Consulting Engineers Ltd

'optimising development potential'

LA 3 - LAND WEST OF HEMEL HEMPSTEAD

Transport Assessment Rev E

Volume 1 of 4

Project No. 16-021

June 2018

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Project No. 16-021

June 2018

Document Control Sheet

REV	ISSUE PURPOSE	AUTHOR	CHECKED	REVIEWED	APPROVED	DATE
-	1st Draft	TMS/PL	TMS	GAC	GAC	31/05/2017
A	2nd Draft	TMS/PL	TMS	GAC	GAC	02/06/2017
B	Final	TMS/PL	TMS	GAC	GAC	14/07/2017
C	Final	TMS/PL	TMS	GAC	GAC	05/09/2017
D	Planning Submission	TMS/PL	TMS	TMS	GAC	08/12/2017
E	Planning Submission	TMS/PL	TMS	TMS	GAC	21/06/2018

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1.0 INTRODUCTION / PRE-APPLICATION DISCUSSION

1.1 This Transport Assessment (TA) has been prepared by Charles & Associates Consulting Engineers (C&A), on behalf of Taylor Wimpey and Barratt Homes (the Developers) to support a hybrid planning application for a development of up to 1100 dwellings (including affordable homes) on a land known as LA3 Land West of Hemel Hempstead. The site also has potential for the provision of land for a two-form entry Primary School, a private Nursery school as well as other community facilities. These are expected to include a Care Home, Community Hall and a Convenience Store.

1.2 The hybrid application includes a detailed application for the phase 1 aspect comprising of the first 350 dwellings.

1.3 The phase 2 development includes an outline application for a further 750 dwellings a primary school, care home and other community facilities centred around the community hub i.e. the remainder of the sites development potential. The hybrid application will include the determination of access for the full scheme.

1.4 The site is located to the west of Hemel Hempstead in Hertfordshire. The site location is shown in **Figure 1**.

1.5 This report has been prepared in accordance with guidance for the preparation of TAs provided by the Department for Transport (DfT) and in accordance with National Planning Practice Guidance (NPPG) for Travel Plans, TA.

1.6 Hertfordshire County Council (HCC) acts as the local highway authority for the region taking responsibility for the majority of the roads in the area with the exception of the strategic highways network, i.e. the A21 and M1/M25 which are the responsibility of Highways England.

1.7 Taking into account the site's geographical and political context, this report will give due considerations to the policy's relevant to

- Dacorum Core Strategy Adopted 2013
- Saved Local Plan Policies
- HCC's Local Transport Plan (LTP3) 2011 -2031
- Decorum's Community Infrastructure Levy.
- Dacorum Site Allocations DPD
- Inspectors Report on the emerging Local Plan including major and minor amendments

1.8 This Transport Assessment (TA) has been prepared to consider the travel implications of the future residents, school users and workers and the impact this will have on the existing highway network. The analysis has been undertaken for both the Phase 1 detailed application and for the total development. The TA has been prepared in accordance with a series of technical notes which have been approved by Hertfordshire County Council as highways authority. Highways England has also been consulted. These Technical Notes and consultations form the basis of this TA.

1.9 This report contains:

- A brief review of the pre-application consultation with the relevant highway authorities;
- A description of the site location and the local highway network;
- A description of the proposed development and the access strategy;
- An appraisal of existing traffic flows and accident data;
- An evaluation of the potential future site trip generations and attractions relating to the proposed development as well as multimodal data;
- An assessment of the impact upon the highway network;
- A description of the approach to encourage sustainable travel

1.10 Consultation with Hertfordshire County Council Highways (HCC) started on 13th May 2016 with the submission of a Transportation Scoping Note as a precursor to pre-application discussions. Following this, a pre-application meeting was held with HCC on 25th May 2016 to discuss the proposals and agree the base information and methodology for the preparation of the TA.

1.11 HCC's response highlighted the requirement of a Design and Access Statement in all planning applications that have an impact on the highway as well as some key planning policies that the proposed development should be consistent with. HCC also requested a revised trip generation assessment be provided.

1.12 The agreed process included the submission of a series of Technical Notes dealing with different aspects of the TA. These were subsequently submitted to HCC highways in which technical aspects of the TA base data and methodology have been agreed. These Technical Notes and the Council's responses to them are attached at **Appendix A** including:

- 16-021-001 Scoping Report
- 16-021-004 TRICS MM Trip Rates
- 16-021-005 CENSUS 2011 JTW Distribution and Assignment
- 16-021-006 Consideration of Bus Services
- 16-021-008 School Distribution and Assignment with Appendices

1.13 In July 2016, Highways England were consulted about the potential impact of the proposed development. This identified the need to carry out an assessment to understand the scale of potential impact of the development on the junction of the (M1 J8) and (M25 J20). HE initial consultation response stated that junction assessment would only be required if the number of vehicular trips are shown to be significant. Following subsequent Submission to HE it has clearly been demonstrated that the level of development trips associated with the development would not have a material impact on the operation of these

junctions as such agreement has been reached to exclude these junction from the TA assessment. Supporting evidence to this effect is provided at **Appendix B**.

2.0 EXISTING CONDITIONS

Site Location

2.1 The site is situated west of Hemel Hempstead to the south of fields end farm and north of the river Bulbourne. The site location plan is provided at **Figure 1**.

2.2 The site's setting is adjacent to the urban edge of Hemel Hempstead which extends to the east. The site is bounded by agricultural land towards the north, west and south.

2.3 The area for development comprises of 51.82 Hectares which is currently in use mainly for agricultural purposes. Access is currently taken to the site from Pouchen End Lane along the western and northern boundaries of the site.

Local Highway Network

2.4 The local highway network is shown in **Figure 2**. The site abuts Long Chaulden to the east, Chaulden Lane to the south as well as Pouchen End Lane to both the west and north west. In addition to these frontages, the site also adjoins The Avenue which provides further opportunities for Vehicle, Cycle and Pedestrian access to connect to the surrounding Highway Network.

2.5 Long Chaulden connects to Northridge Way at its northern and southern ends forming a loop between Warners End Road to the north and St. Johns Road to the south. St. Johns Road and Warners road provide routes to Hemel Hempstead Town Centre and through to Hemel Hempstead Industrial Estate. Boxted Road and Berkhamsted Road provides routes to the north and west. Chaulden Lane and Pouchen End Lane may also provide some limited opportunities of connectively to the surrounding areas for some modes.

2.6 Long Chaulden is subject to a 30-mph speed limit and with a carriageway width of about 6.8m wide. In the vicinity of the site frontage Long Chaulden footway width of 3m on its western side and a 4.5m on its eastern side are provided although widths do vary. Street Lighting is also provided. Long Chaulden provides both direct access to frontage properties as well as serving a local distributor function.

2.7 Along the site frontage, no parking restrictions or traffic calming measures exist. Beyond the site frontage the verges along Long Chaulden have been paved providing space for vehicles to park whilst retaining the existing 1.8 m footways. These spaces include a number of marked bays for disabled drivers. Consequently, the full carriageway width remains clear of parked cars.

2.8 Towards the south east of Long Chaulden, a school safety zone is in place, which covers the area between Honeycross and Cuttsfield Terrace. Chaulden Infant's and Nursery School and Chaulden Primary School are located to the north east and Pixies Hill Primary School is located to the south. This zone includes 1 m wide centre white ladder markings with red surfacing and associated centre refuges, an uncontrolled crossing and double yellow lines.

2.9 Various residential roads connect to Long Chaulden along its length via simple priority junctions. These include Green End Lane, Hollybush Lane, Roseheath and Newlands Lane to the north and Middle Hill, Jocketts Road, Honeycross Road, Lindlings, Hazeldell and Pixies Hill Road to the south.

2.10 The junction of Long Chaulden and Warners End Road to the north east of the site is a mini roundabout, which also connects with Northridge Way.

2.11 Short distance westward from this junction, a further mini roundabout is in place, which connects to the southern end of Boxted Road. A

controlled pedestrian crossing is located just to the west of this mini roundabout. The junction of Long Chaulden with Northridge Way to the south east of the site is also a mini roundabout.

2.12 Northridge Way runs north to south, effectively connecting between the two ends of Long Chaulden. This is a 6.75 m wide road, of a very similar configuration to Long Chaulden, with residents' car parking on hard, off-road verges with footways behind. However, some verges are grassed and some constructed of grasscrete, and several mini roundabouts are in place at junctions as well as priority junctions.

2.13 There are a series of traffic calming features along this road, including mini roundabouts, central white ladder markings, 1m wide red strips which abut both road channels on the carriageway and white lines adjacent to the channels at some locations.

2.14 Towards the south end of Northridge Way, south east of Long Chaulden, a mini roundabout junction with Old Fishery Lane is present, which connects with Chaulden Lane. This road runs to the west, past the site south boundary and connects with Pouchen End Lane further to the west.

2.15 The section of Chaulden Lane to the south east of the existing housing has a country lane feel, with hedges and trees immediately adjacent to both sides. The width varies between 4 m to 4.8 m. Passing places are present to the west of this section, and forward visibility is poor for drivers in places as they pass existing houses.

2.16 This section of road is subject to the national speed limit. The western section of Chaulden Lane south of the development site as it approaches Pouchen End Lane becomes markedly more of a country lane in nature, with significant narrowing, dense shrubbery and trees restrict visibility to some extent. Passing places are provided at intervals.

2.17 The road has banks on the north side and is subject to national speed limit. Pouchen End Lane is a single track country lane, abutting the western boundary of the site. To the south west, it runs under the railway via a 4.3 m wide bridge. It then runs over a canal via a narrow bridge which is subject to a 3T weight limit. This leads through to the A4251 to the south at a priority junction before joining the A41.

2.18 Access to the site is currently taken from Pouchen End Lane to the west and the north boundaries of the site.

Public Rights of Way

2.19 The site benefits from a number of public rights of way. A map illustrating these routes is provided in **Figure 3**

2.20 Footpath 20 runs along the eastern side of the site providing a connection to Shrub Hill Common to the south and leading to Fields End Lane to the north.

2.21 Footpath 21 runs along the northern boundary of the site and connects to route 20 and 22. Route 22 provides a connection to The Avenue leading past John F Kennedy Catholic School, through to Roseheath.

2.22 Footpath 91 runs west – east across the site between Pouchen End Lane just north of Pouchen End and Honeycross Road.

Walking

2.23 The surrounding residential roads to the east of the proposed development provide an established network of good quality walking routes with suitable footways as well as street lighting. Providing access to a range of local services and facilities.

2.24 The PROW detailed above also provide useful additional walking routes which can provide more direct routes to some locations. PROW 20 leads east through shrubs hill common this provides leisure and potential commuter route of 2.5km leading via the pedestrian link between Beechfield Road and Hanger Close to Bridge Street and Hemel Hempstead Town Centre.

2.25 The canal Towpath also provides an additional route for leisure use and can be incorporated in to pedestrian routes leading to Fishery Road and hemel hempstead rail station.

Cycling

2.26 Dacorum Borough Council historically produced the Dacorum Cycling Strategy in October 2009 as an advisory document. this identified Pouchen End Lane towards the west and north-west and Chaulden lane towards the south as a good route for cycling. Furthermore, it was shows that Chaulden Lane towards the south had potential for improvement.

2.27 Following discussions with officers it is considered that this report and its proposals are now substantially outdated.

2.28 AECOM produced a Hemel Hempstead Bikeability study in April 2016 this provides a description of the current cycling environment. The first plan considers the level of cycle training which would be required for a cyclist to use a particular route. These are shown as Bikeability Levels 1-3. The second plan identifies the features and facilities provided along each route. These plans are reproduced at **Appendix C**.

2.29 Examination of the plans shows that majority of the cycle routes in Hemel Hempstead are on carriageway routes with no facility. All routes within the locality of the site are on road routes. However, following site visits and in light of AECOMS Bikeability study it is considered that the existing residential roads are suitable for cyclists.

2.30 Following discussions with HCC and Dacorum Cycleway Officers it was agreed that that due to the issues of parking taking place on existing footways throughout the area. Dacorum preference would be to maintain the existing on road cycle routes. However, it was agreed that where feasible improvements to cycle facilities should be provided where possible at junctions where works are proposed.

2.31 The canal Towpath is accessible from Pouchen End Lane as well as via Old Fishery Lane this offers potential additional pedestrian and cycle routes leading east towards Hemel Hempstead town centre.

2.32 PROW 20 also provides a more direct route of about 2.5km to Hemel hempstead town centre in addition to the on-road routes available.

