSTM4), refined to reflect 2021 travel conditions.

For each alternative growth location, two forecast scenarios were considered: a Reference Case, which includes planned and committed development and infrastructure, but excludes the growth locations within Wokingham for 2040, and a Development Scenario with Mitigation, which encompasses one of the strategic site options, the South Wokingham SDL extension, and other smaller site allocations. The focus was on quantifying impacts during morning and evening peak hours.

7.1.2 Data extracted from different scenarios has been used to assess transport impacts on the highway network under alternative development growth assumptions. A range of key performance indicators extracted from the strategic model. These indicators have included actual traffic flows, delays and their changes to the Reference Case, journey times for a selection of routes, and the maximum volume-to-capacity ratio at junction turns.

7.1.3 These metrics offer a preliminary, strategic-level insight into the effects of the developments when compared to the Reference Case. However, it is important to note that these indicators do not provide a precise measurement of the local impacts or their mitigation. For a more detailed analysis of the local implications, further studies involving microsimulation or detailed junction modelling would be necessary.

7.1.4 The study has been designed not to make subjective judgments about the severity of the impacts from proposed development and infrastructure projects. Instead, it has aimed to quantify and compare the effects of major alternative growth locations broadly summarised as:.

- Hall Farm, with M4 overbridge and associated improvements
- Ashridge, with A329/Ashridge Interchange
- Twyford, with eastern relief road

7.1.5 To convey the assessment results, the study has used visual aids like thresholds for vehicle delay and colour coding to illustrate the differences between various scenarios. These representations do not necessarily imply a greater or lesser degree of acceptable impact, but are 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 precedence over private car trips. 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.

7.1.6 The report has detailed the findings of a highway network analysis across three development scenarios at Hall Farm, Ashridge, and Twyford, assessing the impact of each on local and strategic road networks during peak hours.

Scenario 1B – Hall Farm

7.1.7 In summary, the development tested in **Scenario 1B 'Hall Farm'** is estimated to significantly increase vehicle trips, with the AM peak seeing an additional 6,441 trips and the PM peak 5,246 trips, leading to material flow increases on roads particularly surrounding large development sites (i.e. Hall Farm and South Wokingham Extension). Roads such as Observer Way, A327, and Shinfield Eastern Relief Road are expected to experience the highest increases in traffic flow. The analysis also anticipates higher delays at key junctions like Black Boy roundabout and increased journey times averaging 4.2% in the AM and 3.4% in the PM peak hours.

7.1.8 However, strategic interventions included in Scenario 1B 'Hall Farm' like the link through Hall Farm between the A327 and Lower Earley Way along with a package of mitigation significantly offset the adverse effects. By adopting a monitor and manage approach WBC can expect to work with neighbouring authorities to manage residual effects on the network, to be explored further as part of the IDP and viability assessments.

7.1.9 The strategic road network analysis indicates that the proposed development could be accommodated with no significant adverse impact, as the M4 mainline operation, M4 Junction 10 and Junction 11 show no material changes in delays or maximum turn V/C. This finding is further supported by a comprehensive microsimulation assessment of the M4, conducted for a larger development at Hall Farm (3,930 dwellings) as reported in the LPU Transport Assessment, July 2024, compared to 2,700 dwellings reported in this document.

Scenario 1B - Ashridge

7.1.10 **Scenario 1B 'Ashridge'** forecasts an additional 6,594 vehicle trips during the AM peak and 4,649 during the PM peak. This is similar to the number of additional trips generated by the 'Hall Farm' scenario, because there is less internalisation, although 'Ashridge' shows a slightly higher increase in the AM peak.

7.1.11 The strategic modelling results align with expectations, indicating that additional growth at Ashridge, the South Wokingham extension, and other sites across the borough in Scenario 1B impact the highway network operation.

7.1.12 Strategic modelling results suggest that while the development impacts highway network operation, the most significant issues arises from the new A329(M) Ashridge intersection:

- The new A329(M) Ashridge intersection significantly re-routes existing traffic within the Wokingham area. This mainly alleviates traffic and congestion at Coppid Beach but creates high levels of congestion at the Warren House Road/Diamond Jubilee Way roundabout on the NWDR.
- During the PM peak hour, delays exceeding 2 minutes are forecast on the A329(M) mainline in the eastbound direction as vehicles queueing on the approach the new intersection.

7.1.13 In addition, significant delays of over 30 seconds are forecast on all arms of the Warren House Road/Forest Road junction, which provides access from one of the Ashridge growth location development parcels.

7.1.14 The model highlights that traffic will be constrained at some existing junctions without development. Whilst Ashridge will result in additional development traffic, like Hall Farm, the planned mitigation is forecast to affect other junctions. To ensure that any proposals can be considered positively it will be necessary to Investigate mitigation options further to balance positive/negative effects.

7.1.15 Journey times in Scenario 1B 'Ashridge' are forecast to increase on average by 7.5% in the AM and 6.2% in the PM peak hours. These increases on average are noticeably higher than those forecast under Hall Farm alternative scenario, and the main reason for this are the congestion hotspots identified earlier.

7.1.16 The analysis of the M4 mainline and M4 J10 and J11 under the Ashridge Scenario 1B shows an increase in vehicle flow, with changes generally being slightly higher than those observed in Scenario 1B 'Hall Farm' with the introduction of the new junction onto the A329(M).

7.1.17 Journey times between M4 Junctions 12 and 8/9 are minimally impacted by the additional trips, with differences of less than 4 seconds.

7.1.18 At M4 Junction 11, the existence of high congestion is noted in the Reference Case (before the development trips are added) which worsen slightly in Scenario 1B. The westbound off-slip from the M4 at Junction 11 experiences an average delay increase of 50 seconds during the morning peak, while other approaches see negligible changes in delays during the PM peak.

7.1.19 Junction 10 does not show significant issues with V/C or delays in the Ashridge scenario according to the thresholds used of 85% V/C, but there is a notable increase in flow, leading to a 22-second delay on the A329(M) westbound during the morning peak.

7.1.20 The assessed scenarios provide an overview comparison of their different impacts using the network assumptions for current and future mitigation proposals. This provides a comparison assessment across the network as reported. For a more detailed analysis of the implications on the strategic road network, further studies involving microsimulation or detailed junction modelling would be recommended.

Scenario 1B - Twyford

7.1.21 **Scenario 1B 'Twyford'** exhibits the least growth in traffic demand when compared to the alternative growth scenarios, with an increase of 1.8% in the AM peak and 1.5% in the PM peak compared to its Reference Case. This amounts to an increase of 4,952 vehicles in the AM peak and 4,121 in the PM peak. Thus, while the 'Hall Farm' and 'Ashridge' scenarios show similar levels of increased traffic compared to the Reference Case, the 'Twyford' scenario stands out as the option with significantly fewer (around 30% fewer) additional trips than the other two growth scenarios during peak hours. However, it is important to note that Twyford does not include employment growth present in the other scenarios, which may influence overall traffic patterns and growth.

7.1.22 This scenario also shows more dispersed traffic increases across the local network and slightly lower additional trips compared to Hall Farm and Ashridge. The A4 New Bath Road, Castle End Road, Hinton Road and B3024 Hurst Road are among the roads expected to see an increase in traffic flow. In particular, the Twyford crossing congestion hotspot is noted to be minimally impacted by the development, predominantly due to the new Castle Ends Gardens link road providing additional capacity for alternative routes away from the crossing

7.1.23 Delay increases and journey time impacts are minimal, with journey times expected to rise by an average of 4.3% in the AM and 3.9% in the PM (a similar level to that observed in Scenario 1B 'Hall Farm').

7.1.24 The strategic analysis indicates that the M4 mainline will not see significant changes in flow or journey times. M4 Junction 11 is expected to see a slight increase in the max turn V/C in the

AM peak, but no significant delay increases are noted. For a more comprehensive understanding of the impacts on the strategic road network, it is recommended to undertake additional studies using microsimulation or detailed junction modelling.

7.2 Conclusions

7.2.1 In summary, all three development scenarios indicate increased traffic flows and journey times, with Scenario 1B 'Ashridge' showing greater impact than the others, largely due to a number of congestion hotspots created by the new A329(M) interchange and additional development trips at Ashridge.

7.2.2 Each development presents unique challenges to the local highway network, with all impacting upon already congested hotspots, such as Black Boy roundabout, Coppid Beech junction, Jennett's Park roundabout and others, with Twyford showing a more evenly distributed impact with less pronounced delay increases.

7.2.3 The strategic road network analysis generally indicates that the proposed development could be accommodated with no significant adverse impact, as the M4 mainline operation, M4 Junction 10 and Junction 11 show no material changes in delays or maximum turn V/C. However, both Twyford and Ashridge scenario may require further detailed assessment using a microsimulation model to confirm this.