Public Transport – Bus Services

2.33 There are currently two bus services running in close proximity to the site including Service 3 and ML1. Service 3 is currently operated by Arriva while ML1 being operated by Red Eagle. These operate as commercial services. The existing bus service routing is shown graphically in relation to the site in **Figure 4**.

2.34 The routes are accessible from stops on Long Chaulden and on Boxted Road. The north bound stop on Long Chaulden is about 80m north of the site frontage with the south bound stop located on the opposite side of the road along the site frontage. The bus stop on Boxted Road is located just south of its junction with The Avenue about 560m from the site boundary and is provided with a bus turning facility.

2.35 Service 3 is accessible from the north bound stops on Long Chaulden and also from Boxted Road.

2.36 Service 3, Hemel Hempstead Town Centre – Chaulden Circular operates a daily service with between 3-4 buses per hour throughout the day

Monday to Friday services operate between 05:45 – 22:59 with slightly reduced duration on Saturday and Sunday. The service operates along a circular route originating from Hemel Hempstead town centre and north to Gadebridge. The route then passes through Warners End making a clockwise loop around Northridge Way and Long Chaulden.

2.37 ML1 is served by the North and south bound stops on Long Chaulden and also from the Boxted Road Stop,

2.38 Service ML1 Hemel Hempstead railway station – Maylands Avenue Circular operates a Monday to Friday service between 06:32 and 19:19 with 2 services per hour. The service operates a circular route. In the morning Peak hour, it originates at Hemel Hempstead railway station where it heads north to Warners End and then to The Avenue. From here it leads south to Long Chaulden where it takes an anti-clock wise route along Long Chaulden leading to the rail station. The route then travels via St. Albans Road to Hemel Hempstead Industrial Estate providing a valuable commuter route. It is noted that this circular route is reversed in the PM peak hour as shown in **Figure 4** and the timetable for this is provided at Appendix D.

Public Transport – Rail Services

2.39 Hemel Hempstead railway station is the nearest railway station to the site and is approximately 1.9km walk from the proposed Long Chaulden access.

2.40 An alternative route of about 1.9 km is also available from the proposed southern cycle access on Chaulden Lane Via Northridge Way and Fishery Road. The Canal Towpath also provides a pleasant equidistant route as an alternative.

2.41 Hemel Hempstead Station is a mainline station providing direct trains to London Euston, Tring and East Croydon.

2.42 During C&A's site visit on Friday 18th November 2016 it was recorded that 108 Cycle Parking Spaces were provided at the station of which about 50 spaces were available at 15:00. The weather was warm and dry on the day and as such it is considered that these facilities have spare capacity.

Local Facilities

2.43 Various amenities lie within industry standard walking distances of 2km and cycling distance of 5km from the proposed development site. These includes Infant, primary and secondary schools, bus stops, post office, GPs and local centres. A plan showing various amenities and distances with respect to the site is provided in **Figure 5**. The following table identifies the approximate walk and cycle distances to these facilities

Table 2.1 Walk and Cycle distances to Local Facilities

Facility	Approximate Walking Distance to the Long Chaulden Access
Chaulden Local Centre	650m
Stoney croft Local Centre	900m
Chaulden Infants School	630m
Chaulden Junior School	650m
John F Kennedy	750m
Micklem Primary School	1km
The Cavendish Secondary School	1.6km
Hemel Hempstead Town Centre	3.0km

2.44 Considering the range of local facilities within a short walking and cycling distances, it is considered that the site is well located to provide access to a substantial range of existing Local Facilities.

2.45 Hemel Hempstead town centre is also located within a reasonable cycling distance of 3.0km from the primary site access as well as being

accessible by bus services. The town centre provides many high-street retail opportunities and other businesses providing employment opportunities.

Existing Traffic Flows

2.46 To understand the potential impact of the proposed development traffic, an assessment needs to be undertaken of the performance of the existing roads now and in the future, without development. The starting point for this assessment is to obtain existing traffic flows and to use these to build a model of traffic flows across the local area.

2.47 The extent of the survey data required as well as the survey dates were agreed with HCC and these were undertaken on the 15th June 2016 during school term time.

2.48 The surveys undertaken are primarily peak hours classified turning movement counts, which include queue length surveys. In addition, six automatic traffic counts which have been conducted where speed data is also required.

2.49 The first ATC on Long Chaulden was positioned in the vicinity of the proposed site access to provide Classified volumes as well as traffic speeds.

2.50 The second ATC on Pouchen End was positioned just south of Chaulden Lane and north of the railway bridge to provide Classified volumes as well as traffic speeds.

2.51 At the request of HCC, a further 4 ATC have since been conducted on each approach to Junction 4&5 on Long Chaulden, Boxted Road, Warners End Road and Northridge Way. This provides the designer with approach speeds which are required to assess the existing mini roundabout design as well as any improvements which may be proposed.

2.52 The locations of the above junctions where classified vehicle counts and Automatic Traffic Counts (ATC's) have been conducted are identified in **Figure 6.**

2.53 Following consultation with HCC Highways, it has been agreed that capacity assessments are required at the following junctions which HCC Highways are responsible for:

J1a Site Access on Long Chaulden
J2 The Avenue/ Boxted Road Roundabout
J3 Long Chaulden/ Northridge Way Roundabout
J4 Long Chaulden/ Boxted Road Roundabout
J5 Warners End Road/ Northridge Way Roundabout
J6 Warners End Road/ Leighton Buzzard Roundabout
J7 Northridge Way/ Fishery Road Roundabout
J8 Fishery Road/ A4251 London Road Roundabout

2.54 Additionally C&A have provided Highways England with details of the existing and development traffic. This was represented both in terms of traffic flows and also the percentage change resulting from the development traffic. This was provided for Junction 1-8 and also at the following strategic junctions.

- M1 Junction 8 with A414
- M25 Junction 20 with A41
- A41 – Two Waters Road

Following submission of this information, HE have responded stating *"I have the following comment to make with regards to the additional information you have supplied relating to the impact of traffic from the West Hemel Hempstead site on M25 J20 and M1 J8 – that as you set out in your note the % increase at these junction is small demonstrating that traffic from the development has dispersed elsewhere before hitting the strategic network. This being the case I don't feel that further assessments will be necessary for the TA."* **Appendix B**

2.55 Subsequent to the above response, C&A have not conducted any capacity assessments on the strategic road network. For completeness, however the TA Traffic figures identify the observed traffic and development traffic for these junctions.

Accident Analysis

2.56 Hertfordshire County Council (HCC) keep records of all reported traffic accidents that result in injury to one or more people. This can be used to identify whether there are any locations that have a high number of accidents and whether these are of similar nature.

2.57 Personal Injury Accident (PIA) Data was obtained from HCC for each junction tested in this report. The PIA data was obtained for the 5-year period to June 2016.

2.58 Detailed analysis of the accident data provided was carried out to identify any potential highway issues which may be leading to high accident rates at any particular locations. A full summary detailing the findings and tabulation of accidents is provided in **Appendix E**.

Summary of Accident Data

2.59 Following detailed consideration of the 5 year accident records, it is concluded that there is no indication of any unusual levels of accident risks generally; nor is there any localised pattern of accidents that might indicate a highway safety issue for which remedial action would be required.

3.0 POLICY CONTEXT

National Policy

3.1 The National Planning Policy Framework (NPPF), published March 2012, now forms the overarching guidance on planning matters within England. It replaces the previous Planning Policy Statements (PPS) and Planning Policy Guidance (PPG). Of particular relevance to the preparation of this TA, is the replacement of guidance on Housing and Transport contained within PPS4 and PPG13 respectively.

3.2 The NPPF focuses on sustainability and encouraging sustainable transport solutions within new developments. Evident within NPPF paragraph 30, "*Encouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion*." Further reaffirming this point it states later that "*local planning authorities should therefore support a pattern of development which, where reasonable to do so, facilitates the use of sustainable modes of transport."*

3.3 Continuing with the theme of sustainability, NPPF paragraph 35 details some specific aims for the design of developments, including to "*give priority to pedestrian and cycle movements, and have access to high quality public transport facilities*;" and to "*create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians…"*

3.4 Paragraph 32 of the NPPF gives reference to TAs and the plans and decisions to be taken from them. *"All developments that generates significant amounts of movement should be supported by a Transport Statement or TA. Plans and decisions should take account of whether:*

- *The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site to reduce the need for major transport infrastructure;*

- *safe and suitable access to the site can be achieved for all the people; and*
- *improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe."*

3.5 The NPPF is complemented by a web-based resource 'Planning Practice Guidance' which was launched in March 2014. The relevant sections of this guidance are entitled 'Travel plans, TAs and statements in decision-taking'.

3.6 One of the key changes between this guidance and previous guidance provided within PPG13 is the move away from maximum parking standards. Paragraph 8 of the guidance states that *"Maximum parking standards can lead to poor quality development and congested streets, local planning authorities should seek to ensure parking provision is appropriate to the needs of the development and not reduced below a level that could be considered reasonable".*

3.7 At the time of writing The NPPF is currently in the process of being updated to reflect policy proposals previously consulted upon within the Housing White Paper and the Planning for the right homes in the right places consultation. As of 9th March 2018 consultation on the draft revised National Planning Policy Framework and planning practice guidance have been issued with the consultation due to end on the 10th May 2018. Section 9 of this document aims to Promotes sustainable transport and sets out the draft policy which is relevant to the preparation of this TA.

3.8 Paragraph 103 consider that transport issues should be considered at the earliest stages of plan-making as set out in items a-e. This general principal has been complied with through the comprehensive

consultation with HCC from an early stage. During this process items a-e have been considered in detail in this TA in also in the Environment Impact Assessment which is informed by this TA.

3.9 Paragraph 104 Considers the management of the pattern of growth in support of achieving sustainable travel objectives. This TA clearly sets out the manner in which the development conforms with the stated objectives.

3.10 Paragraph 105 item a considers the effect of mixed use sites in achieving a reduction in the number and length of journeys. The proposed mixed use development clearly complies with this objective with the inclusion of nursery and primary school facilities and a local centre in a central and accessible location within the site. Similarly items b-d are relevant to this TA with items e and f being beyond the scope of this type of development.

3.11 Paragraph 106 considers the setting of local parking standards with paragraph 107 proposing that Maximum parking standards should only be set where there is clear and compelling justification that they are necessary for managing the local network. This is of relevance in the setting of the required parking standards with the Planning Authority.

3.12 Paragraph 108 items a-c regarding sustainable transport, access as well as the developments impact on capacity and congestion and mitigation measures are considered in this TA.

3.13 Paragraph 109 states that *Developments should only be prevented or refused on highways grounds if the residual cumulative impact on the road network or road safety would be severe.*

3.14 Paragraph 110 items a-e define the main priorities and objectives for sustainable transport, disabled access, safety, security, attractive layouts. And compliance with current design standards. In addition to

providing access for deliveries and emergency services. Finally for the provision of charging infrastructure for plug in and ultra-low emission vehicles.

3.15 Paragraph 110 identifies the requirement of a travel plan. The TA includes both a Framework Travel Plan applicable to the full outline application with a detailed Travel Plan provided for the phase 1 detailed application.

3.16 Manual for Streets (MfS) produced by the Department for Transport sets out the principles to be used for the design, construction adoption and maintenance of new residential streets.

3.17 Of particular relevance to this assessment is Chapter 7 which details the visibility requirements for junctions. In addition to this, MfS section 6.6 discusses how highway design should cater for emergency and service vehicles.

3.18 MfS also covers the adoption of highways and it states that *"Section 38 of the Highways Act 1980 gives highway authorities the power to adopt new highways by agreement and this is the usual way of creating new highways that are maintainable at the public expense. The Act places a duty on highway authorities to maintain adopted highways at public expense under section 41."*

3.19 The Design Manual for Roads and Bridges (DMRB) provides official standards, advice notes and other documents relating to the design, assessment and operation of trunk roads including Motorways in the United Kingdom.

Regional Policy

3.20 HCC's Local Transport Plan (LTP3) 2011 -2031 sets out a 20 year strategy for development of transport in the county. Five goals support the vision of the plan.

- Support economic development and planned dwelling growth;
- Improve transport opportunities for all and achieve behavioural change in mode choice;
- Enhance quality of life, health and the natural, built and historic environment for all Hertfordshire residents;
- Improve the safety and security of residents and other road users;
- Reduce transport's contribution to greenhouse gas emissions and improve its resilience.