Appendix A Hall Farm / Loddon Valley Infrastructure Assumptions

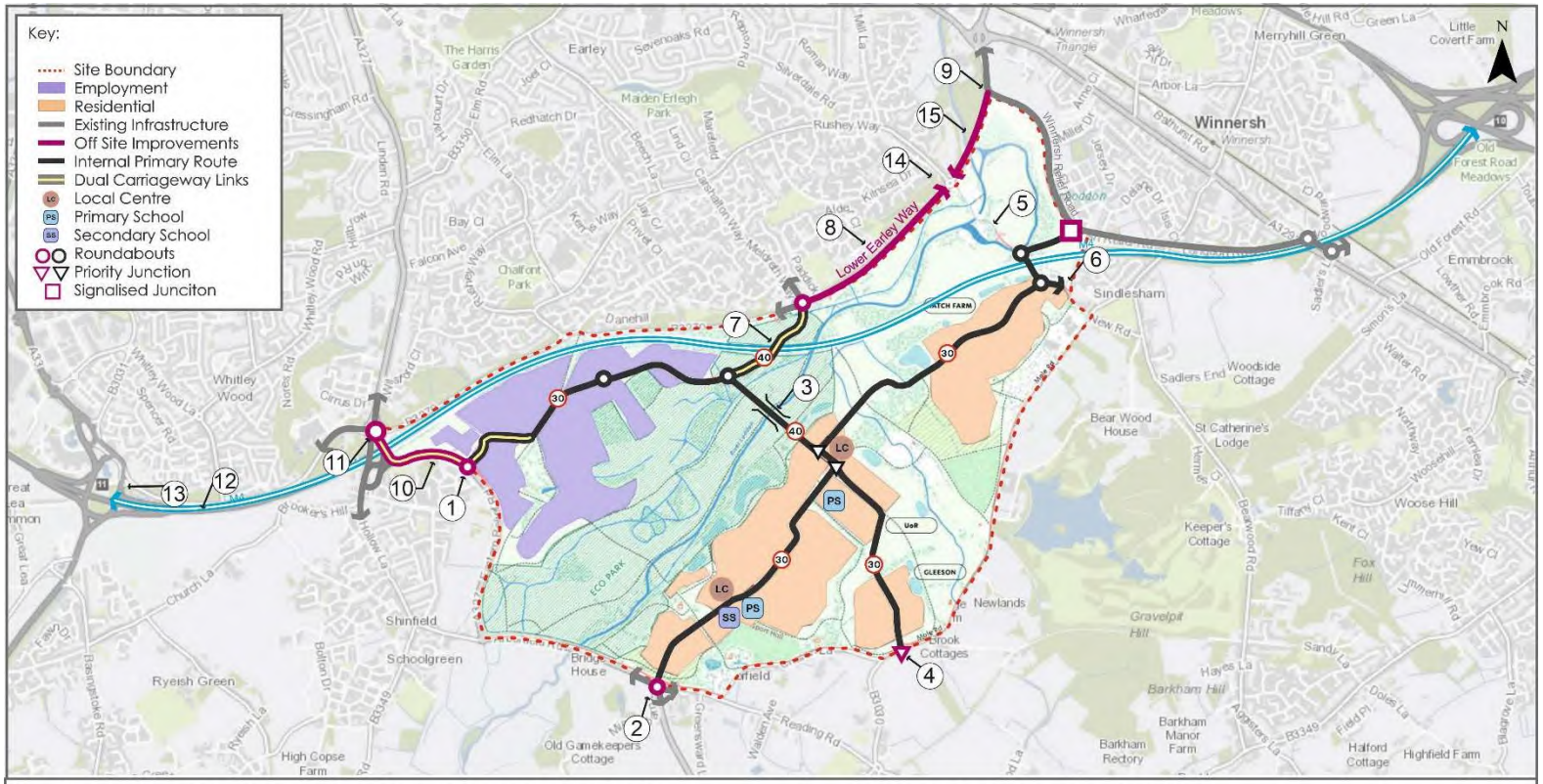
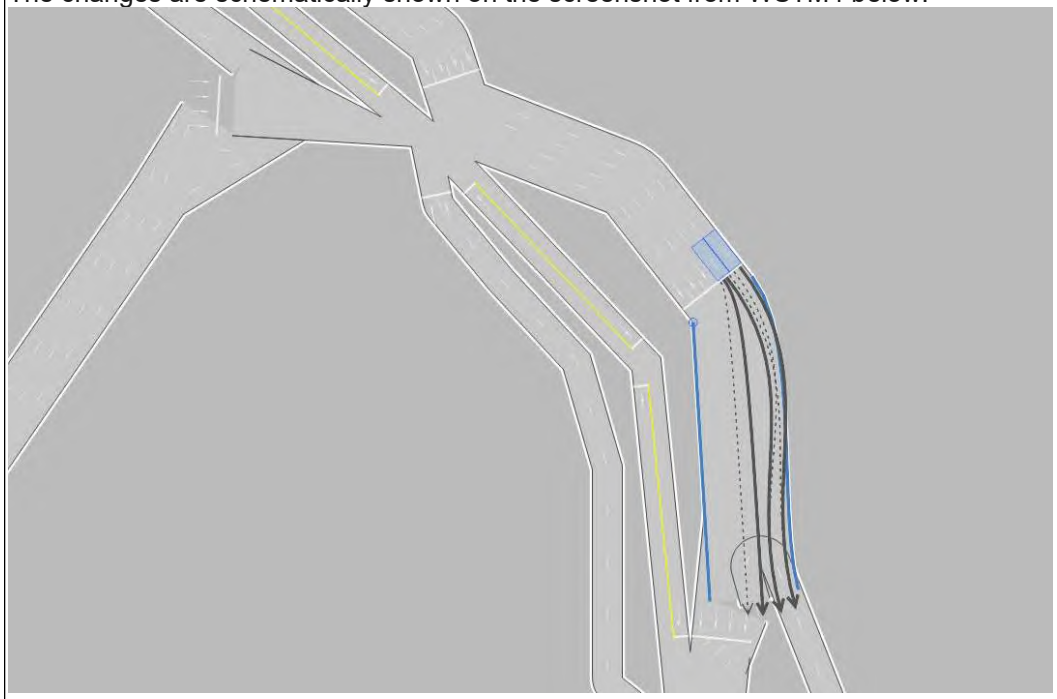


Figure 7 Hall Farm / Loddon Valley – Highway Infrastructure

Table 11 Hall Farm / Loddon Valley – Highway 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 bridge over River Loddon	Single lane. This lies on a primary route, which is assumed to have a speed limit of 30mph.
4	New access to B3030 Mole Road	Priority junction with access from Hall Farm / Loddon Valley being a minor arm.
5	Mill Lane closed to through traffic.	Access to Sindlesham roundabout is severed.
6	New access to Mill Lane and connection to Winnersh Relief Road	See Figure 9.
7	New access to Lower Earley Way landing at the B3270/Meldreth Way Roundabout	See Figure 10.
8	Additional northbound lane on Lower Earley Way	No changes to current speed limit of 50mph. Access from Barn Croft Drive and Paddick Drive become left-in/ left-out only.
9	Upgrade to Lower Earley Way/ Hatch Farm Way junction.	Changes are applied to all arms including provision of the second right turn lane from the south from Lower Earley Way to Hatch Farm Way. See Figure 11.
10	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.
11	Shinfield Road Gyratory - additional circulatory lane on Black Boy's roundabout	Upgrade from three to four lanes on circulatory.
12	2 lanes westbound between Whitley Wood Lane and J11	No change to the existing speed limit of 40 mph. See Figure 12. The B3270/ Whitley Wood Lane junction may need to have the right turn from Whitely Wood Lane banned.

	Infrastructure	Further Information
13	M4 J11 Optimisation and changes to lane markings to accommodate additional lane for traffic movement into B3270.	The changes are schematically shown on the screenshot from WSTM4 below. 
14	Two lane northbound exit at Mill Lane/ Rushey Way roundabout	The 2-lane exit is approximately 170m in length (or up to about 40 meters south of the River Loddon).
15	Two lanes southbound on Lower Earley Way North between the Hatch Farm Way and Mill Lane junctions	Requiring a new bridge over the River Loddon and probably flood & BNG mitigation

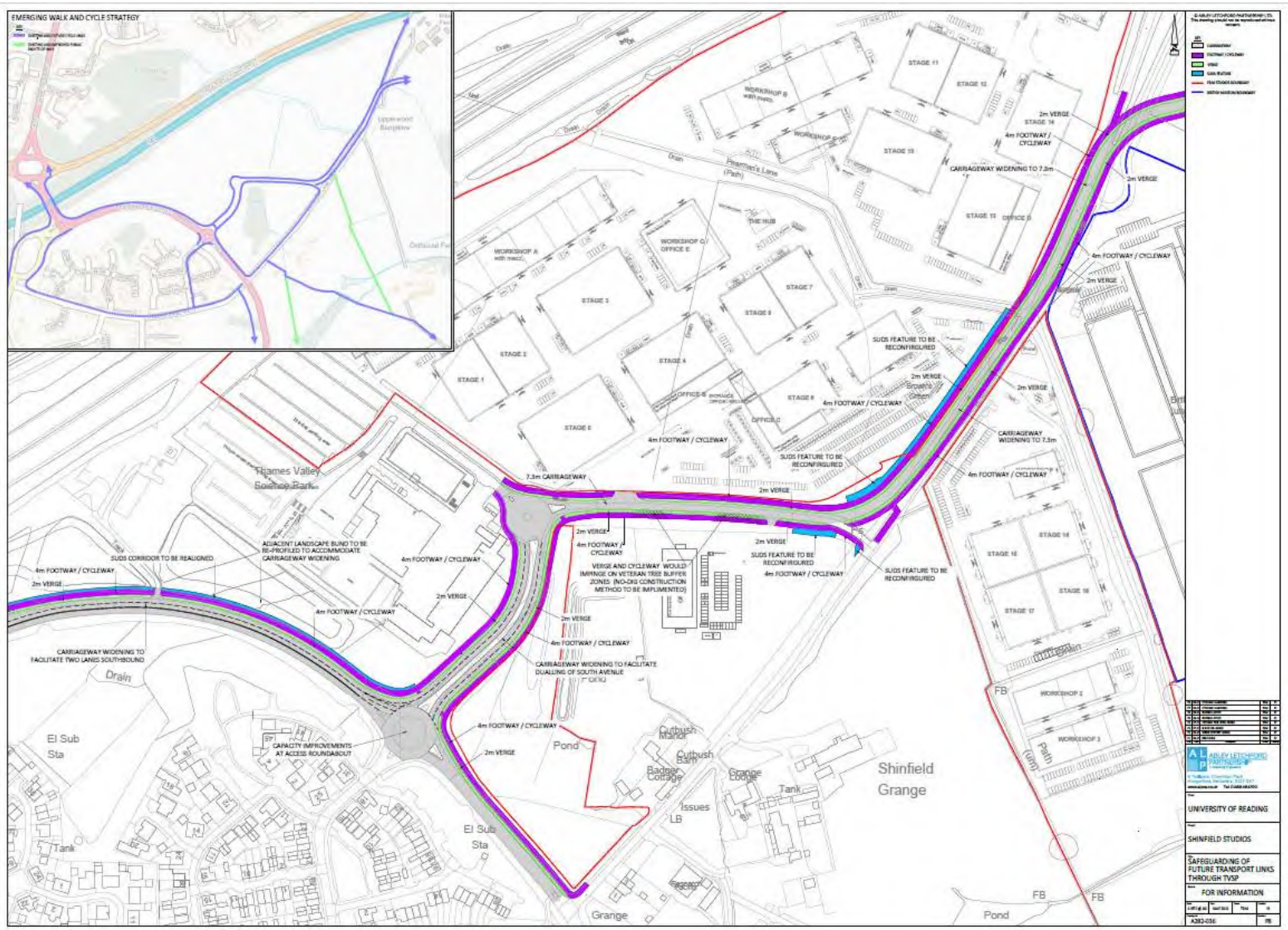


Figure 8 Provision of an additional southbound lane along the Shinfield Eastern Relief Road