3.21 Hertfordshire's Transport Vision Statement as stated in LTP3 is, *"to provide a safe, efficient and resilient transport system that serves the needs of business and residents across Hertfordshire and minimises its impact on the environment".*

3.22 Commitment Statement by Dacorum Borough Council *"Dacorum Borough council supports Hertfordshire County Council in delivering LTP3 objectives. Integrated transport and land use strategies are critical to the Borough Council's planning polices and the sustainable community strategy. The commitment is long term and essential to the delivery of sustainable development and sustainable communities".*

3.23 Hertfordshire County Council Highways published Roads in Hertfordshire Highways Design Guide which is now in its third revision dated January 2011. This document identifies the appropriate design standards to use with reference to the appropriate application of Manual for Streets and DMRB design guidance.

Local Policy

3.24 Hemel Hempstead Urban Transport Plan 2009 is an overarching document *"to identify short, medium and long-term strategies to shape*

travel patterns and provide a transport framework for related policy issues".

3.25 Dacorum Borough Local Plan 1991 – 2011 adopted in 2004 is the statutory Local Plan covering the whole of Dacorum Borough. It was adopted in April 2004. Appendix 5 of the Local Plan sets out recommended maximum car and cycle parking standards for each of the Use classes. Due to the age of the Local Plan and these standards Dacorum have requested that C&A use these as the basis for defining specific Parking standards for the proposed development rather than simply applying the standards.

3.26 The Core Strategy 2006-2031 was adopted in September 2013 this is the first of the documents that make up Dacorum's new Local Plan. It therefore does not replace all of the policies contained within the Dacorum Borough Local Plan 1991-2011. Many of policies have been 'saved' and will continue to form part of the Development Plan for Dacorum Borough until they are formally superseded or cancelled

3.27 The site is allocated within the Site Allocations Development Plan (DPD) currently being promoted through the Local Plan adoption process. The Site Allocation DPD has been examined by the Planning Inspector, who published his final report on 6th April 2017. The final adoption of the Site Allocations DPD is to be considered in May 2017, with adoption planned for mid / late 2017. The site is allocated under Policy LA3, West Hemel Hempstead. The inspectors report includes reference to various Modifications these being summarised in Main Modifications Schedule.

3.28 Planning inspector required a early review of the of key parts of the Local Plan relating to new housing and the future role of the Green Belt. Following this Dacorum decided to refresh the whole plan.

3.29 In November 2017 Dacorum published Local Plan Issues and Options consultation which was open for comment until 13th December 2017.

Subsequently Issues and Options Counsultation Sustainabuility Appraisal, draft Schedule of Sites Appraisals and working note have been published.

4.0 THE PROPOSED DEVELOPMENT AND ACCESS STRATEGY

Proposed Development

4.1 The proposed development will comprise up to 1100 dwellings along with provision of a two-form primary school, Nursery School other uses associated with the community hub.

4.2 The Hybrid application will take the form of a detailed application to include access for the Phase 1 development as well as outline application for the Phase 2 development these are defined below.

4.3 Phase 1 will include the provision of up to 350 dwellings to include access for the full development.

4.4 Phase 2 will comprise of the remaining 750 residential dwellings a primary school, Nursery School as well as uses associated with the community hub.

4.5 Although the final details of the community hub are yet to be finalised it is expected that this will include:

- a convenience store (Use Class A1) (up to 450 sq.m.) with associated car parking and delivery areas;
- 4 no. ground floor retail units (Use Class A1/ A2 / A3 or A5) (up to 400 sq.m. in aggregate) with associated car parking and delivery areas;
- A community building (Use Class D1) (up to 360 sq.m.) with associated car parking;
- Up to 70 bed care facility (Use Class C2) (4500 sq.m.);
- Children's day nursery (Use Class D1) (300 sq.m.).

Proposed Access Junctions

4.6 Two all-purpose access junctions are proposed for the site. The first being provided along the site frontage with Long Chaulden in the form of a simple priority junction with right turn lane as shown in **Drawing No. 16-021-071**.

4.7 The junction has been designed in accordance with HCC Roads in Hertfordshire Design Guide which considers the appropriate use of both MfS and DMRB design standards in accordance with HCC guidance. For this junction DMRB has been used to design the appropriate geometry for the access.

4.8 When designing a new junction visibility splays are determined based upon the observed 85th percentile wet weather speeds which were observed to be 34.45mph north bound and 35.15mph south bound. These speeds are well below 37mph and as such MfS has been used to obtain the appropriate visibility splays at this junction. The resulting visibility splays of 2.4m by 52m to be provided in both directions details of the calculations used to determine the visibility splays are provided at **Appendix F.**

4.9 The layout incorporates features for both pedestrian and cycle access as well as to cater for access to the two proposed bus stops on either side of Long Chaulden which are to be implemented as part of the access works. The access road is provided with 2m footways as a minimum on both sides of the road. To the north of the access along the site frontage with Long Chaulden a 3m wide shared footway cycleway is provided. This leads to a Cycle crossing point on the primary access where a suitable cycle refuge is provided leading through to a shared footpath / cycle path.

4.10 Generally, cycle routes in hemel are on road routes and as such the shared pedestrian cycle route is in addition to the on-road routes entering the site.

4.11 The access incorporates the provision of a new north bound bus stop on long Chaulden and a relocated south bound bus stop. Between these a pedestrian refuge is located to the rear of the buses thus avoiding common safety concerns associated with pedestrian crossings near bus stops.

4.12 In addition, pedestrian refuges are provided across the site access and to the south of the site access in order to cater for all possible pedestrian desire and these also act to keep traffic on the correct side of the road.

4.13 The junction design has been through a Stage 1 Road Safety Audit and designer's response with all recommended measures being implemented culminating in **Drawing 16-021-071** being put forward for consideration and approval by HCC. The safety audit and designer's response are provided at **Appendix G**.

4.14 The second access is a simple extension of The Avenue in to the site as illustrated in **Drawing 16-021-149**. This has been designed as a Primary Road Bus Route with 6.75m carriageway with 2m footways on both sides connecting in to the existing carriageway and footways in The Avenue.

4.15 The route crosses the exiting PROW route 20 and as such dropped kerbs with tactile paving will be provided to maintain the continuity of this route across the proposed Primary Road.

Travel Plan

4.16 The hybrid application required both a Framework Travel covering the full development as well as a Full Travel Plan based upon the Framework

Travel Plan to consider detailed Phase 1 development. These are provided at **Appendix T**.

4.17 Both travel plans have been prepared by C&A Consulting Engineers Ltd in concert with the TA. This approach provides the opportunity for the infrastructure required by the Travel Plan to be addressed and provided within the TA at the outset so that the TP measures can be as effective as possible. Theses TPs should both be read in the context of the TA.

4.18 An additional Travel Plan will be required for the detailed Phase 2 Development once a detailed application comes forward.

Sustainable Access Strategy – Pedestrians and Cyclists

4.19 The access strategy for the development aims to achieve a high level of permeability across the site for pedestrians and cyclists. The internal road and footpath network will connect to the existing pedestrian facilities and local roads in the surrounding area to provide ease of movement between the new and existing built-up areas and the facilities within them. The proposed footway and Cycleway provision is provided as **Figure 7** and the local facilities plan is provided as **Figure 5**.

4.20 The design philosophy for both the phase 1 and phase 2 developments will follow the advice of Manual for Streets and will focus on a high quality environment with the aim of designing places where people will be encouraged to walk and to cycle. The internal road network will be designed to maintain low vehicle speeds of between 10mph for mews / shared surfaces up to a maximum of 30mph for the proposed primary Road / Bus route. This approach will provide an attractive internal pedestrian and cycle environment which will encourage these sustainable modes.

4.21 Footways will be provided along the internal roads where appropriate and within shared surfaces where traffic flows and speeds are very low such as in mews and access roads serving a limited number of dwellings.

4.22 In addition to the general provision of footways, a network of pedestrian and cycle routes as well as shared footway cycleways will be provided internally to the site as well as along the site frontage with Long Chaulden. This will ensure the development is highly permeable internally and well connected externally to encourage these sustainable modes.

4.23 These routes and connections to the external footways and roads are shown in **Figure 7** as a variety of route types including 2m footways, 2m leisure footpaths and 3m leisure corridors, in addition to connections and improvements to the existing Public Rights of Way (PROW).

4.24 The development will provide connectivity for pedestrians and cyclists to the surrounding footways including access to The Avenue Long Chaulden. In addition access to Chaulden Lane, Pouchen End Lane and Fields End Lane will be provided for cyclists via a number of gated access points.

4.25 In addition connection in to the various PROW which boarder and cross the site. These will be provided where this is possible subject to ecological and arboriculture considerations which will be assessed by others. These locations are illustrated in **Figure 7**

Sustainable Access Strategy – Public Transport

4.26 The provision of bus services to the site during phase 1 and phase 2 has been considered in detail in C&A TN006 a copy of which is provided at **Appendix A**.

4.27 During the preparation of TN006 C&A have consulted with existing bus operators as well as Dacorum and HCC regarding the potential bus contributions to enable an appropriate level of access to public transport to be maintained to the site during both phase 1 and phase 2.

4.28 These discussions have been based upon C&A examination of the existing bus services ML1 and 3 Timetable and Business case analysis which are set out in C&A TN006.

4.29 Subsequent to the analysis, it is proposed that the developer should as part of the Long Chaulden access works relocate the existing south bound bus stop and provide a new north bound bus stop as per **Drawing 16-021-071**. These will provide access to bus services for the phase 1 development without requiring the diversion of services in to the site. The walking distances to bus services for the phase 1 development are shown in Figure 9.

4.30 This approach will result in about 95% of the phase 1 dwellings being within the desirable 400m walking distance of bus stops at the Long Chaulden Access. The maximum walk distance between the bus stops and the farthest dwelling in phase 1 would be about 500m from the proposed bus stops. It is considered that this would provide adequate access to bus services for the phase 1 development without the need for a bus diversion. This would provide additional patronage and revenues to the existing bus services which will aid to improve their continued viability in the future.

4.31 The phase 2 development would require the provision of additional bus stops within the site in two stages. Stage A would be to provide a bus stop within the proposed community hub in order to minimise the walking distance for both the phase 1 and initial phase 2 development. Stage B would then provide an additional bus stop to the southernmost point of the Primary Road Bus Route to serve the southern extent of phase 2. Details of these bus stop location is provided in Figure 10.

4.32 In accordance with the assessment carried out in TN006 it is concluded that the provision of bus services to serve the site during phase 2 would not be commercially viable in the short to medium term. The business case set out in TN006 demonstrates that the operators would be expected to gain additional revenues with no additional cost during Phase 1 occurring in years 1-3. From the commencement of phase 2 until completion the business case identifies a deficit which would reduce over time until the completion of the development. The business case does not take in to account the impact of Travel Plan measures and as such represents a

conservative view with an apparent deficit post completion of £11,440 annually. Applying an amendment to the business case to account for the Travel Plan measures shows that this deficit could be reduced to £10,569 in the final year based upon the travel plan measures alone.

4.33 This value does not include any assessment of potential revenue which could be generated from external sources such as other sites in hemel hempstead which may well come forward during the 8-year project timescale.

4.34 Commercial bus services are constantly under review and the future services may well be revised to account for other development in the area. As such route revisions and future extensions possibly to hemel hempstead rail station may well provide opportunities for additional revenue streams to be realised.

4.35 Considering this it is proposed that a contribution towards bus service provision should be paid by the developer from the commencement of phase 2 for a period of 5 years through appropriate section 106 contribution to be approved by HCC.

Access Strategy – Vehicular Access

4.36 HCC's current Highway design guidance is set out in the *Third Edition of Roads in Hertfordshire – Highway Design Guide* dated January 2011. The design standards take a hierarchical approach which defines a series of road types by their function and specifies the required geometry.

Following discussion with HCC highway officers. C&A have prepared and agreed the road types and geometries to be provided for each. A copy of this road hierarchy table is provided at **Appendix H**.

4.37 The on-site road hierarchy plan is illustrated in **Figure 8**. This identifies the general hierarchical layout that is anticipated to come forward subject to

further detailed design work. This should be read in conjunction with the road hierarchy table **Appendix H**.

4.38 The proposed design approach is to provide a **Primary Road with bus route** through the site between the Long Chaulden access and the Avenue. This will provide a 6.75 m carriageway width with 2m footways. This will be built with a design speed of 30 mph and street lighting will be provided. The Primary Road will be provided with bus stops at appropriate locations. Where practicable it is desirable to limit walking distances to 400m for residents in order to encourage the use of bus services.

4.39 In order to provide a route through the proposed square a **Secondary Street with bus access** will be provided. This will have a carriageway width of 6.25m with 2m footways. This will be built with a design speed of 20mph and street lighting will be provided. The square will act as a focal point for activity and have a significant role as a place as well as having a significant role as a Bus Link.

4.40 The combination of the Primary and Secondary routes with Bus route provides a bus loop within the site. This allows the greatest level of flexibility for future bus services to either loop through the site using a single access point or travel through the site making use of both access points. This arrangement provides the greatest possible level of flexibility for bus services in the future.

4.41 In order to provide access to the southern most parts of the site a **Secondary Street without bus route** is provided. This will have a carriageway width of 5.5m with 2m footways. This will be built with a design speed of 25mph and street lighting will be provided.

4.42 Subsequently **Tertiary Streets** will form the majority of residential roads these will have a carriageway width of 4.8m with 2m footways. These will be built with a design speed of 20mph and street lighting will be provided.

4.43 Although not shown on the masterplan at time of writing, there is scope for the provision of **Mews / Shared Surface Streets and Green lanes.** These would have a 4.1-4.5m wide shared surface layout and street lighting will be provided.

4.44 The primary bus route and secondary bus route have been tracked through the Phase 1 development so that the future bus route which is expected to commence in phase 2 will be able to be accommodated through the phase 1 development.

4.45 Track plots for the Emergency service, Refuse Collection, as well as access for Home deliveries and general access by car have also been produced for the phase 1 development. These demonstrate that all these vehicle types are able to manoeuvre via appropriate routes to service the phase 1 development. These Track plots are provided at **Appendix I** and include tracks for the following vehicles

- Bus - Rigid Public Service Vehicle 12m
- Refuse Vehicle - Olympus Elite 6 (6x4 Wide)
- Home Delivery Vehicles - 4.6t Light Van

4.46 In addition to the above, the principals set out in MfS and MfS2 have also be considered in the design of residential roads. It is proposed that MfS visibility requirements will be applied to junctions on to existing roads subject to speed surveys. For the Long Chaulden Access the required visibility splays are shown in **Drawing 16-021-071**.

4.47 For the proposed roads, the visibility requirements within the detailed application for Phase 1 site have been provided in accordance with the Road Hierarchy table at **Appendix H.** The resulting phase 1 visibility assessments are provided at **Appendix L**. Demonstrating that that the Road Hierarchy design requirements are achieved.

4.48 The phase 2 Tracking and Visibility assessments are not applicable to this application and as such these would be provided as part of a future detailed application for the phase 2 development.

Access Strategy – Travellers and Adopted Foul Pumping Station Access

4.49 The Travellers site is to be located to the south west of the site taking access from Chaulden Lane. The access for this will need to regularly cater for general access for cars. In addition, occasional access for tow vehicles + caravans and occasional maintenance access to the pumping station.

4.50 In order to cater for the general day to day activity it is proposed to construct a suitable access as per **Drawing No 16-021-010** with visibility splays of 2.4m by 31m. This provides inter-visible passing places along Chaulden lane which cater for a car to pass a 4x4 car with caravan.

4.51 During the initial construction of the site, access will also be required for the delivery and installation of prefabricated portable buildings and their periodic replacement in the future. These are expected to be prefabricated in two parts resulting in 2 articulated vehicles delivery per dwelling during the construction phase.

4.52 Discussions have been held with HCC regarding the routing of delivery vehicles and track plots have been provided. The access design is provided in **Drawing No. 16-021-010** and the associated Track Plots are provided at **Appendix M.**

Access Strategy – Construction Access

4.53 The access arrangements considered above form the final development access proposals. There is also the need to provide temporary access for larger vehicle during the construction phase. This will be dealt with in a Construction Management Plan. This document will deal with the quantum and routing of construction traffic, throughout the construction process.

4.54 Construction Management Plans for Phase 1, Phase 2 and the Travellers site will be provided prior to the construction of each phase and will be a requirement within a planning condition.

Parking Provision Residential and Community Hub

4.55 Dacorum Borough Councils is responsible for setting parking standards and these date from 2004. C&A are aware that Dacorum is seeking a review of these standards in the future however in the first instance we have been directed review the current standards which are set out in Appendix 5 of the Local Plan 1991-2011 and then to consider if these are appropriate for the proposed development. The 2004 standards apply a maximum parking standard which can be reduced for zone 1 and 2 however the proposed site is in zone 4 and as such the maximum parking standards would be applicable.

Residential Parking Standards

4.56 Following a review of the above standards and discussion with Dacorum the following parking standards have been agreed to be applied to the residential aspect of the development.

Table 4.1 *Residential Parking Standards agreed with Dacorum*

DWELLINGS	GENERAL PROVISION	MAXIMUM PROVISION (INCLUDING GARAGES)
1 BED FLATS	1 SPACE	NA
2 BED FLATS	1 SPACE	NA
2 BED HOUSES	1.5 SPACES	NA
3 BED HOUSES	2 SPACES	3 SPACES
4+ BED HOUSES	2-4 SPACES	6 SPACES

Note Where flats have allocated parking it is proposed that additional visitor spaces will be provided at a rate of 0.25 spaces per dwelling.

4.57 For residential properties the Cycle parking standards require a minimum of one Long term space per dwelling. This should be provided as secure and sheltered cycle parking either as dedicated facility or the provision of suitable space within a Garage or Shed.

4.58 The proposed phase 1 and 2 residential developments will comply with the above agreed parking standards and these will be applied once a detailed schedule of dwelling types has been developed. It is noted that the council requires a minimum garage size for these to be considered to be parking spaces rather than storage areas. This will be taken in to account in the application of the standards.

Community Hub Parking Standards

4.59 The proposed community hub although not part of the detailed application will contain a number of uses including Convenience store, A1 uses, Community Hall, Primary School, Nursery School, 1 and 2 bed Flats and a Care Home.

4.60 This area will be provided with a combination of dedicate parking for each use as well as an area of shared parking provided in the square comprising of 35 spaces and on street parking providing 15 spaces.

4.61 Considering the range of uses the parking demand for each will have a different parking demand profile throughout the day. Each use will therefore have a different time of peak demand.

4.62 Considering this is clearly more efficient to provide an area of shared parking rather than to fully cater for each use individually. Following this it is proposed that a reasonable reduction below the sum of the individual uses would be appropriate where shared spaces are provided.

4.63 The Proposed Parking provision table identifies the relevant Dacorum parking standard, the proposed dedicated parking provision and the

resulting parking deficit for each use individually as provided at **Appendix K**

4.64 The overall parking deficit has been calculated as (-4) spaces. Considering that unallocated spaces will be utilised more efficiently than allocated spaces. The proposed provision is considered to be adequate to accommodate the anticipated parking demand for these uses in combination without excessive over-provision.

4.65 Cycle parking will be provided for each use either individually or communally as appropriate for long term and sort term parking spaces in accordance with the parking standards detailed at **Appendix K**

5.0 TRIP GENERATIONS AND ATTRACTIONS

5.1 Following pre-app consultation with (HCC) It was agreed that the TRICS data base should be examined and appropriate Trip Rates agreed to inform the TA. To this aim C&A submitted TN-006 which included an assessment of

- **Private Housing Trip rates**
- **Mixed Private / Affordable Housing**
- **Primary School Trip rates**

5.2 The developer is providing land for a two-form entry Primary school however this will not be built by the developer. Despite this an assessment of the trips associated with all aspects of the development including the school is required as the access arrangements for the whole development are to be determined as part of the phase 1 detailed application. This TA provide a full assessment of the total impact of the total development on the Local and Strategic highway network.

5.3 The trip rates agreed by HCC are provided in **Appendix A** which includes TN 006 and subsequent email exchanges as well as the final agreed TRICS outputs. The resulting TRIP rates and resulting Trip generation are tabulated below for ease of reference.

5.4 For the purposes of this assessment, it has been agreed that 70% of dwellings will be assumed to be Privately owned and that 30% will be assumed to be affordable. As such, these percentages have been applied to the phase 1 (350 units) and phase 2 (750) units in the following tables

Table 5.1 *Trip Rates*

Per Dwelling	AM Peak Hour Trip Rates			PM Peak Hour Trip Rates		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Trip Rate Private Housing	0.132	0.374	0.506	0.315	0.175	0.490
Trip Rate Affordable Housing	0.119	0.347	0.466	0.274	0.137	0.411

Table 5.2 *Phase 1 Development Trips*

350 Dwellings	AM Peak Hour			PM Peak Hour		
	Arrivals	Departures	Total	Arrivals	Departures	Total
(245 Private Dwellings) 70%	32	92	124	77	43	120
(105 Affordable dwellings) 30%	12	36	49	29	14	43

Table 5.3 *Total Development Trips*

1100 Dwellings	AM Peak Hour			PM Peak Hour		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Phase 2 Trips (770 dwellings) 70%	102	288	390	243	135	378
Phase 2 Trips (330 dwellings) 30%	39	115	154	90	45	135

Primary School Development

Table 5.4 *Primary School Trip Rates and Trips*

	AM Peak Hour			PM Peak Hour		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Trip Rate (Per Pupil)	0.283	0.207	0.490	0.037	0.056	0.093
Trips (420) Primary Pupils	119	87	206	16	24	40
Trips (30) Nursery Pupils	8	6	14	1	2	3

5.5 The majority of primary school pupils will originate from within the development itself and would not have an impact upon the local highway network. This effect is considered later in this report and shown in table 5.5.

5.6 Following discussion with Dacorum senior school's planner and the highways authority, 60-part time nursery pupils have been agreed to be equivalent to 30 full time Primary pupils as trips associated with these take place in two shifts daily reducing the peak hour impact by 50%.

Community Hub and Shops

5.7 The Community hub shops and community buildings will serve the residents within the site. These will of course attract a number of car bourn trips which will either be dedicated trips or form part of another journey. However, any dedicated trips to the community hub would be internal to the site and any trips which are part of another journey are already accounted for in the Residential trip rates which have already been assessed.

5.8 Considering this the community hub shops and other uses are considered to be wholly internal to the site and as such these would not have an impact upon the external highway network and no further assessment of these is required.

Residential Trip Distribution

5.9 A large proportion of week day morning and evening peak hours traffic is comprised of people travelling to work by car or van. During the pre-application process, it was agreed with the highways authority that a distribution based upon Census 2011 Journey to work data would provide a suitable means of identifying the AM and PM peak hour residential distribution.

5.10 Subsequently, C&A submitted TN005 CENSUS 2011 JTW DISTRIBUTION AND ASSIGNMENT. This note was agreed with HCC and provides a suitable basis for the distribution and assignment of residential trips in the AM and PM peak hours. Full details of this are provided at **Appendix A** and the resulting distribution and assignment is provided in Traffic Figure 01 and 02 for the Long Chaulden Access and for The Avenue access respectively.

School Distribution and Assignment

5.11 Discussions were held between C&A and senior school's planner in order to identify the anticipated pupil and staff trips as well as to identify suitable catchments for pupils and staff.

5.12 C&A TN008 and HCC response are provided in **Appendix A.** The following table 5.5 identifies the agreed school pupil vehicular trips from the agreed catchment as well as staff trips arising from beyond the school catchment. It is noted that the PM school trips are significantly lower than the AM trips as the school PM peak hour would generally fall between 3-4PM with little activity after this.

Table 5.5 *Agreed School Pupil Vehicular Trips external to the site*

	AM Peak Hour 8-9AM		PM Peak Hour 5-6PM	
	Arrivals	**Departures**	**Arrivals**	**Departures**
School Pupils from Catchment	45	45	2	1
Staff	16	0	0	12
Total	61	45	2	13

5.13 The majority of trips to and from the school will originate from the development itself and as such there is an element of double counting as no adjustment has been made to the residential trip rates to account for the internalisation of primary and nursery school trips. The TA is considered to provide a robust assessment of the likely vehicular traffic arising from the site.

5.14 The total development trips for phase 1 are provided in Traffic figures 30 and 31 with the total Development Trips including both phase 1 and 2 are provided in Traffic figures 12 and 13.

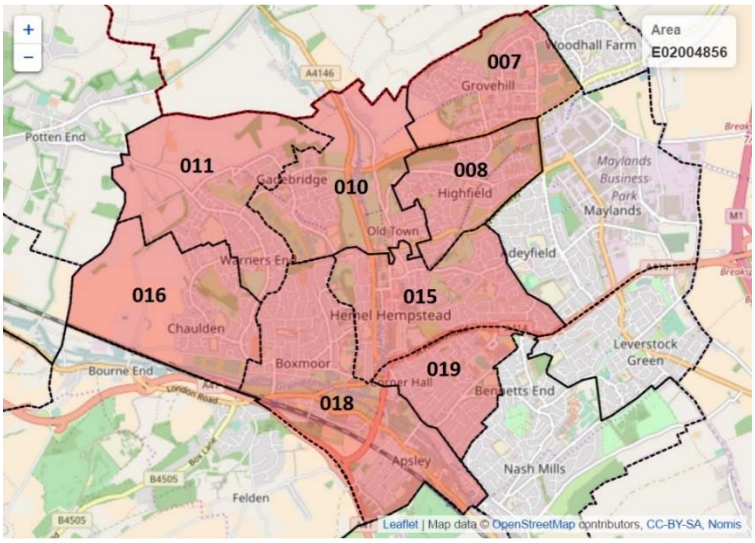
6.0 FUTURE TRAFFIC GROWTH AND COMMITTED DEVELOPMENTS

6.1 The observed traffic survey data was obtained in 2016 to inform the junction capacity assessments included in this TA.