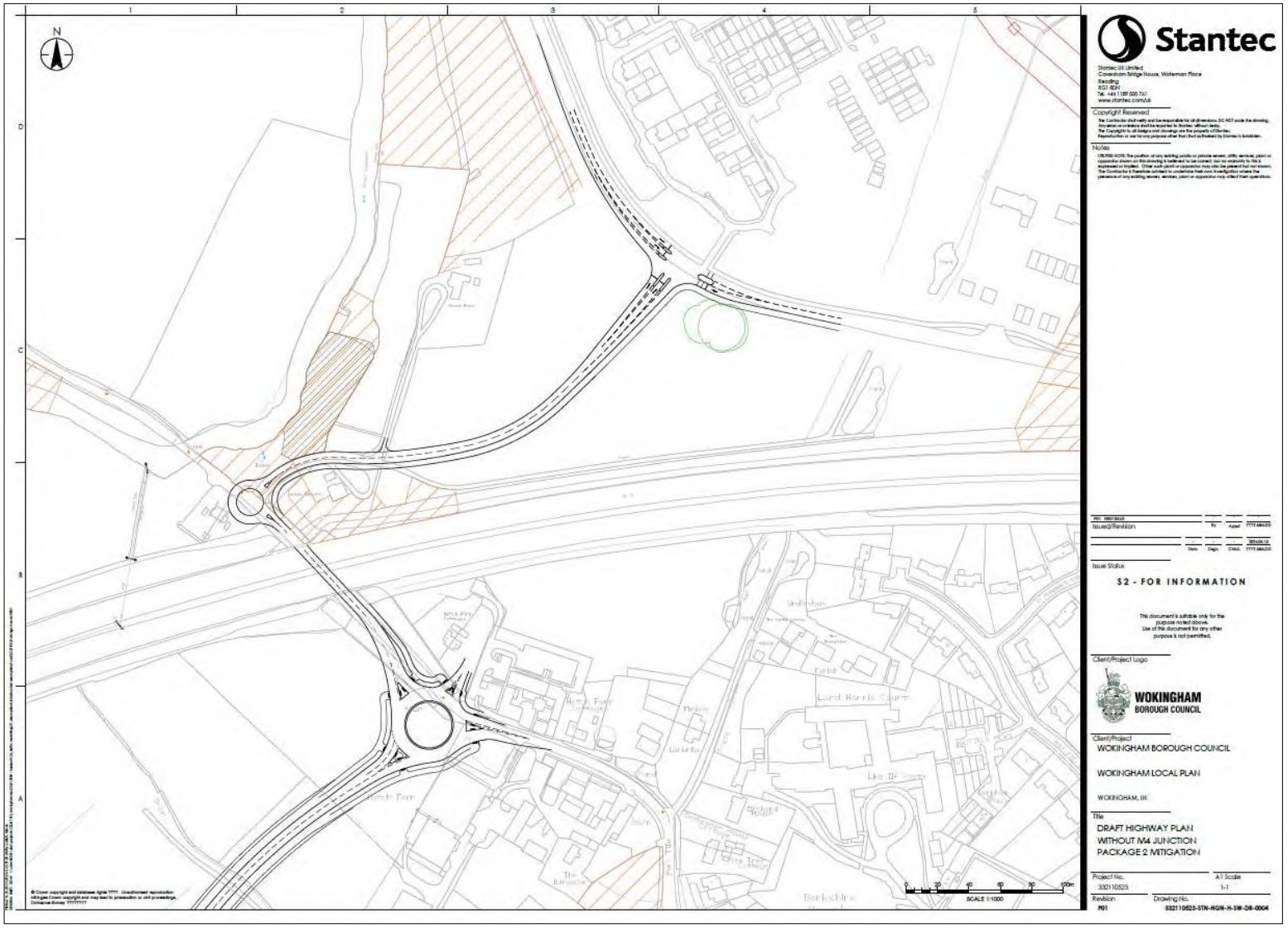


Figure 9 New access to Mill Lane and Connection to Winnersh Relief Road

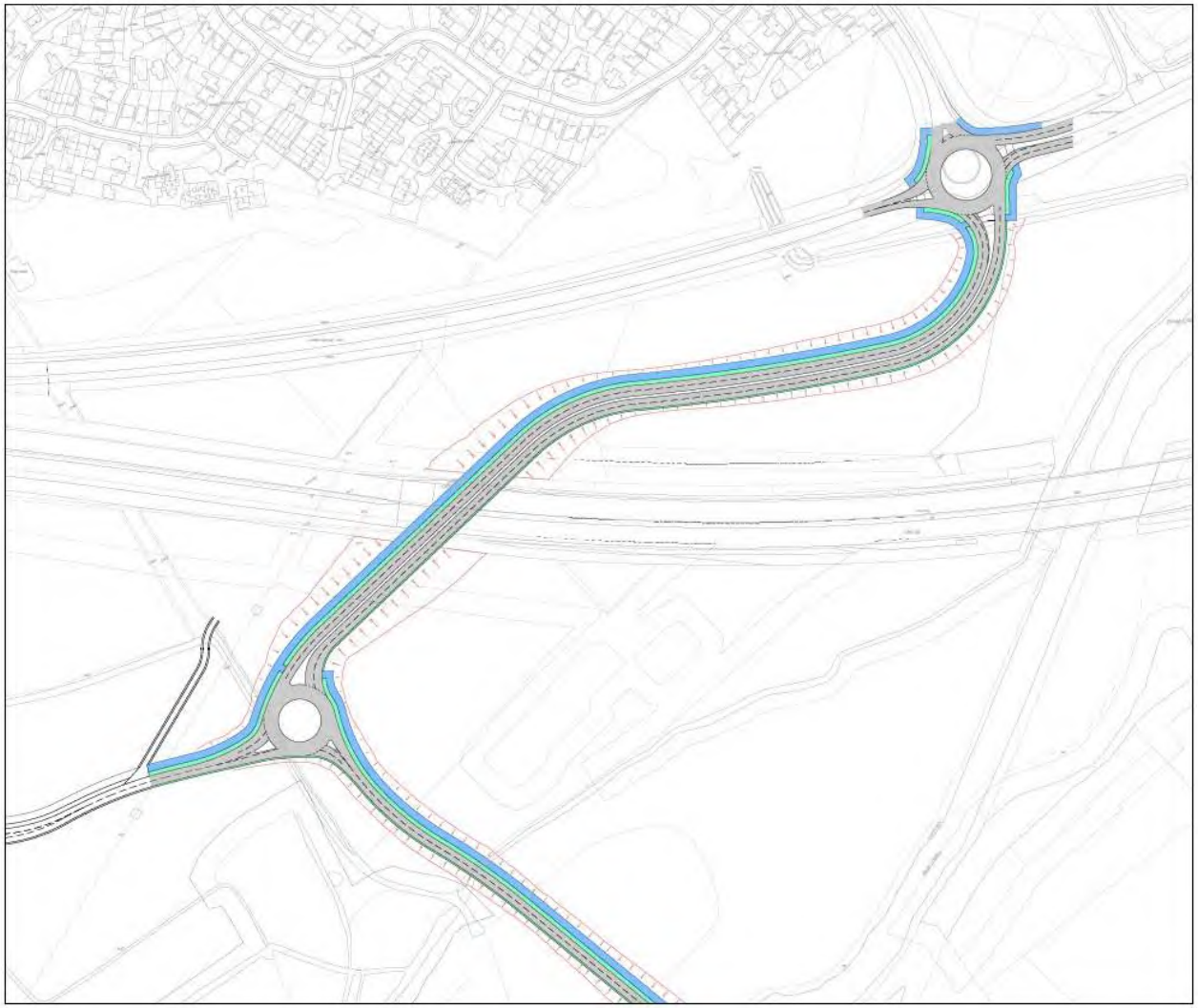


Figure 10 New access to Lower Earley Way landing at the B3270/Meldreth Way Roundabout (source: Abley Letchford Partnership Consulting Engineers, drawing no. A392-097)

Figure 11 Upgrade to Lower Earley Way/ Hatch Farm Way Junction.

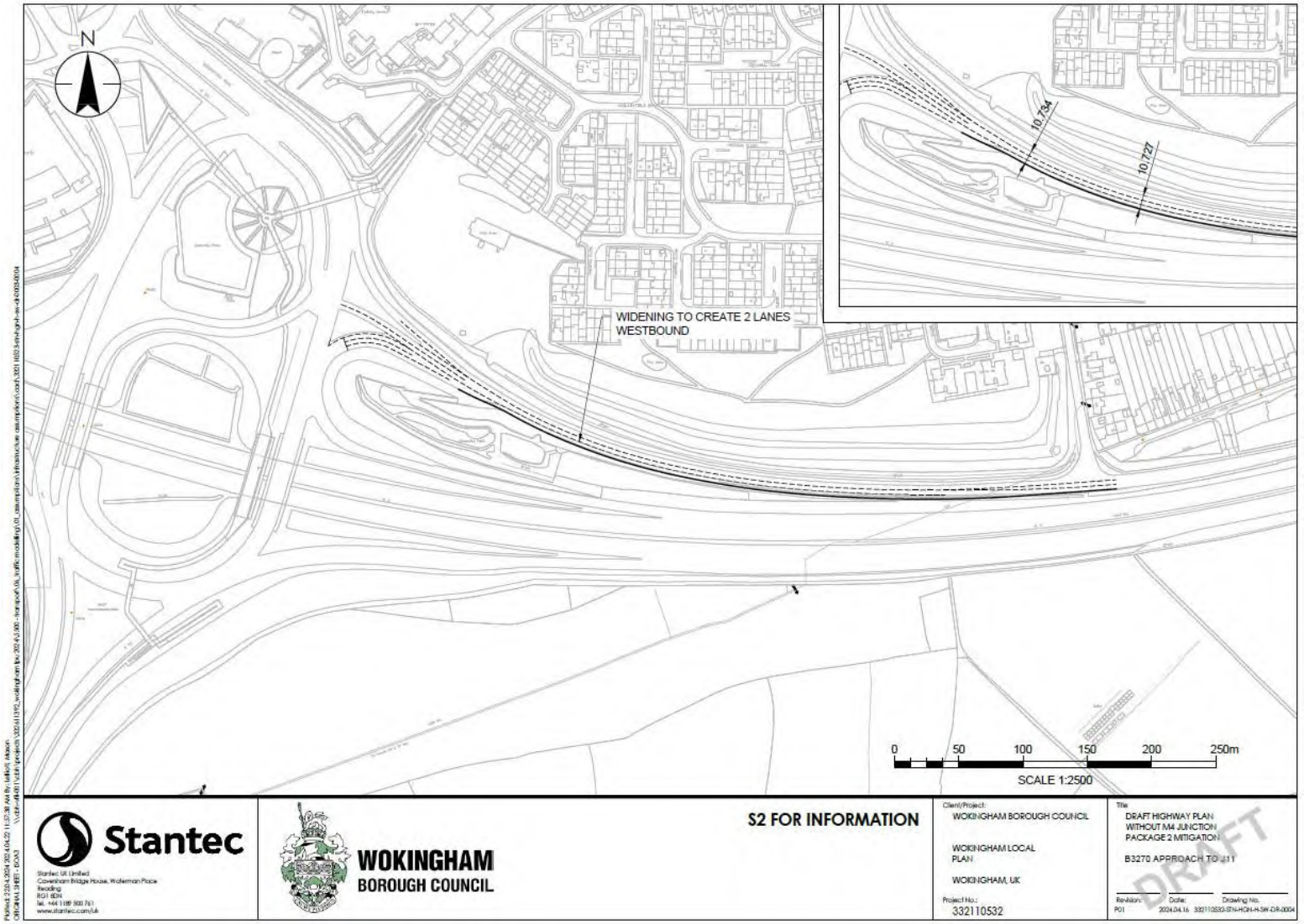


Figure 12 2 lanes westbound between Whitley Wood Lane and J11.