6.2 At the time of writing it is anticipated that a planning application will be forthcoming during 2017.

6.3 Historically policy required that a future year of 5 years post application should be considered the norm for future year assessments; however, since the release of NPPF it is now up to the developer and highways authority to discuss and agree the future year to be used for assessment purposes as may be appropriate for the individual site in question. Following discussion with HCC it has been agreed that a future year of 2022 would remain appropriate in the case of this development

6.4 In order to identify the traffic levels in 2022 which will form the base year of assessment growth, factors were obtained using TEMRPOv7 with NTM AF15 applied for Urban Principal Roads. Values were obtained for the areas in Dacorum numbered below.



6.5 Following this it was agreed with HCC that the average growth rate for these areas should be used. The 2016-2022 growth rates used are **1.06973** AM

and **1.07004** PM and these are applied in Traffic figures 16 and 22 for the AM and PM peak hours.

6.6 Following the completion of the agreement of TEMPRO growth factors it is recognised that a new version of TEMPRO V7.2 was released. HCC have advised that they have undertaken a similar assessment and that the revised growth factors are within 1% of the agreed TEMPRO growth factors and as such the original assessment remains entirely valid.

Committed Developments

6.7 An extensive list of committed developments has been considered and discussed with HCC and it has been agreed that out of these only two such development need to be considered in terms of their traffic impact and these are listed below.

- Site E: Library and adjacent land, Combe Street Development: Demolition of library and construction of public Service Quarter and associated infrastructure

- Site K: Land off Dacorum Way between Marlowes, Combe Street and River Gade Development: Residential, 207 Units.

6.8 The locations of these developments are graphically illustrated in Figure 11 alongside the other development which were considered.

6.9 Trip generation data for these committed developments were obtained from relevant TAs and are provided in table 6.1 below.

Table 6.1 Committed Development Trip Generations

Committed Development	AM Peak 0800-0900			PM Peak 1700-1800		
	In	Out	Total	In	Out	Total
E, Library and adjacent land 4/03355/14/MFA 21/11/2014	14	31	46	27	15	43

K, Land off Dacorum Way 4/03624/14/MOA 10/12/2014	171	28	200	27	58	84
Total	185	59	246	54	73	127

6.10 The peak hour traffic distribution figures for these developments were obtained from The TA for these sites a copy of their development traffic is provided in **Appendix O**. These vales have been entered in Traffic Figures 17 and 23.

6.11 The combination of the future year 2022 traffic flows and the committed development trips are provided in Traffic Figures 18 and 24.

Consideration of additional sites and their potential highways impact. (April 2018 Update)

6.12 This TA including Traffic Figures and Junction Capacity assessments have been prepared in accordance with Hertfordshire County Councils requirements as highways authority. This assessment work includes the committed developments set out in Table 6.1 above. Which were agreed between HCC and C&A during the preparation of the TA.

6.13 Subsequent to the above Dacorum Borough Council (DBC) in their position as the planning authority requested in April 2018 that a number of additional developments be reviewed within the ES chapter. The aim of which being to identify their potential cumulative impact in terms of the ES chapter parameters.

6.14 To inform the ES chapter the TA has been updated to consider the potential effects of these developments if they were to come forward. These are concidered below as set out below in tables 6.2 – 6.5 and associated text.

Table 6.2: Cumulative Sites (April 2018)

Planning Application Reference	Site	Description
4/00925/14/MOA February 2015 4/01630/17/MFA October 2017	Residential Development on former Martindale School	43 Dwellings approved in February 2015 Amended scheme for 65 Dwellings approved in October 2017.
4/00493/16/FUL	St Marys Dominican convent	Change of use of existing buildings from class C2 to class C3 dwelling house, alterations and refurbishment of listed buildings granted in June 2016. This will provide 20 additional residential units and the refurbishment of one existing residential unit.

6.15 The former Martindale School site gained permission for 43 dwellings in February 2015 subsequently in October 2017 permission was granted for an additional 22 dwellings giving a total of 65 dwellings.

6.16 The St Marys Dominican convent gained planning consent for 20 additional residential units in June 2016.

6.17 In addition to the above planning consents, there are circa 1.32 hectares of land to the south east of the proposed Site. This area whilst in separate ownership does form part of the same allocation confirmed in the Dacorum Site Allocations DPD LA3 – West Hemel. However, as there are no detailed planning application proposals to assess at the time that this TA and subsequently the ES was compiled.

6.18 Given the quantum of development has not been established and as as such it is necessary to estimate the sites likely highways, impact the following assumptions have been made. The developable area of this parcel, once a gas pipeline buffer has been taken into account, would be about 0.62 hectares which at an estimated density of 35 dwellings per hectare could provide about 22 residential units.

6.19 The above sites relate to a total of (22+20+22) =64 additional dwellings each taking access from different parts of the Local Highway Network. This quantum of development would be expected to generate the following additional trips relating to each site

Table 6.3: Martindale School Additional Trips 22 Dwellings

	Arrivals	Departures	Total
08:00-09:00	3	8	11
17:00-18:00	7	4	11

6.20 The additional development would have a negligible impact on Junction 2,4 & 5 with the additional trips dissipating beyond this.

Table 6.4: St Marys Dominican convent Additional Trips 20 Dwellings

	Arrivals	Departures	Total
08:00-09:00	3	7	10
17:00-18:00	6	4	10

6.21 The additional development would have a negligible impact on Junction 3,7 & 8 with these additional trips dissipating beyond this.

Table 6.5: LA3 Additional Trips 22 Dwellings

	Arrivals	Departures	Total
08:00-09:00	3	8	11
17:00-18:00	7	4	11

6.22 The additional development would have a negligible impact on Junction 2,3,4,5,6,7 & 8 with the additional trips dissipating beyond this.

6.23 Given the location of these sites; the small scale of these developments and the resulting low levels of additional vehicular trips on the local highway network. These sites individually or in combination would have a negligible impact on the operation of all the junctions under consideration in the TA. The ES chapter criterion of severance, driver delay, pedestrian delay, pedestrian amenity, fear and intimidation, accidents and safety or

hazardous loads associated with these sites is fully concidered in Chapter 9 of the ES.

6.24 Given the above review it is not concidered appropriate to include these additional sites within the Traffic Figures or in the Junction Capacity analysis within the TA.

Derivation of Traffic Tables and Traffic Figures

6.25 The methodology of producing the Traffic figures is based upon the agreed parameters and methodologies set out in C&A technical notes which were agreed with HCC Highways. The following section describes the various Traffic figures produced to inform the TA.

6.26 The proposed trip rates for each use along with the workings of how these are applied are provided in a series of Tables 1-13 which are provided at **Appendix N** and considered in detail below.

6.27 Table 1 provides the agreed trip rates for Houses privately owned while Table 2 provides the agreed trip rates for the TRICS category of Mixed Private / Affordable housing. These will be applied to the proportion of private and affordable housing in due course in subsequent tables.

6.28 Table 3A provides the agreed trip rates for the 2-form entry primary school and these are also applicable to the nursery school.

6.29 Table 3B identifies the total vehicular school trips expected at the school gate however the proposed 1100 dwellings within the site will inevitably result in the internalisation of the vast majority of school trips within the site. Considering this the trip rates cannot directly be applied to the external highways network and as such some assumptions as detailed in C&A technical note 008 and amendments to this in HCC response have been applied to calculate the expected number of vehicular trips.

6.30 Table 3C identifies the number of staff trips arriving from outside of the catchment and these have been included in accordance with HCC response to C&A technical note 008. These staff trips have been assigned to the road network in accordance with the agreed Census 2011 JTW distribution and assignment as set out in C&A TN 005.

6.31 Table 3D identifies the number of vehicle trips expected to arrive to the school from within the catchment this includes those arriving from inside the site.

6.32 Table 3E calculates 10% of the trips from Table 3d which C&A proposed in C&A TN 008

6.33 Table 3F identifies the number of trips expected from the area outside the site but within the agreed catchment. HCC have requested a modification to C&A methodology and applying this 45 pupil arrivals and 45 departures will arise from outside of the site. These will arise from within the catchment in the morning peak hour. This represents 10% of the 420primary + 30nursary pupil trips which C&A and HCC have agreed will all be car trips for the purposes of this assessment. In reality it is likely that some could well be bus or cycle trips as such this approach provides a robust assessment of the likely trips arising from the external catchment area.

6.34 Table 4 applies the Housing Privately Owned Trip rates to 70% of the total 1100 dwellings. Table 5 applied the Mixed Private & Affordable trip rate to the remaining 30% affordable dwellings. Table 6 provides the sum of the total number of expected trips for the Total residential development and these values are taken forward in to the traffic figures.

6.35 For the purpose of the distribution and assignment Traffic Figures Table 7 and 8 identify the proportion of trips which would be expected to take access via the Long Chaulden and The Avenue access. And these values feed through to the traffic figures

6.36 Tables 9-13 repeat this process for the phase 1 development splitting the 350 dwellings in to 70% private and 30% affordable applying the appropriate trip rates and recombining them to give the expected trips which then feed through to the figures.

Figures

6.37 The distribution and assignment for the Long Chaulden and The Avenue as agreed with the Hertfordshire County Council Highways (HCC) are provided as Traffic Figures 01 & 02.

6.38 The residential Trips for 1100 dwellings are split between the two accesses for the AM and PM peak hours in accordance with the agreed distribution and assignments. These are shown in Traffic Figures 03 – 06

6.39 The distribution and assignment for school pupils as agreed with (HCC) is provided as Traffic Figures 07. This distribution is applied to the external student trips and some staff trips arising from the catchments from table 3d as Traffic Figure 08 & 09.

6.40 During discussions with HCC it has been agreed than a proportion of staff may well arrive from beyond the school pupil catchment as such these have been assigned on the highways network in accordance with the agreed CENSUS JTW distribution and assignment. The resulting external Staff Trips are provided in Traffic Figures 10 & 11.

6.41 The Total Development Trips comprising of 1100 dwellings and the 2FE Primary School + Nursery are provided in Traffic Figures 12 & 13. For the purpose of this TA it has been assumed that vehicle trips to and from the community centre uses will predominantly originate within the development as such these have not been specifically assessed.

6.42 Traffic surveys for junction 1-7 were undertaken on the 15th June 2016 for subsequent to this an additional survey for junction 8 was requested by the

highways authority and this was conducted on the 19 October 2016. These surveys were agreed with the highways authority and were undertaken during school term time avoiding school holiday periods. Traffic Figure 14 and 20 provide the AM and PM observed peak hour traffic. These have been converted in to Passenger Car Units (PCU) for modelling purposes in Figures 15 and 21. All subsequent figures are considered in terms of PCU's.

6.43 The future year traffic in 2022 has been calculated by applying 2016-2022 TEMPRO growth factors to the observed traffic flows Traffic Figures 14 and 20. The resulting future year are provided in Traffic Figures 16 for the AM peak hour and Traffic Figure 22 for the PM peak hour.

6.44 The relevant committed development was assessed and agreed with HCC the traffic flows relating to these are provided in Traffic Figures 17 & 23 for the AM and PM peak hours.

6.45 Traffic Figures 18 & 24 are provide the 2022 + Committed development for the AM and PM peak hours.

6.46 Traffic Figures 19 & 25 provided the 2022+Committed +Development for the AM and PM peak hours.

6.47 Traffic Figures 26-33 follow the same assessment methodology above but consider the phase 1 development only for the first 350 dwellings.

7.0 EXISTING JUNCTIONS CAPACITY ASSESSMENTS

7.1 New development of any significant scale will inevitably lead to a level of additional vehicular traffic on the local and wider road networks. It is therefore necessary to examine the impact of the development on the capacity of local junctions by testing the future year (2022) + committed development and also the future year (2022) + Committed + Proposed development.

7.2 The industry standard computer programs PICADY and ARCADY as part of TRL Junctions 9 program as well VISSIM microsimulation have been used to model and assess the capacity of the junctions.

7.3 PICADY was used to model priority junctions, ARCADY was used to model roundabouts and VISSIM was used to model the double mini roundabout comprising of Junction 3 and 4. The model outputs for these are provided at **Appendix Q**.

7.4 The observed queues for each junction have been considered against the modelled queues and it is considered that the queue data is sufficiently close to the modelled queues that there is no justification or need to calibrate any of the junction models.

7.5 The existing Junction 4 and 5 mini roundabouts were originally modelled in ARCADY9 and efforts were made to model the interaction between these two-mini roundabouts.

7.6 Following the ARCADY analysis, it was concluded that due to inherent limitations in ARCADY9 program that the resulting model did not accurately reflect the observed operation of the junctions in combination and that an alternative approach should be considered.

7.7 Following discussion with HCC it was agreed that C&A would produce a bespoke microsimulation model using VISSIM microsimulation software. This model incorporates both mini roundabouts as well as the effects of the

existing signalised pedestrian crossings. The model also accounts for the observed mix of Cars, HGV's, Buses, as well as pedestrian movements. The resulting model provides a highly accurate and realistic basis for assessing the impact of the development traffic on Junctions 4 and 5 in combination.

VISSIM Modelling notes

7.8 VISSIM microsimulation does not provide the standard RFC and Queue values generally associated with ARCADY or PICADY rather the assessment of junction performance can be represented in a number of ways including Delays as well as Average and Maximum Queue Lengths.

7.9 VISSIM provides accurate results with regards to delays however the modelling definitions of queues are quite different to those used in ARCADY or PICADY and as such these although a very useful comparison tool between different scenarios or junction layouts within VISSIM are not directly comparable to the traditional modelling outputs provided by ARCADY.

Existing Junction Capacity Assessment

7.10 For the proposed development, capacity assessments were carried out for four scenarios;

- Observed 2016
- 2022 + Committed
- Phase 1 Development 2021 + Committed + Development (350 dwellings).
- Total Development 2022 + Committed + Development (1100 dwellings 2FE School + Nursery School).

7.11 The summary results of these capacity assessments are detailed below; with full details provided at **Appendix Q**. The location of each of the following junctions is identified in **Figure 6**

J1 Proposed Long Chaulden Junction

7.12 Junction 1 is a proposed junction which would only be constructed if the development was to take place as such there is no need to assess this junction based upon the existing traffic flows.

J2 Existing the Avenue/ Boxted Road Roundabout

7.13 This is a four-arm roundabout between The Avenue, Boxted Road (N), Warmark Road and Boxted Road (S). The junction is 500 m towards north east from the site's secondary access. The ARCADY capacity assessments results for this junction are summarised in the tables below.

Table 7.1 *2016 Observed Flows*

	AM Peak			PM Peak		
Movement	**RFC**	**Modelled Queue**	**Observed Queue**	**RFC**	**Modelled Queue**	**Observed Queue**
Boxted Road (S)	0.41	<1	0	0.51	1.0	0
The Avenue	0.17	<1	0	0.07	0.1	2
Boxted Road (N)	0.42	<1	0	0.46	0.9	0
Warmark Road	0.04	0	0	0.01	0.0	0

Table 7.2 *2022 + Committed*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Boxted Road (S)	0.44	<1	0.54	2
The Avenue	0.19	<1	0.08	<1
Boxted Road (N)	0.45	<1	0.50	1

Table 7.3 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Boxted Road (S)	0.46	<1	0.59	2
The Avenue	0.25	<1	0.11	<1
Boxted Road (N)	0.47	<1	0.51	1
Warmark Road	0.05	0	0.01	0

Table 7.4 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Boxted Road (S)	0.51	1	0.70	3
The Avenue	0.39	<1	0.17	<1
Boxted Road (N)	0.52	2	0.54	2
Warmark Road	0.05	<1	0.02	0

J2 Summary

7.14 The existing Junction 2 operates well within capacity in all scenarios. With the full development in place in 2022, the maximum RFC of 0.52 in the AM peak on Boxted road and RFC 0.70 in the PM Peak. This will result in minimal queuing. As such the existing junction does not require any modification for capacity purposes, even with the full 1100 dwellings development is in place.

J3 Long Chaulden/ Northridge Way Roundabout

7.15 This is a mini-roundabout with three arms, Northridge Way (N), Long Chaulden and Northridge Way (S). The ARCADY capacity assessments results for this junction are summarised in the tables below.

Table 7.5 *2016 Observed Flows*

	AM Peak			PM Peak		
Movement	**RFC**	**Modelled Queue**	**Observed Queue**	**RFC**	**Modelled Queue**	**Observed Queue**
Northridge Way (N)	**0.86**	**6**	**0**	0.57	2	0
Northridge Way (S)	0.61	2	0	**0.97**	**15**	**0**
Long Chaulden	0.61	2	0	0.50	1	0

7.16 In 2016 J3 operates well within capacity in the AM peak hour the observed queues in the PM peak hour would also indicate that it operates well within capacity.

7.17 However, the modelled RFC and Queues for the PM peak hour would indicate a capacity issue on the southern approach with an RFC of 0.97 and queues of 15 vehicles.

7.18 The difference in observed queues would suggest that the ARCADY model in the PM is underestimating the available junction capacity however no adjustment has been made to the geometric model to accommodate this as queues in reality can vary significantly from day to day even with the same traffic demand.

Table 7.6 *2022 + Committed*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Northridge Way (N)	0.95	12	0.60	2
Northridge Way (S)	0.66	2	1.04	32
Long Chaulden	0.67	2	0.54	2

7.19 In 2022 + committed results in increases in the AM RFC by 0.09 and queues by 7 compared to the 2016 assessment. In the PM increases in RFC of 0.07 and Queues of 17 compared to the 2016 assessment. Therefore in 2022 this junction will operate with some congestion even before any development trips are added.

Table 7.7 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Northridge Way (N)	0.99	16	0.62	2
Northridge Way (S)	0.68	3	1.09	49
Long Chaulden	0.73	3	0.57	2

7.20 The addition of 350 dwellings increased the AM RFC by 0.03 and queues by 3. In the PM increases of RFC 0.04 and Queues of 14 would be expected. Therefore, development trips have a minor impact on the capacity of the junction above that of the 2022+ Committed development.

Table 7.8 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Northridge Way (N)	1.06	29	0.64	2
Northridge Way (S)	0.73	3	1.19	93
Long Chaulden	0.86	6	0.63	2

7.21 The addition of 1100 dwellings increased the AM RFC by an additional 0.07 and queues by 13. In the PM additional increases of RFC 0.10 and Queues of 42 would be expected. Therefore, development trips have a significant impact on the capacity of the junction above that of the 2022+ Committed development.

7.22 The assessment with the total development would indicates that the junction would operate in the AM with an RFC of 1.06 and queues of 29 and in the PM with an RFC of 1.19 and queues of 93. This is substantially above the junctions theoretical capacity of 1. Therefore it is proposed to improve this junction.

J4 Long Chaulden/ Boxted Road Roundabout

7.23 This is a mini-roundabout between Long Chaulden and Boxted Road with a signalised pedestrian crossing in the western arm of the junction. This junction's proximity to junction 5 results in a significant level of junction interaction which cannot be reliably modelled using ARCADY as such Junction 4 and 5 have been combined below for modelling purposes using VISSIM microsimulation.

J5 Warners End Road/ Northridge Way Roundabout

7.24 This is a mini-roundabout between Long Chaulden, Northridge Way and Warners End Road adjacent to St. Albans C of E Church.

7.25 The following tables identify the VISSIM outputs of Delay, Average and Maximum Queues for the existing junction layout for 2016, 2022+Committed and 2022+Committed+Development.

Table 7.9 AM Network Performance Delays (Seconds)

	2016	**2022 + C**	**2022+ Total Development**
Average Delay Time/Vehicle (s)	23	25	81
Average Speed (mph)	18	18	10
Total Travel Time (h)	42	46	88

7.26 The above table indicates that the addition of the total development in 2022 would be expected to increase average junction delays from 25s to 81s in the AM peak hour Average speeds through the junction reduce from 18mph to 10mph. This is considered to be a significant at this junction and indicates the need to provide mitigation.

Table 7.10 AM Queue Results (PCU's)

		2016		**2022 + C**		**2022+Total Development**	
Queue Marker	**Location**	**Average Queue**	**Maximum Queue**	**Average Queue**	**Maximum Queue**	**Average Queue**	**Maximum Queue**
1	J4 / Boxted Road	4	45	4	28	56	63
2	J4 /Long Chaulden	0	8	1	11	2	17
3	J5 / Warners End Rd	0	12	1	12	1	14
4	J5 / Northridge Way	0	5	0	7	0	15

7.27 The above table indicates that the addition of the total development in 2022 would be expected to increase both average and maximum queues on

Boxted road substantially during the AM peak hour with lesser increased on the other arms. This level of increase is considered significant and mitigation should be considered.

Table 7.11 PM Network Performance Delays (Seconds)

	2016	**2022 + C**	**2022+ Total Development**
Average Delay Time/Vehicle (s)	25	29	86
Average Speed (mph)	18	17	10
Total Travel Time (h)	45	51	95

7.28 The above table indicates that the addition of the total development in 2022 would be expected to increase average junction delays from 29s to 86s in the PM peak hour Average speeds through the junction reduce from 17mph to 10mph. This is considered to be a significant at this junction and indicates the need to provide mitigation.

Table 7.12 PM Queue Results (PCU's)

		2016		**2022 + C**		**2022+Total Development**	
Queue Marker	**Location**	**Average Queue**	**Maximum Queue**	**Average Queue**	**Maximum Queue**	**Average Queue**	**Maximum Queue**
1	J4 / Boxted Road	1	21	1	17	9	63
2	J4 /Long Chaulden	1	8	0	9	3	21
3	J5 / Warners End Rd	0	15	0	12	14	54
4	J5 / Northridge Way	3	29	5	40	35	42

7.29 Table 7.12 indicates that the addition of the total development in 2022 would be expected to increase both average and maximum queues on all

arms of the junction substantially during the PM peak hour. This level of increase is considered significant and mitigation should be considered.

J6 Warners End Road/ Leighton Buzzard Road Roundabout

7.30 This is a four arm roundabout between Warners End Road, Leighton Buzzard Road and B487. All four entry arms have three lanes. The ARCADY capacity assessments results for this junction are summarised in the tables below.

Table 7.13 *2016 Observed Flows*

	AM Peak			PM Peak		
Movement	**RFC**	**Modelled Queue**	**Observed Queue**	**RFC**	**Modelled Queue**	**Observed Queue**
B487	0.44	<1	1	0.81	5	2
A4146 (S)	0.70	3	1	0.74	3	4
Warners End Road	0.90	8	2	0.53	2	1
Leighton Buzzard Rd	0.62	2	6	0.63	2	2

7.31 The existing junction layout operates with adequate spare capacity in the AM and PM peak hours in 2016. Modelled and observed queues are within a reasonable range and as such the model is considered to provide a suitable basis for assessment.

Table 7.14 *2022 + Committed*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
B487	0.48	1	0.91	9
A4146 (S)	0.75	3	0.83	5
Warners End Road	1.01	27	0.59	2
Leighton Buzzard Rd	0.68	3	0.69	3

7.32 In 2022 + Committed development the junction operates above capacity in the AM peak hour with RFC of 1.01 and queues of 27 on Warners End Road. In the PM peak hour, the junction operates within capacity.

Table 7.15 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
B487	0.49	1	0.93	11
A4146 (S)	0.76	4	0.87	6
Warners End Road	1.07	49	0.61	2
Leighton Buzzard Rd	0.69	3	0.70	3

7.33 The addition of 350 dwellings increased the AM RFC by 0.05 and queues by 28 on Warners End Road. In the PM increases of RFC 0.04 and Queues of 14 would be expected. Conceding that the junction is over capacity in the morning peak hour it would be appropriate to provide improvements to this junction during the course of phase 1 and prior to 2022.

Table 7.16 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
B487	0.51	2	0.97	18
A4146 (S)	0.78	4	0.95	12
Warners End Road	1.18	108	0.66	2
Leighton Buzzard Rd	0.70	3	0.72	3

7.34 The addition of the full development would result in the junction operating well above capacity in the AM peak hour with RFC of 1.18 and Queues of 108. In the PM peak hour, the junction would operate just within capacity with RFC of 0.97 and queues of 18 on the B487. Considering this the junction will require mitigation at an early stage of the development.