Appendix B Ashridge Infrastructure Assumptions

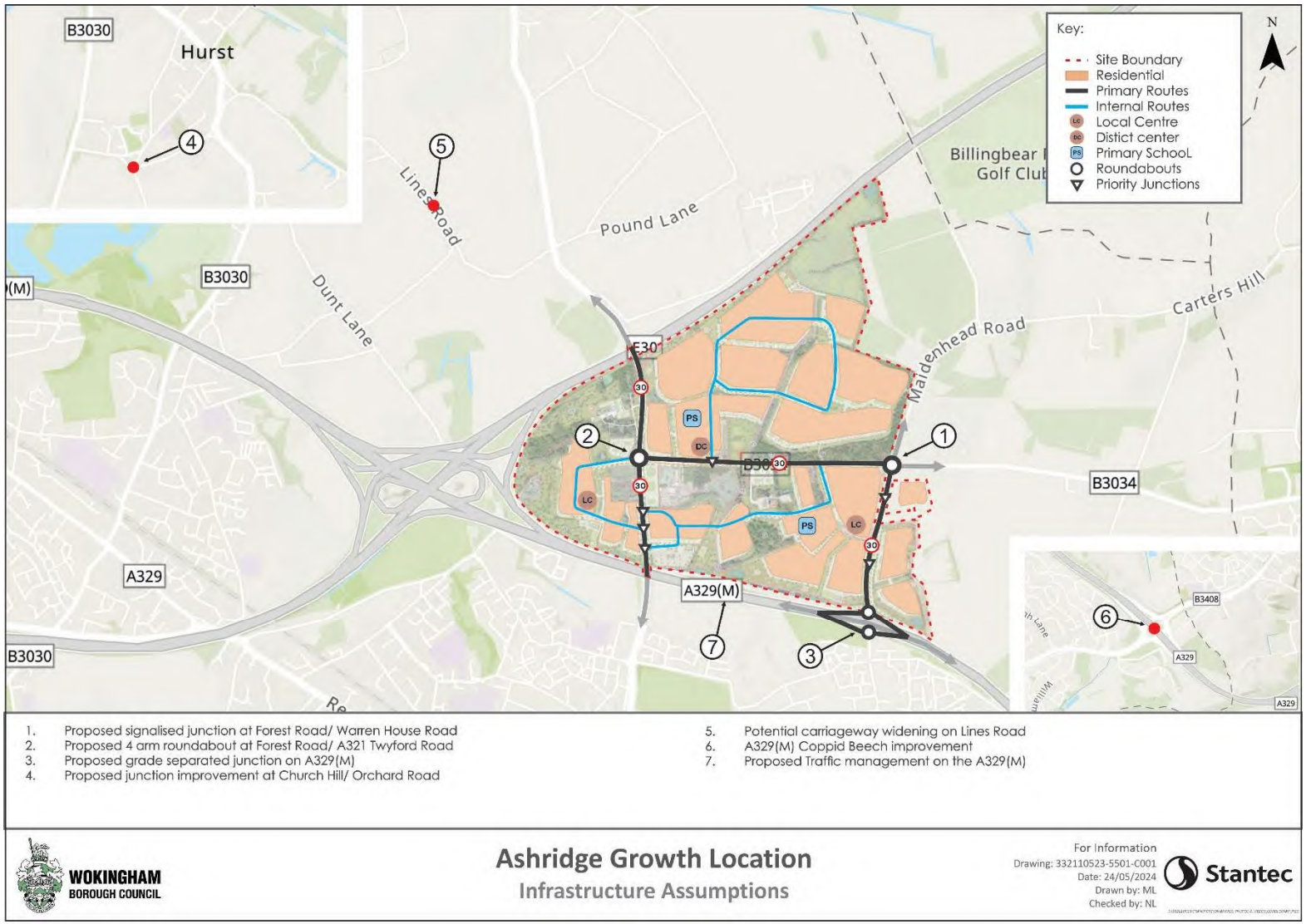


Figure 13 Ashridge Growth Location –Infrastructure Assumptions

Table 12 Ashridge Growth Location –Infrastructure Assumptions

No.	Infrastructure	Further Information
1	Proposed Signalised Junction at Forest Rd / Warren House Rd	Refer to Figure 14
2	Proposed 4 Arm Roundabout at Forest Rd / A321 Twyford Rd	Refer to Figure 15
3	Proposed Grade Separated Junction on A329(M)	Refer to Figure 16 (Proposed Grade Separated Junction Arrangement). The speed limit on the section of the A329(M) between M4 J10 and the proposed grade separated junction will be reduced to 50mph.
4	Proposed Junction Improvement at Church Hill/Orchard Rd	Figure 17
5	Potential Carriageway Widening on Lines Road	Widening from Existing Width of approx. 4.84 m to 6.0 m
6	A329(M) Coppid Beech Improvement	Figure 18
7	Proposed Traffic Management on the A329(M)	Figure 19

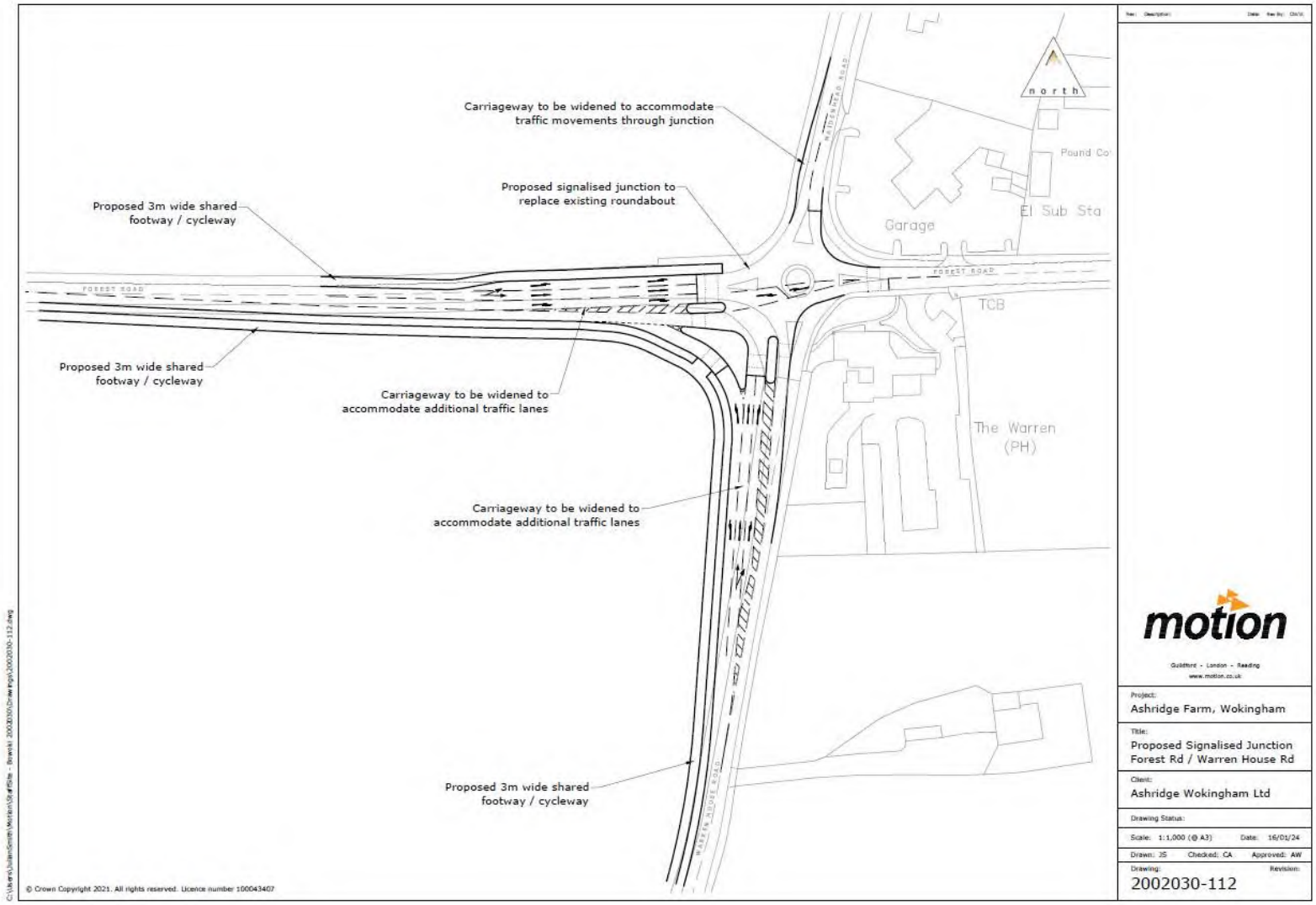


Figure 14 Proposed Signalised Junction at Forest Rd / Warren House Rd

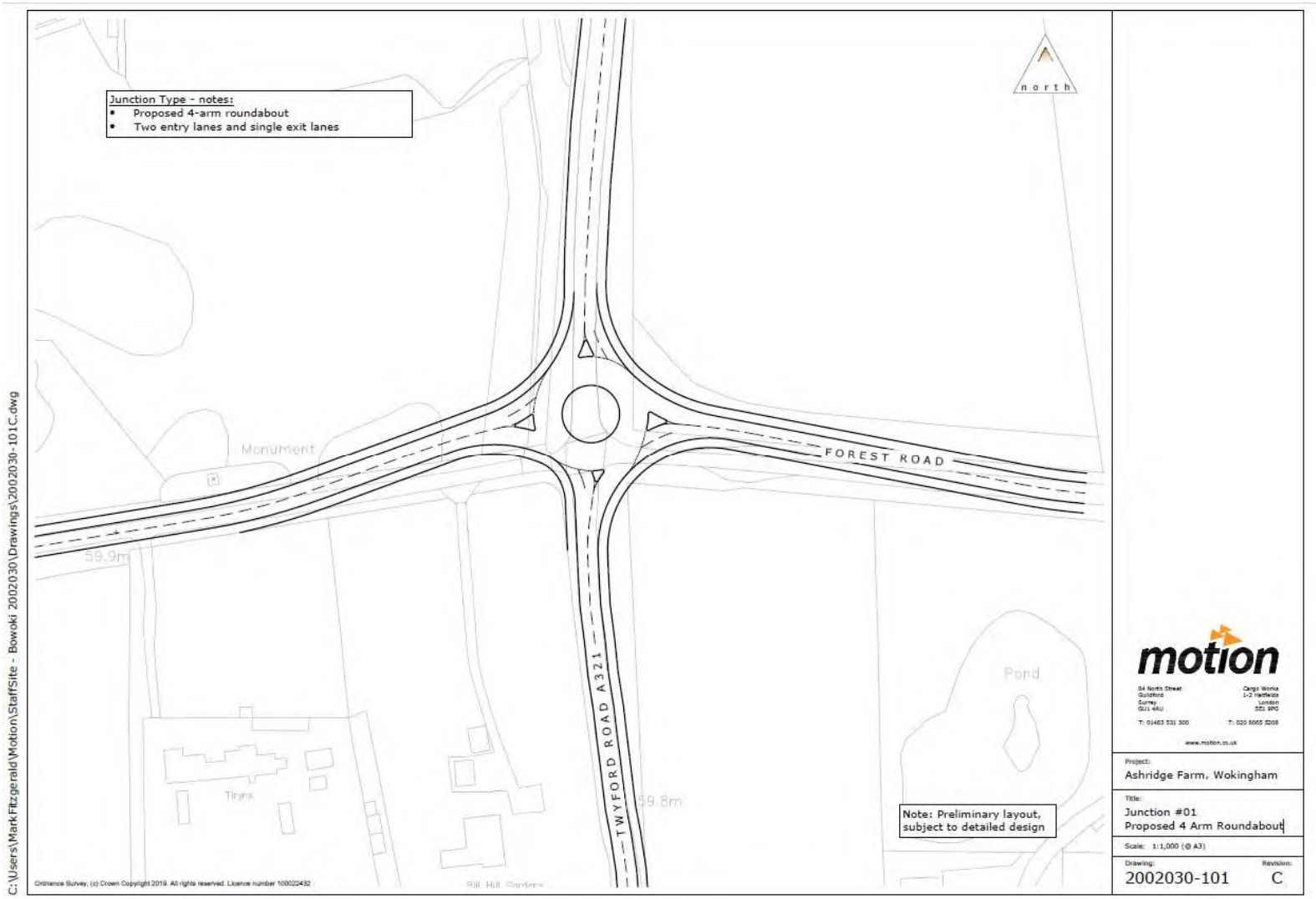


Figure 15 Proposed 4 Arm Roundabout at Forest Rd / A321 Twyford Rd

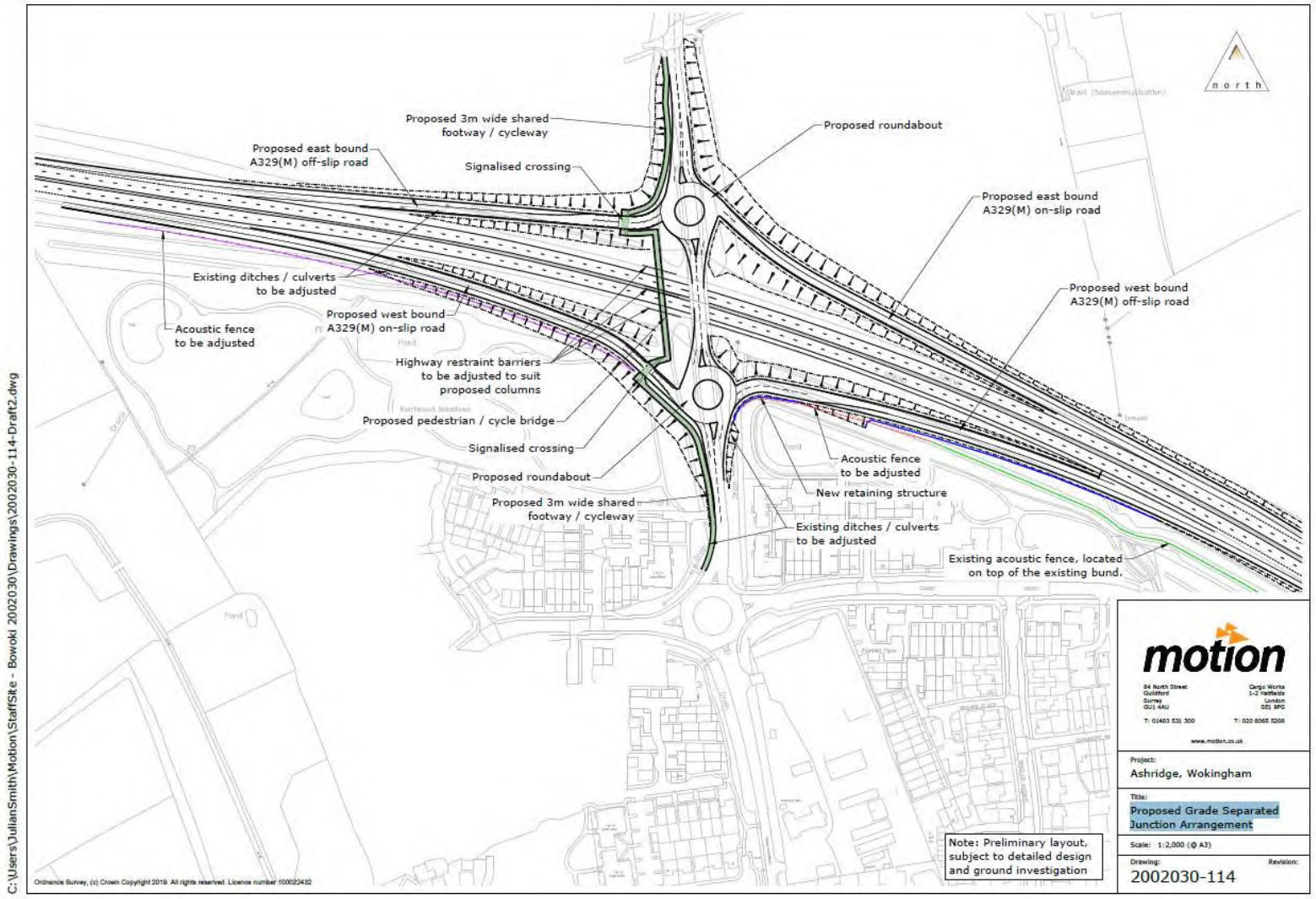


Figure 16 Proposed Grade Separated Junction on A329(M) – East and west -facing slips