J7 Northridge Way/ Fishery Road Roundabout

7.35 This is a four-arm roundabout between Northridge Way, Green End Road, St. John's Road and Fishery Road. The roundabout has a circulating carriageway width of about 6.8 m. The ARCADY capacity assessments results for this junction are summarised in the tables below.

Table 7.17 *2016 Observed Flows*

	AM Peak			PM Peak		
Movement	**RFC**	**Modelled Queue**	**Observed Queue**	**RFC**	**Modelled Queue**	**Observed Queue**
St. Johns Road	0.36	<1	0	0.39	<1	0
Fishery Road	0.47	<1	0	0.85	6	0
Northridge Way	0.73	3	2	0.50	1	7
Green End Road	0.27	<1	0	0.15	<1	0

7.36 The junction currently operates with spare capacity on all approaches in both peak hours. The modelled queues are sufficiently similar to the observed indicating that the model accurately reflects the operation of the roundabout.

Table 7.18 *2022 + Committed*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
St. Johns Road	0.40	<1	0.43	<1
Fishery Road	0.51	1	0.92	9
Northridge Way	0.79	4	0.55	2
Green End Road	0.31	<1	0.17	<1

7.37 In 2022 the roundabout operates within its theoretical capacity with reasonable queues as such no improvements would be required for capacity reasons.

Table 7.19 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
St. Johns Road	0.41	<1	0.44	<1
Fishery Road	0.52	2	0.95	14
Northridge Way	0.83	5	0.56	2
Green End Road	0.32	<1	0.18	<1

7.38 The addition of 350 dwellings increased the AM RFC by 0.04 and queues by 1 on Northridge way. In the PM increases of RFC 0.03 and Queues of 5 would be expected on fishery road. Considering the junction continues to operate within capacity and that the impact is minor there is little justification for junction improvements to be required during the phase 1 development.

Table 7.20 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
St. Johns Road	0.45	<1	0.46	<1
Fishery Road	0.56	2	1.03	34
Northridge Way	0.92	10	0.61	2
Green End Road	0.37	<1	0.18	<1

7.39 The addition of a further 750 dwellings increased the AM RFC by 0.09 and queues by 5 on Northridge Way. In the PM increases of RFC 0.08 and Queues of 20 would be expected on Fishery Road. The results of this assessment indicate that the existing junction would operate beyond its theoretical capacity of 1 with significant queuing occurring on fishery road in the PM peak hour. Considering this mitigation measures should be provided.

J8 Fishery Road/ A4251 London

7.40 This is a four-arm compact roundabout between Fishery Road and A4251. The southern arm is an entry only forming the egress from Hemel Rail Station used predominantly by buses and taxis. The ARCADY capacity assessments results for this junction are summarised in the tables below.

Table 7.21 *2016 Observed Flows*

	AM Peak			PM Peak		
Movement	**RFC**	**Modelled Queue**	**Observed Queue**	**RFC**	**Modelled Queue**	**Observed Queue**
A4251 (E)	0.41	<1	7	0.65	2	11
NO ENTRY	0.29	<1	3	0.43	1	6
A4251 (W)	0.72	3	7	0.91	9	18
Fishery Road	0.88	7	7	0.53	2	4

7.41 The junction currently operates with spare capacity on all approaches in both peak hours. The modelled queues although lower than the observed queues on some arms are sufficiently similar to indicating that the model accurately reflects the operation of the roundabout.

Table 7.22 *2022 + Committed*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
A4251 (E)	0.45	<1	0.70	3
NO ENTRY	0.33	<1	0.50	1
A4251 (W)	0.78	4	1.00	23
Fishery Road	0.97	16	0.58	2

7.42 In 2022 the roundabout operates close to its theoretical capacity in the morning peak hour and at capacity in the PM peak hour with increased queues as such even without the development this junction would benefit from some junction improvements.

Table 7.23 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
A4251 (E)	0.46	<1	0.72	3
NO ENTRY	0.33	<1	0.51	2
A4251 (W)	0.79	4	1.04	31
Fishery Road	1.02	27	0.59	2

7.43 The addition of 350 dwellings increased the AM RFC by 0.05 and queues by 11. In the PM increases of RFC 0.04 and Queues by 8 would be expected. The results of this assessment indicate that the existing

junction would operate beyond its theoretical capacity of 1. Therefore mitigation measures should be considered.

Table 7.24 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
A4251 (E)	0.47	1	0.75	3
NO ENTRY	0.34	<1	0.54	2
A4251 (W)	0.81	5	1.11	55
Fishery Road	1.12	65	0.63	2

7.44 The addition of a further 750 dwellings increased the AM RFC by an additional 0.10 and queues by an additional 38. In the PM, additional increases of RFC 0.07 and Queues of 28 would be expected.

7.45 The results of this assessment indicate that the existing junction would operate significantly beyond its theoretical capacity of 1. Therefore mitigation measures should be implemented.

Required Junction Mitigations

7.46 Based on the results from the capacity assessment summarised above it is concluded that most of the junctions assessed would be operating over their theoretical junction capacity with increased queues and delays and as such these would require mitigation measures to be implemented to compensate for the development traffic.

7.47 The following junction would therefore require mitigation at appropriate stages of the development.

- ***Junction 3 Long Chaulden / Northridge Way Mini Roundabout***
- ***Junction 4&5 Long Chaulden / Boxted Rd / Warners End Rd / Northridge Way Mini Roundabouts***

- ***Junction 6 Warners End Rd / Leighton Buzzard Rd Roundabout***
- ***Junction 7 Northridge Way / Fishery Road Roundabout***
- ***Junction 8 Fishery Rd / A4251 Roundabout***

8.0 PROPOSED OFF SITE JUNCTION MITIGATIONS

8.1 The capacity assessments of the existing junctions in Section 7 show that the RFCs for junction 3, 4&5, 6, 7 and 8 for the with development scenarios result in higher than ideal values of RFC's Queues and Delays resulting from the proposed development. The aim of these modification is to mitigate the impact of the proposed development at these junctions. Whilst also considering appropriate improvements to pedestrian and cycle facilities and catering for a 12m bus as the minimum design vehicle for most junctions.

8.2 These measures may not necessarily fully eliminate any existing capacity issues present. Although these may also be improved or eliminated as a consequence of the proposed improvements.

8.3 The following section highlights mitigation measures that are proposed in the design of the development scheme to reduce traffic induced impacts and improve provision for pedestrians and cyclists and access for bus services. Figure 6 identifies the junction locations which are considered in detail below.

Junction 3 - Long Chaulden / Northridge Way Mini Roundabout

8.4 The capacity assessment results for 2022 with the Full Proposed Development and Committed Developments show that there would be increased delays and queues at the existing junction. The proposals provide widening to the existing entry lanes which is achieved by revising the near side kerbs on the western entry and southern entry as well as widening on the eastern side of Northridge Way. The proposals also include the renewal of the Zebra Crossing on the southern approach. This incorporates a standard Tactile paving layout improving upon the existing non-standard layout. On the western arm, the existing dropped kerbs are to be replaced with dropped kerbs incorporate Tactile paving. The proposed Layout has been subject to a Stage 1 Road Safety Audit and all recommendations have been applied to the proposed layout.

8.5 The proposed junction improvement measures are illustrated in **Drawing No. 16-021-072**

Junctions 4&5 - Long Chaulden / Boxted Road / Warners End Road / Northridge Way Mini Roundabouts

8.6 The junction capacity assessment identifies that increased queuing and delays would take place at this junction. The main capacity issue here is caused by the proximity of the two mini roundabouts and the lack of queue storage afforded by the single lane in each direction between the two junctions.

8.7 The proposals retain a double mini roundabout arrangement with the following amendments including two lane entries from the north and south, and two lanes in each direction between the two mini roundabouts. Following These measures provide greater entry capacity as well as increased storage capacity between the two mini roundabouts.

8.8 To provide for pedestrians the existing pedestrian crossings to the west will be retained and renewed to match the revised carriageway width. The existing dropped kerb with tactile paving is retained to the north and the pedestrian refuge to the south will be enlarged to meet current minimum design requirements replacing the current substandard refuge.

8.9 The proposed layout has been subject to a Stage 1 Safety audit and following review by the Highway's Authority amendments have been made and these have been submitted a second time for a Stage 1 safety audit. The now proposed junction incorporates all suggested measures suggested in both safety audits and items discussed with HCC.

8.10 **Drawing No. 16-021-067** illustrates the proposed junction improvement measures for the above junction.

Junction 6 - Warners End Road / Leighton Buzzard Road Roundabout

8.11 The junction capacity assessments in the TA indicate that the proposed development would have an adverse impact on junction capacity. It is also worth noting that remedial measures have recently been implemented in the form of circulatory lane marking. In addition, the existing dropped kerbs on the west north and eastern arms lack tactile paving.

8.12 In order to address the needs for pedestrians the proposals provide tactile paving on all pedestrian crossing points in accordance with current design requirements.

8.13 To address the Junction capacity issues the give way position has been brought forwards and the existing hatched areas on the circulatory carriageway are replaces with physical islands incorporating dropped kerbs and tactile paving. The central island kerb is renewed and the recently introduced circulatory lane markings are retained.

8.14 The proposed layout now provides dedicated lanes for all three movements which provides greater junction capacity junction capacity modelling in the TA shows that the proposals provide suitable mitigation for the development.

8.15 The proposed pedestrian infrastructure improvements will be of benefit primarily to existing users and also to any one walking from the site to the town centre. The existing signalise pedestrian crossing to the south is retained in its existing form.

8.16 The proposals have been subject to an independent Stage 1 Road Safety Audit which did not raise any concerns with the proposed layout.

8.17 **Drawing No. 16-021-069** illustrates the proposed junction improvement measures for the above junction

Junction 7 - Northridge Way / Fishery Road Roundabout

8.18 The TA junction Capacity assessment identifies a minor capacity issue at this junction

8.19 The improvements include revisions to the give way markings providing increased entry width on all approaches. In addition, on the western approach a retaining wall is provided to support the existing footway and to enable a revised kerb alignment. The existing pedestrian refuges on each arm of the junction remain unaltered.

8.20 **Drawing No. 16-021-073** illustrates the proposed junction improvement measures for the above junction

Junction 8 - Fishery Road / A4251 Roundabout

8.21 The TA junction Capacity assessment identifies a capacity issue at this junction

8.22 The improvements include increase length of two lane approach from the north with a revised kerb line from the northern to the eastern arm to provide greater entry width for two lanes. The existing single-entry lane to the west is replaced with a two-lane entry.

8.23 The existing pedestrian refuge on the northern arm is enlarged with some revised kerbs on each entry reducing the ICD. Cyclists are also provided for with a one way west to east cycle lane taking cyclists traveling from the north to the east off carriageway and connecting in to the existing cycle route heading east. The roundabout geometry has been designed to DMRB compact roundabout design standards which provide a far safer roundabout design than a standard or non-standard layout. The existing central island is retained as it is.

8.24 The proposed layout was submitted for a Stage 1 RSA and all suggested measures have been implemented.

8.25 **Drawing No. 16-021-068** illustrates the proposed junction improvement measures for the above junction.

9.0 PROPOSED OFF SITE JUNCTION CAPACITY ASSESSMENTS

9.1 The full modelling results for the proposed off-site junction improvements are summarised below with the full model output provided at **Appendix S**.

J3 Long Chaulden/ Boxted Road Roundabout

9.2 The improvements to J3 include the widening of all three entries to provide increased junction capacity to accommodate the increase in traffic associated with the development. Details of these improvements are provided in **Drawing No. 16-021-072**.

9.3 The following table provides a summary of the resulting junction capacity parameters. Which demonstrates that the proposed junction will operate with sufficient capacity to accommodate the proposed development.

Table 9.1 *022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Northridge Way (N)	0.80	4	0.51	1
Northridge Way (S)	0.57	2	0.92	9
Long Chaulden	0.53	2	0.41	1

9.4 The proposed junction operates with significantly reduces RFC and Queues below those of the existing Junction in 2022 + committed development as such the proposed improvement more than mitigate for the proposed phase 1 development.

Table 9.2 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Northridge Way (N)	0.86	6	0.52	2
Northridge Way (S)	0.62	2	1.00	23
Long Chaulden	0.63	2	0.48	1

9.5 Despite the proposed junction operating at capacity in the PM peak hour. The proposed junction operates with significantly reduces RFC and Queues below those of the existing Junction in 2022 + committed development scenario as such the proposed improvement more than mitigate for the total proposed development and alleviate to a degree the existing capacity issues at this junction.

J4 & J5 Warners End Road/ Northridge Way Roundabout

9.6 Proposed junction improvement measures are shown in **Drawing No. 16-021-067.**

9.7 The following tables identify the VISSIM outputs of Delay, Average and Maximum Queues for the proposed junction layout for the proposed junction improvements in 2022+Committed+Development.