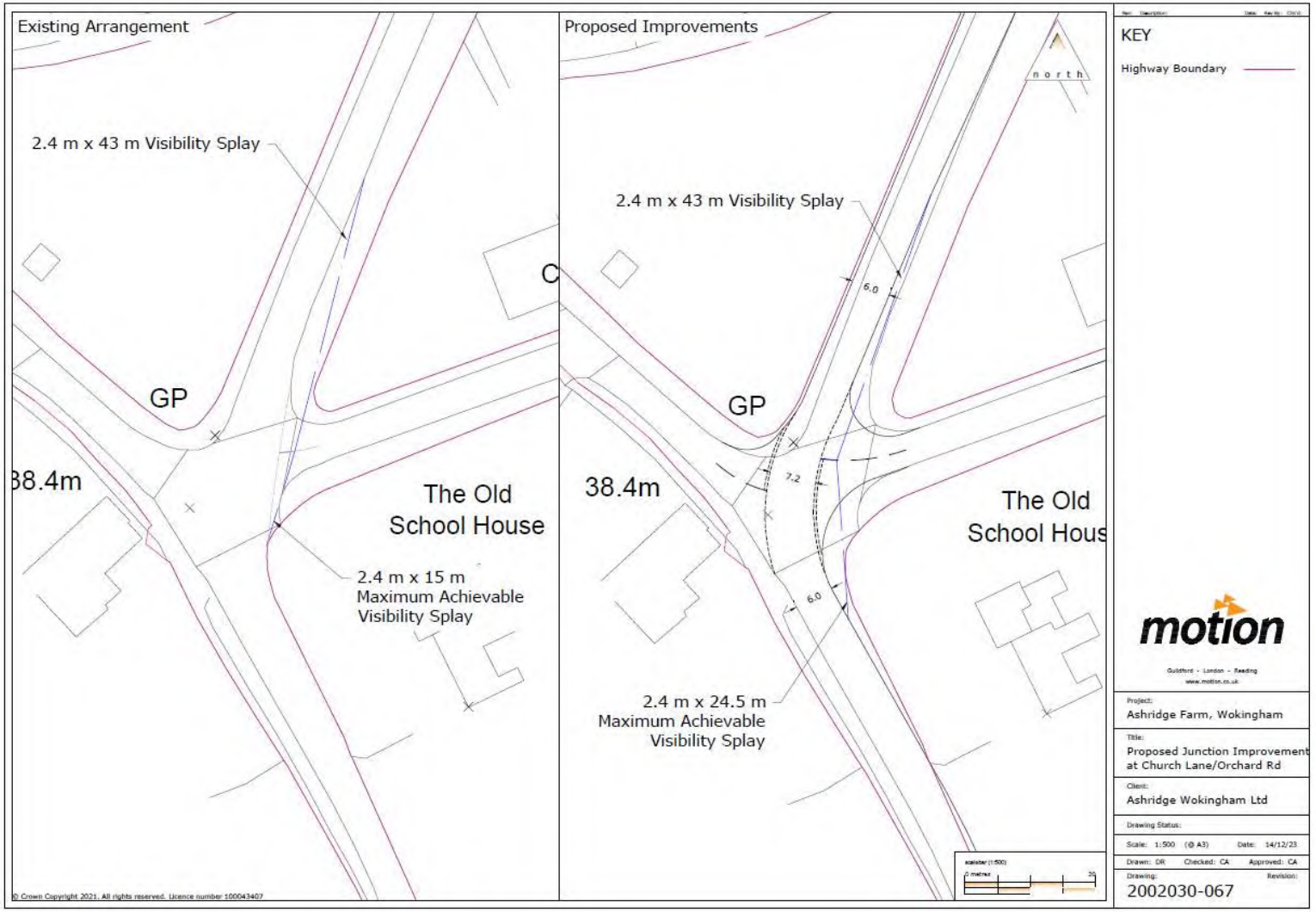


Figure 17 Proposed Junction Improvement at Church Lane/Orchard Rd

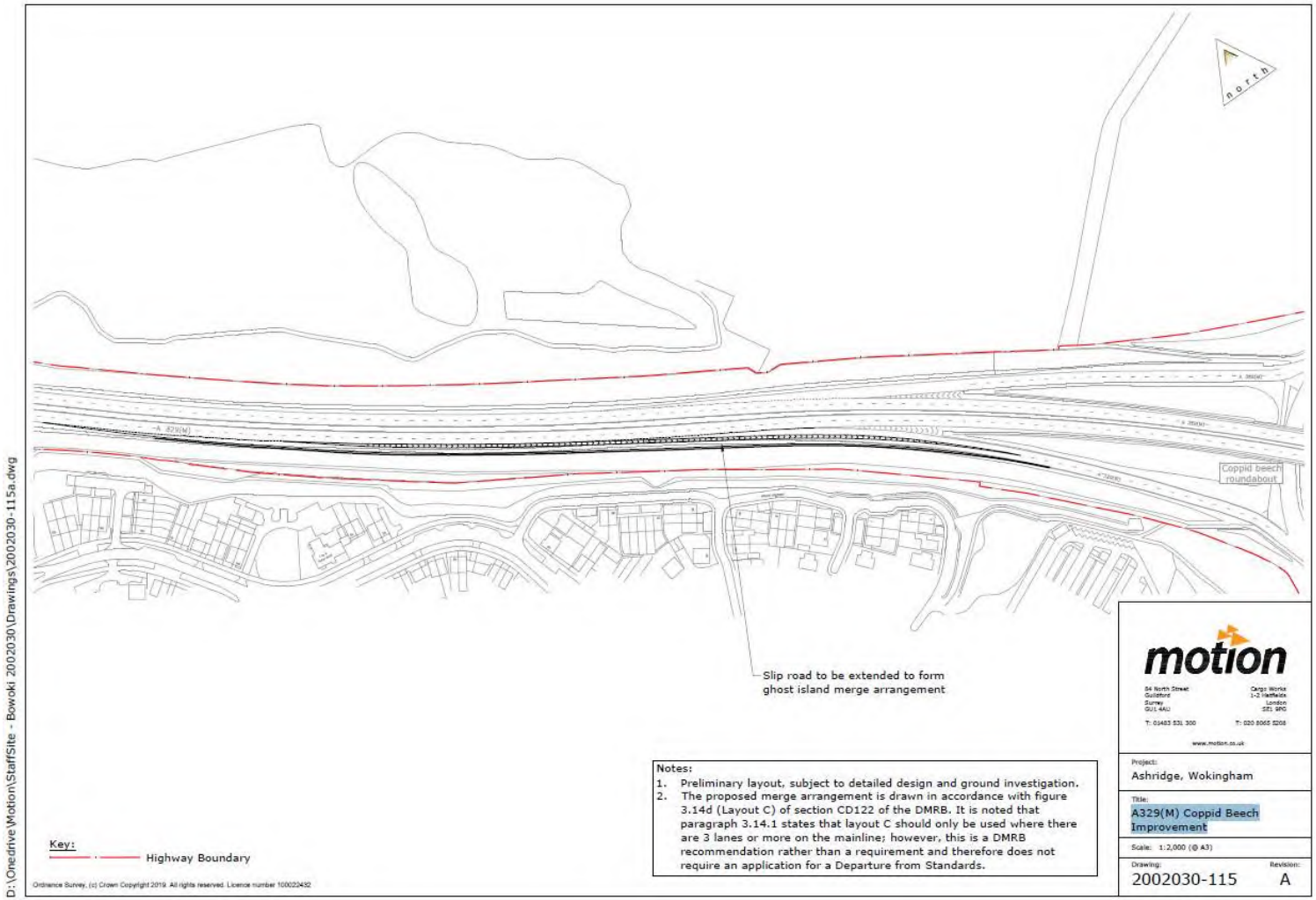


Figure 18 A329(M) Coppid Beech Improvement

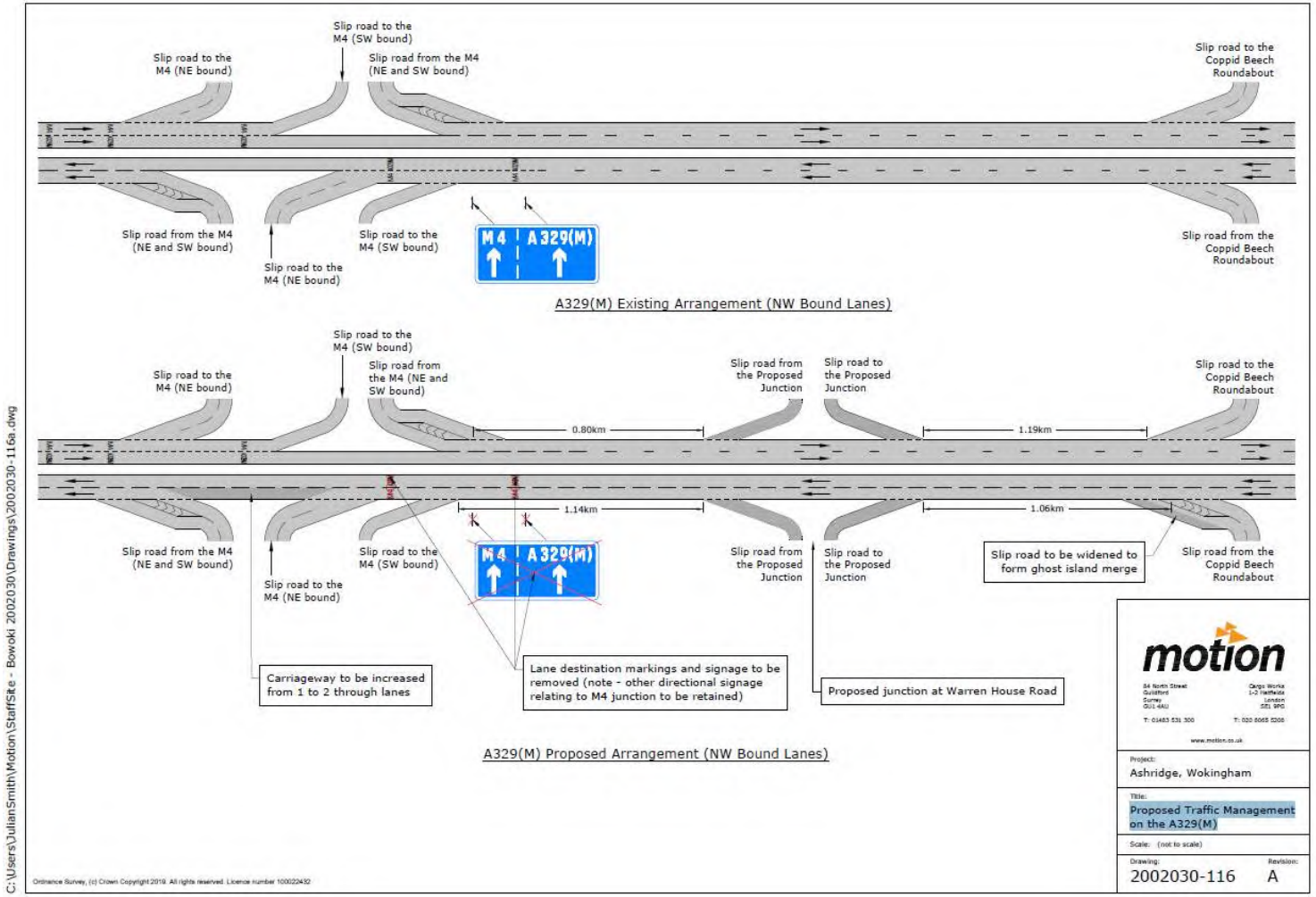


Figure 19 Proposed Traffic Management on the A329(M)

Appendix C Twyford Growth Location Infrastructure Assumptions

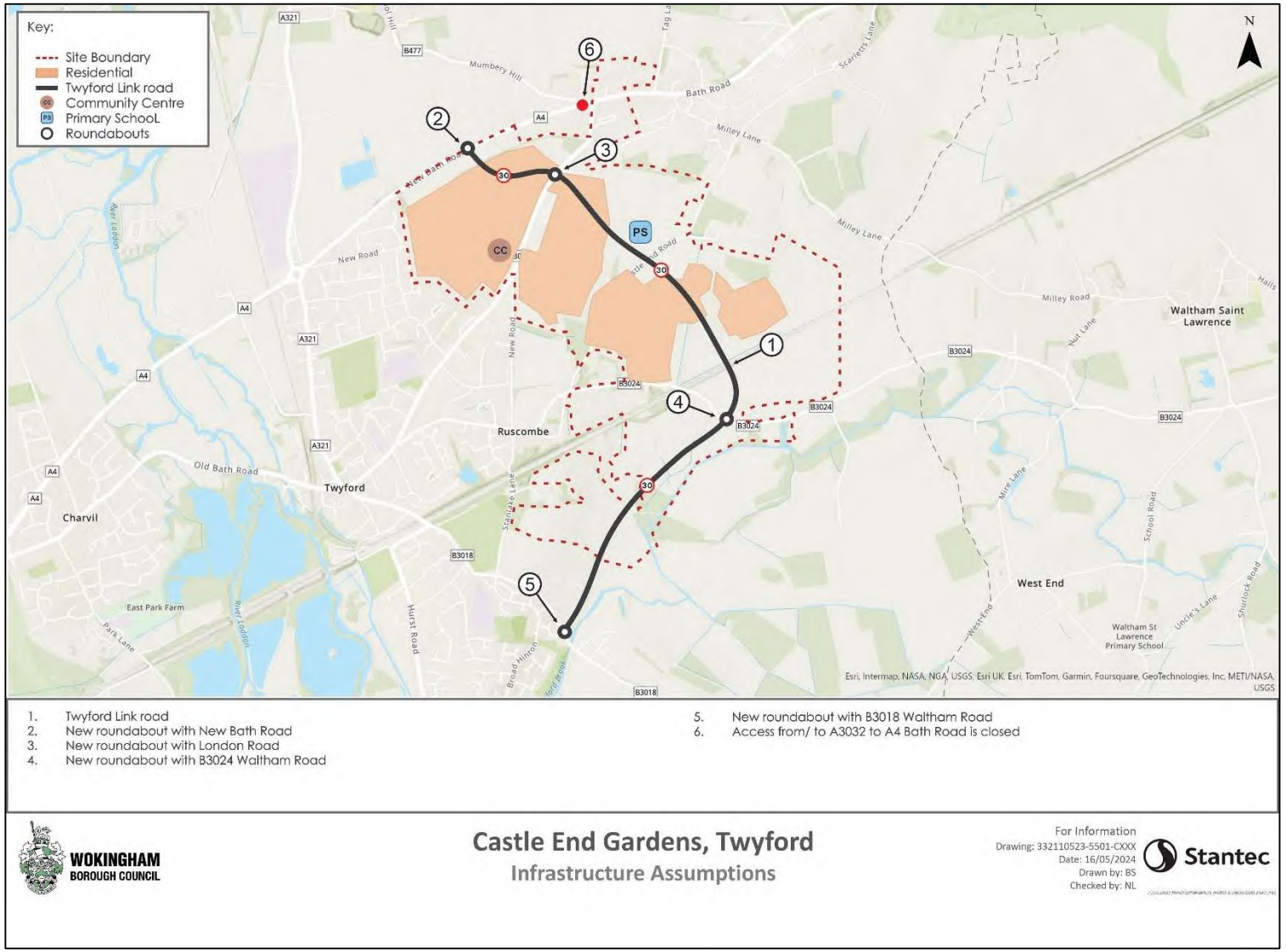


Figure 20 Castle End Gardens in Twyford - Infrastructure Assumptions

Table 13 Twyford Infrastructure Assumptions

	Infrastructure	Further Information
1	Twyford Link Road	Single lane carriageway with a speed limit of 30mph. Refer to Figure 21.
2	New roundabout with New Bath Road	Figure 22. A roundabout with an ICD of 60 meters and two lane approaches on all arms.
3	New roundabout with London Road	Figure 23. A roundabout with an ICD of 56 meters and two lane approaches on all arms.
4	New roundabout with B3024 Waltham Road	Figure 24. A roundabout with an ICD of 56 meters and two lane approaches on all arms.
5	New roundabout with B3018 Waltham Road	Figure 25. A roundabout with an ICD of 60 meters and two lane approaches on all arms.
6	Access from/to A3032 to A4 Bath Road is closed	The primary route in and out of Twyford is via Twyford Link Road and the new roundabout with New Bath Road.

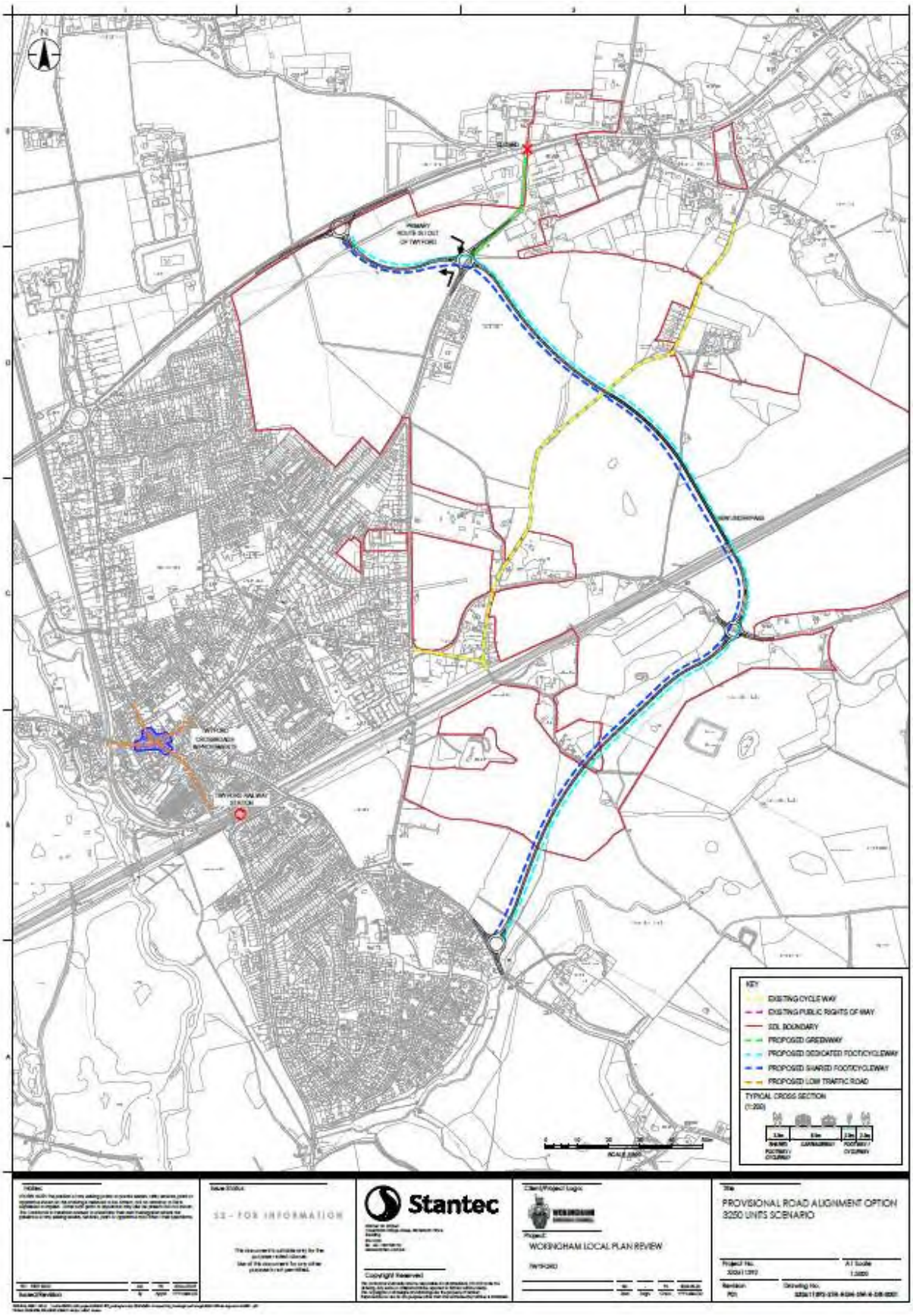


Figure 21 Twyford Link Road

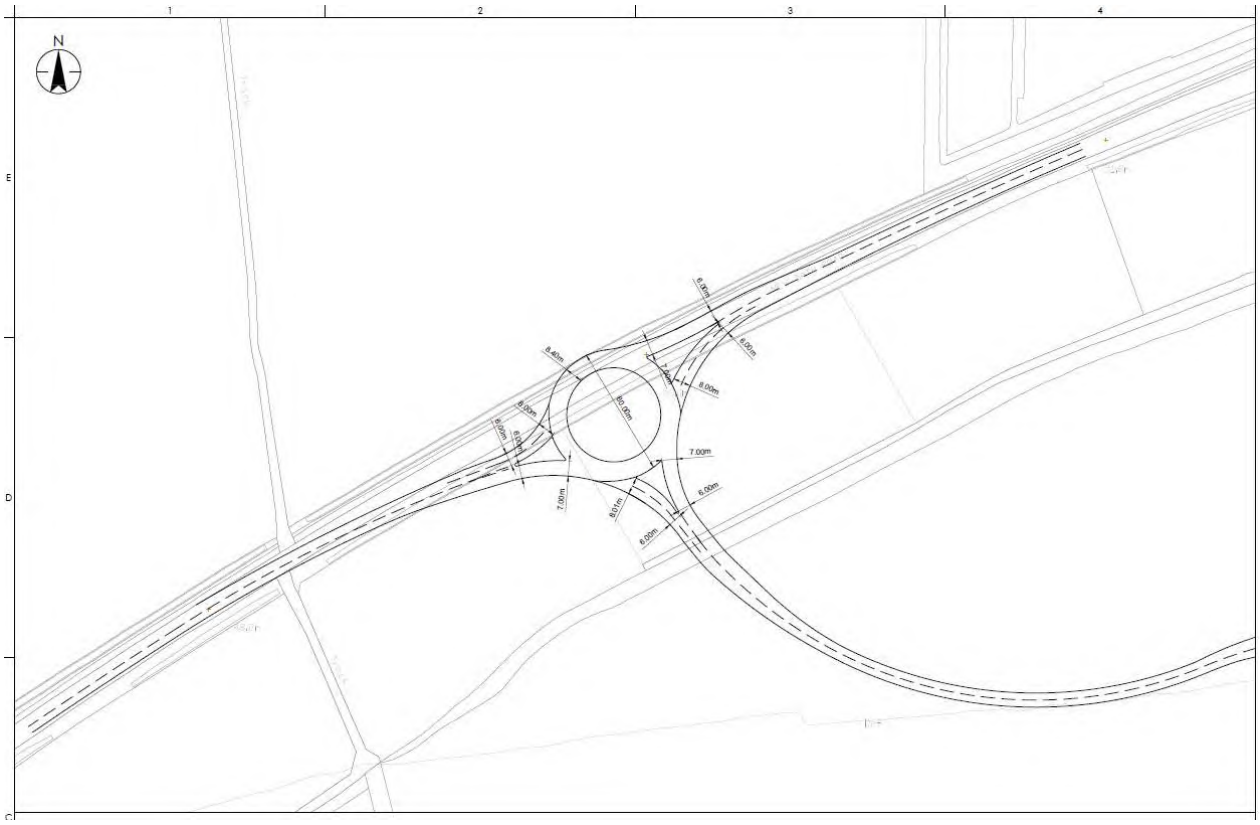


Figure 22 New roundabout with New Bath Road

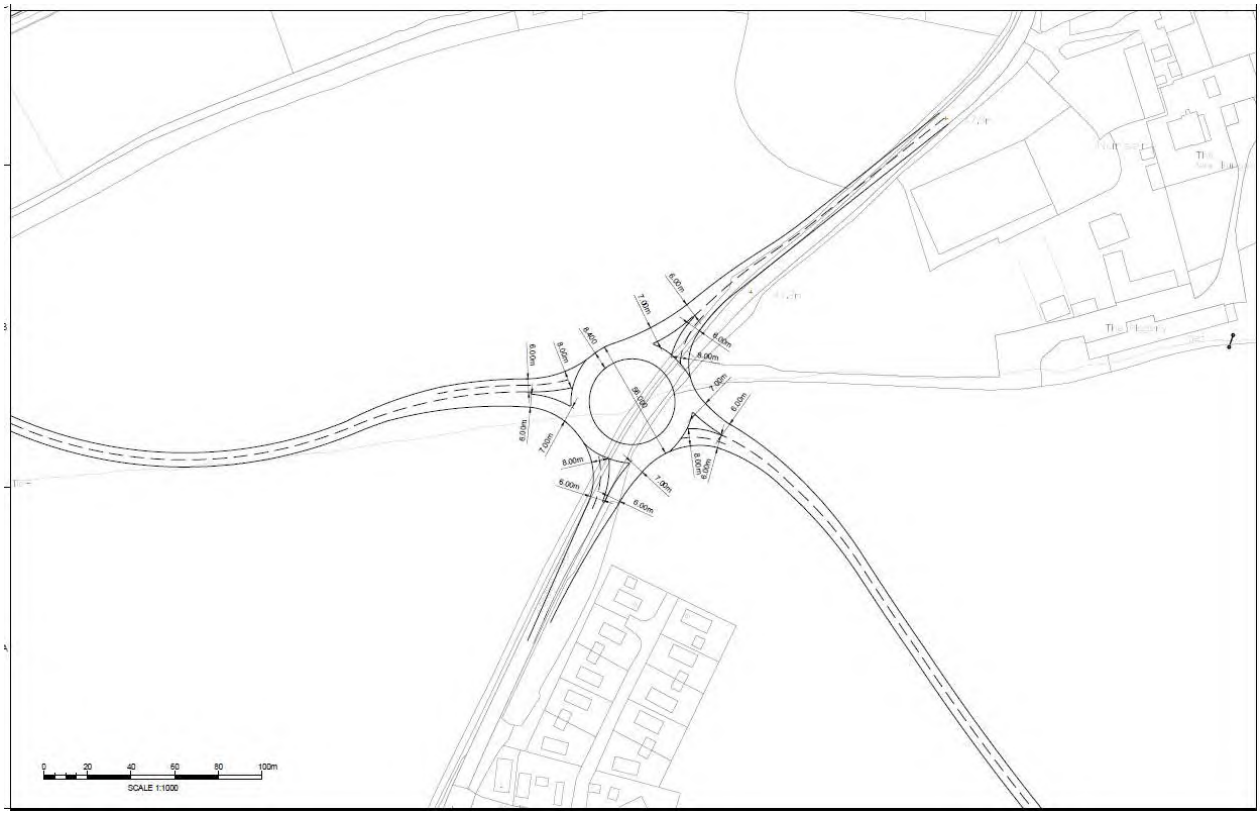


Figure 23 New roundabout with London Road

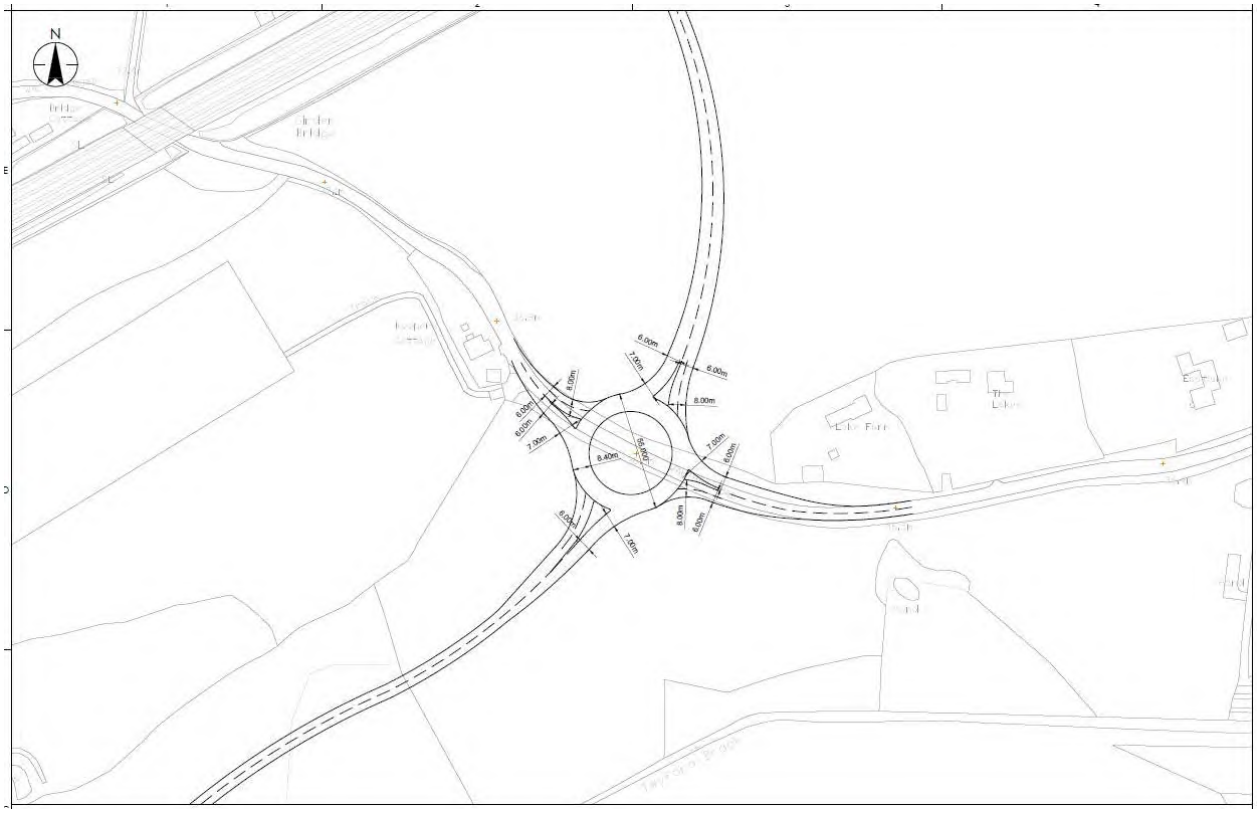


Figure 24 New roundabout with B3024 Waltham Road

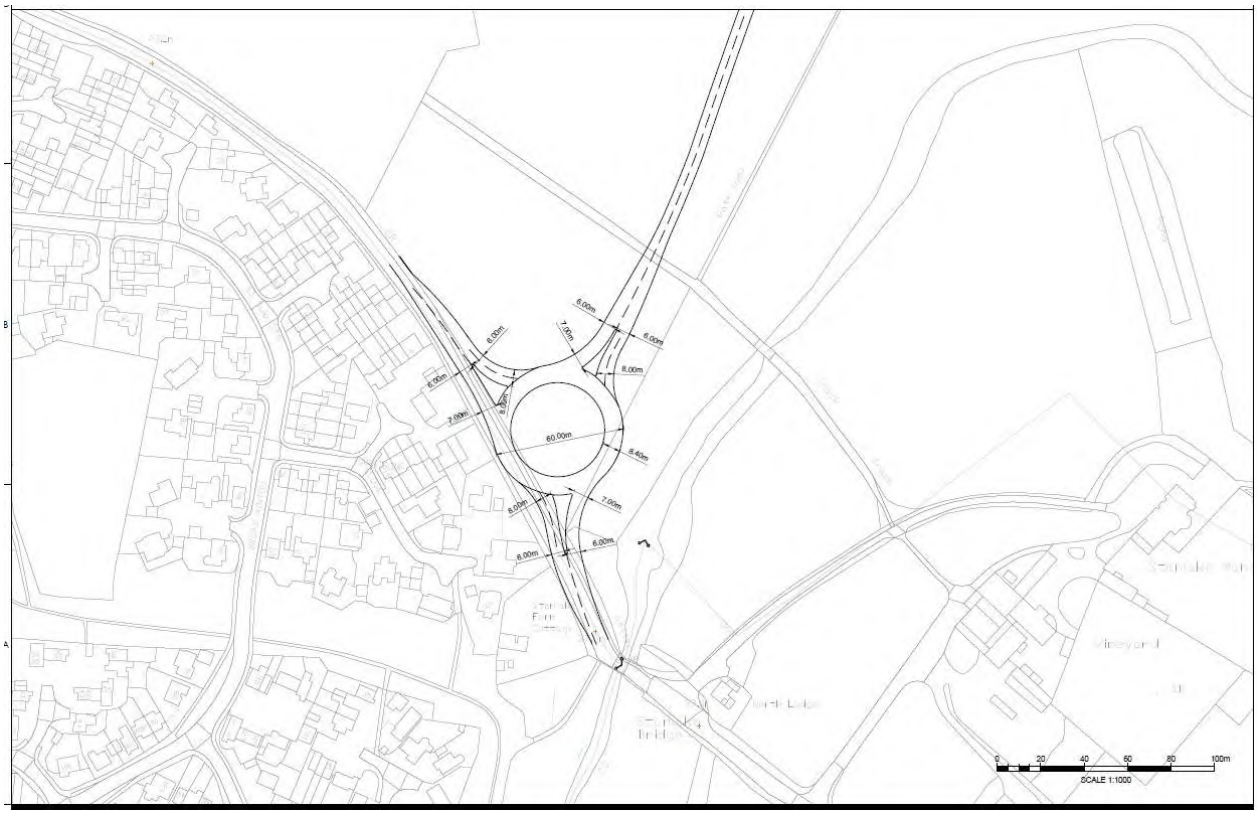


Figure 25 New roundabout with B3018 Waltham Road

Appendix D South Wokingham - Infrastructure Assumptions

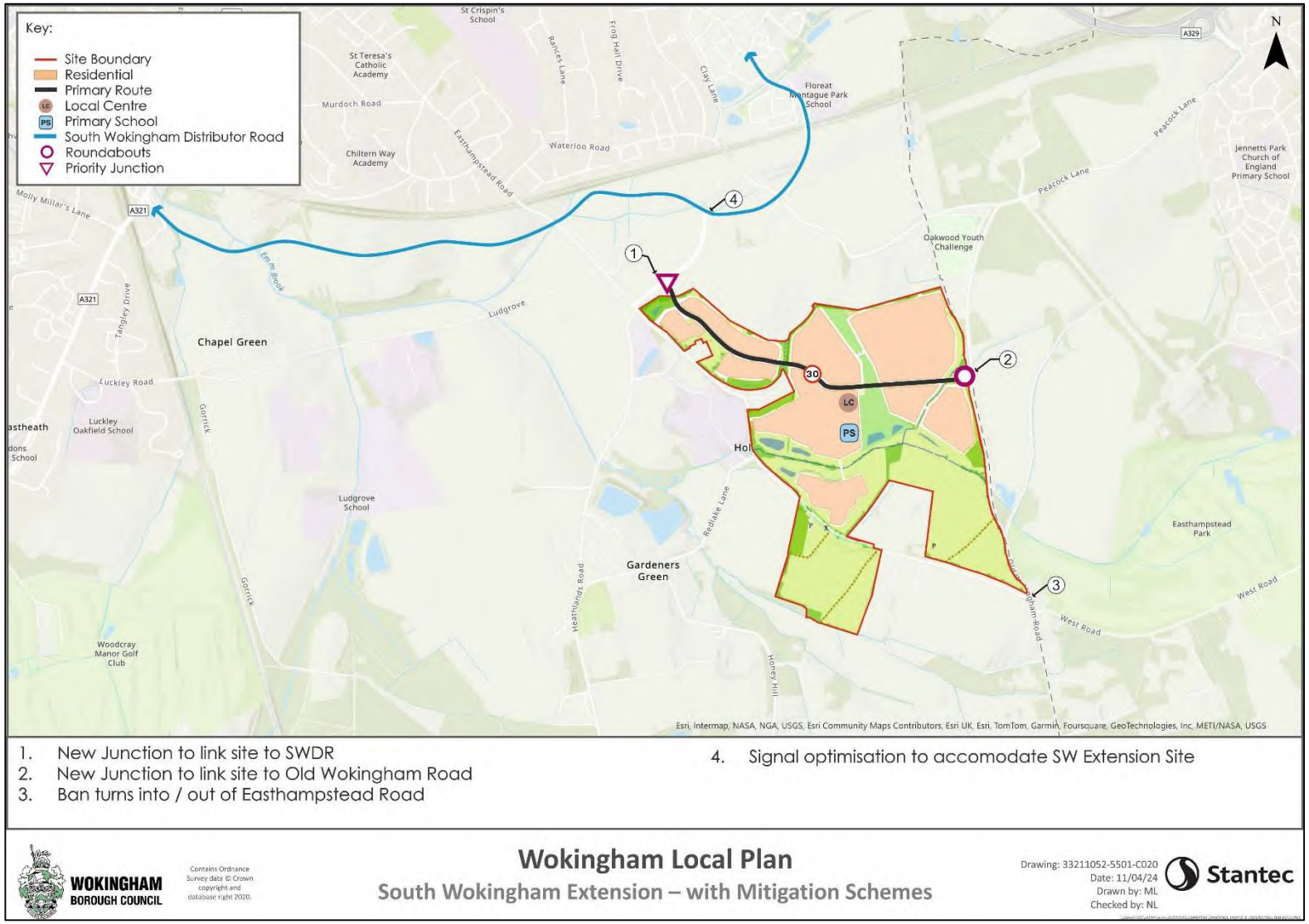


Figure 26 South Wokingham Extension – Infrastructure

Table 14 South Wokingham Extension – Access and Internal Infrastructure

	Infrastructure	Further Information
1	New priority junction to provide access from the site to South Wokingham Distributor Road.	Access from the site is from the minor arm (single lane approach).
2	New roundabout to provide access from the site to Old Wokingham Road.	Single lane approaches on all arms of the roundabout.
3	Modal filter introduced on Easthampstead Road .	The proposal would preclude through traffic.
4	Signal optimisation	May be required to accommodate South Wokingham Extension growth.