Table 9.3 AM Network Performance Delays (Seconds)

	2022+ Total Development
Average Delay Time/Vehicle (s)	21
Average Speed (mph)	19
Total Travel Time (h)	50

9.8 The junction improvements proposed reduce the average delay per vehicle down to 21 seconds. This represents a 3 second reduction in comparison to the 2022 + committed development scenario in fact the modelled delay is actually lower than the delay experienced in 2016.

Table 9.4 AM Queue Results (PCU's)

		2022+Total Development	
Queue Marker	**Location**	**Average Queue**	**Maximum Queue**
1	J4 / Boxted Road	0	9
2	J4 /Long Chaulden	1	15
3	J5 / Warners End Rd	0	9
4	J5 / Northridge Way	1	14

9.9 The junction improvements proposed reduce the Average and Maximum queues substantially below the levels associated with the 2022 + committed development. It is quite revealing that the Maximum queue of 45 Vehicles reduces to just 9 vehicles. With an average queue of 1.

Table 9.5 PM Network Performance Delays (Seconds)

	2022+Total Development
Average Delay Time/Vehicle (s)	22
Average Speed (mph)	19
Total Travel Time (h)	54

9.10 The junction improvements proposed reduce the average delay per vehicle down to 22 seconds. This represents a 7 second reduction in comparison to the 2022 + committed development scenario in fact the modelled delay is actually lower than the delay experienced in 2016.

Table 9.6 PM Queue Results (PCU's)

		2022+Total Development	
Queue Marker	**Location**	**Average Queue**	**Maximum Queue**
1	J4 / Boxted Road	0	5
2	J4 /Long Chaulden	1	13
3	J5 / Warners End Rd	1	29
4	J5 / Northridge Way	1	15

9.11 The junction improvements proposed reduce the Average and Maximum queues substantially below the levels associated with the 2022 + committed development. It is quite revealing that the Maximum queue of 40 Vehicles reduces to 29 vehicles with an average queue of 1.

9.12 Considering the delay, average and maximum queue reductions associated with the proposed layout it is clear that the proposed mitigations will not only mitigate for the proposed development but will also provide a significant reduction in delays and queues benefitting not only the residents of the proposed development but also existing residents.

J6 Warners End Road/ Leighton Buzzard Road Roundabout

9.13 Proposed junction improvement measures are shown in **Drawing No. 16-021-069**. The improvements include increased entry widths on each approach as well as a revised central island to provide a standard DMRB compliant layout.

Table 9.7 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
B487	0.45	<1	0.84	6
A4146 (S)	0.75	3	0.83	5
Warners End Road	0.87	6	0.50	1
Leighton Buzzard Rd	0.67	3	0.67	2

9.14 The proposed junction improvements result in RFC and Queues below levels associated with the existing 2022+committed development scenario. The junction therefore operates within the junctions theoretical capacity with reasonable queuing. Considering that each approach is provided with 3 entry lanes the modelled queues can be accommodated.

Table 9.8 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
B487	0.48	<1	0.88	7
A4146 (S)	0.77	4	0.91	9
Warners End Road	0.96	15	0.54	2
Leighton Buzzard Rd	0.71	3	0.69	3

9.15 The proposed mitigations result in a reduction in RFC and Queues below the levels associated with the 2022 + Committed development in the AM peak hour. In the PM peak the levels of RFC and queues are equivalent to those in the 2022+Committed development scenario with an improvement on the B487 and a slight increase in RFC on the A4146 (S). The results indicate that the improvement result in a nil detriment to the operation of this junction and as such the proposals fully mitigate for the proposed development.

J7 Northridge Way/ Fishery Road Roundabout

9.16 Proposed junction improvement measures are shown in **Drawing No. 16-021-073**. Swept path analysis using 12m bus is provided at **Appendix J**.

Table 9.9 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
St. Johns Road	0.38	<1	0.41	<1
Fishery Road	0.49	1	0.89	8
Northridge Way	0.66	2	0.44	<1
Green End Road	0.26	<1	0.15	<1

9.17 The junction mitigations show a reduction in RFC and queues below levels associated with the 2022+committed scenario.

Table 9.10 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
St. Johns Road	0.42	<1	0.43	<1
Fishery Road	0.52	2	0.96	15
Northridge Way	0.73	3	0.48	<1
Green End Road	0.29	<1	0.15	<1

9.18 The junction mitigations show a reduction in RFC and Queues in the AM peak hour below those associated with the 2022+Committed Development scenario. In the PM peak hour, there is a reduction in RFC and Queues on all but the Fishery Road entry which sees a marginal increase in RFC of 0.04 and an increase of 6 in the queue on fishery road.

9.19 The junction would operate within its theoretical capacity and overall this represents a nil detriment solution.

J8 Fishery Road/ A4251 London Road Roundabout

9.20 Proposed junction improvement measures are shown in **Drawing No. 16-021-068**. This includes the provision of a two lane entry from the west and an increased entry width to the north with an increased length on the two lane approach.

Table 9.11 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
A4251 (E)	0.44	<1	0.68	3
NO ENTRY	0.33	<1	0.50	1
A4251 (W)	0.51	2	0.63	2
Fishery Road	0.85	6	0.50	1

9.21 The mitigation measures result in a substantial reduction in RFC and Queues in comparison with the 2022+Committed development Scenario and as such more than mitigates for the Phase 1 development.

Table 9.12 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
A4251 (E)	0.46	<1	0.71	3
NO ENTRY	0.35	<1	0.53	2
A4251 (W)	0.52	2	0.66	2
Fishery Road	0.93	11	0.55	2

9.22 The mitigation measures result in a substantial reduction in RFC and Queues in comparison with the 2022+Committed development Scenario and as such more than mitigates for the Total Proposed Development. Of particular merit are the reduced RFC form 1.00 to 0.71 in the PM peak hour and reduced queues from 23 down to just 3 also in the PM peak hour.

Proposed Site Access

J1 Site Access on Long Chaulden

9.23 This is simple priority junction with right turning facility incorporating the provision of pedestrian cycle and bus stops in the vicinity of the junction.

Table 9.13 *2022 + Committed + Development (350 Dwellings)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Site Access Left Turn	0.06	<1	0.03	0
Site Access Right Turn	0.08	<1	0.03	0
Long Chaulden Right Turn	0.02	0	0.05	<1

Table 9.14 *2022 + Committed + Development (1100 Dwellings + 2FE School)*

	AM Peak		PM Peak	
Movement	**RFC**	**Modelled Queue**	**RFC**	**Modelled Queue**
Site Access Left Turn	0.23	<1	0.09	<1
Site Access Right Turn	0.31	<1	0.14	<1
Long Chaulden Right Turn	0.11	<1	0.16	<1

9.24 The proposed site access operates with maximum RFC of 0.31 in the AM peak and 0.14 in the PM peak hour. The modelled queues are all below 1. This junction would therefore be expected to operate with ample spare capacity and minimal queuing with the full development in place.

10.0 SUMMARY AND CONCLUSIONS

10.1 This Transport Assessment (TA) has been prepared by Charles & Associates Consulting Engineers (C&A), on behalf of Taylor Wimpey and Barratt Homes to support a detailed planning application for a development of up to 1100 dwellings (including affordable homes) for site LA3 know as Land West of Hemel Hempstead. The site also has potential for the provision of land for a two-form entry Primary School, a private Nursery school as well as other community facilities. These are expected to include a Care Home, Community Hall and a Convenience Store.

10.2 The application is being submitted as a hybrid application with the phase 1 residential development of 350 dwellings forming a detailed application to include access. The phase 2 development which includes the remaining 750 dwellings and other uses in the community hub is being submitted in outline with access to be determined. This TA reflects the need to provide an assessment of both the phase 1 and phase 1+2 Total development scenarios.

10.3 Discussions have been held with Hertfordshire County Council as the local highways authority as well as Highways England during its preparation to agree the base parameters and methodology used in the assessment and these agreed methodology has been applied.

EXISTING CONDITIONS

Site Location and local Road Network

10.4 The site is situated west of Hemel Hempstead to the south of fields end farm and north of the river Bulbourne. The site location plan is provided at Figure 1.

10.5 The local highway network under consideration is illustrated in in Figure 2 and includes routes from both access points at Long Chaulden and The Avenue. Through the local highway network which includes Long Chaulden, Boxted Road, Warner's End Road, Northridge Way, Fishery

Road, A4251, Galley Hill and Leighton Buzzard Road. The local highway network provides various routs through to both local destinations and to the to the strategic highway network including the A41, M1 and M25.

10.6 The junction to be assessed include Junctions 1-8 as shown in Figure 2 as agreed with Hertfordshire county council highways.

10.7 The Junctions of the A41 M1 and M25 have been scoped out of the assessment following consultation with Highways England.

Site Accessibility and Local Facilities

10.8 Local centres in Chaulden and Stoneycroft Shops provide opportunities for access to a variety of local facilities within a reasonable walking distance especially for residents within the phase 1 development. These include community, and health facilities. Chaulden infant nursery and junior schools are all within walking distance. The existing bus services provide access to Hemel Hempstead Town centre as well as providing a commuter route to Hemel rail station providing access to employment opportunities both in the local area and further afield.

10.9 The inclusion of a community hub within the phase 2 development will provide nursery and primary school places for children within the development itself as well as a convenience stores and other community facilities

10.10 The proximity of the site to both these existing and proposed local facilities means that many trips for everyday purposes can easily be made on foot or bicycle. The combination of existing local facilities and those provided as part of the development will ensure that the proposed residential areas will fall within the 800m “walkable neighbourhood” distance to a range of facilities advocated by Manual for Streets. The existing footways and footpaths are of a good standard and will encourage future residents to walk to local destinations. The proposed footways and footpaths within the development have been designed to provide routes along the main desire

lines and will be of high quality to ensure that walking and cycling are an easy choice for trips within the development and to existing facilities routes outside the site.

Public Transport

10.11 The existing bus services ML1 and Route 3 currently run along Long Chaulden and these will be served by two new bus stops which are to be provided as part of the Long Chaulden Access proposals along with suitable pedestrian and cycle facilities. The provision of these bus routes will bring the majority of the phase 1 dwellings within the ideal 400m walking distance to these services with all dwellings being within 500m.

10.12 For the Phase 2 development C&A have consulted with local operators for Arriva and Red Eagle. In addition, discussions have been held with both HCC and Dacorum Councils and the proposition of a 5-year developer contribution based upon C&A TN006 has been established.

10.13 TN006 outlines the anticipated bus contributions which would be payable to the council so that these services or a suitable future service can be provided to serve residents of the phase 2 development.

Existing Transport Conditions

10.14 Generally, the local road network operates with few delays outside the main morning and evening peak hours. During the peaks there can be localised delays due to the volume of traffic as is the case across the UK road network. Traffic surveys have been undertaken to identify flows and queues and this information has been used as the basis for assessment of the effect of the proposed development in the future year.

10.15 Analysis of the records of personal injury traffic accidents has revealed no specific locations where road safety would be prejudiced by the proposed development.

Policy Considerations

10.16 The proposed development has been considered against the relevant transport policies set out in national and local planning policy documents and it is considered that it conforms to the various policy objectives and requirements.

Proposed Development and Access Strategy

10.17 The proposed development will comprise up to 1100 dwellings along with provision of a two-form primary school, Nursery School other uses associated with the community hub

10.18 Phase 1 will include the provision of up to 350 dwellings to include access for the full development.

10.19 Phase 2 will comprise of the remaining 750 residential dwellings a primary school, Nursery School as well as uses associated with the community hub.

10.20 Although the final details of the community hub are yet to be finalised it is expected that this will include a convenience store, retail units, Community building, Care home and children's day nursery

10.21 New connections to the local road network will be constructed at Long Chaulden and The Avenue. Local highway improvements

10.22 Development will be phased with highway improvements introduced appropriately to provide access and also to provide mitigation at existing junctions. This will ensure appropriate access to the development is provided at each stage without causing local junction capacity issues. This phased approach is also applied to the introduction of bus services so that access to bus services at each phase is maintained.

Transport Effects

10.23 The potential transport effects of the expected travel demand of future residents have been assessed in great detail. Trip generation information has been derived primarily from the TRICS database. The data to be applied and the methodology used in determining the anticipated travel demand have been agreed with Hertfordshire County Council and Highways England.

10.24 The agreed data and method have been applied to derive a model of traffic in the local area including future traffic growth and traffic arising from local committed developments. Assessment has been made for a future year of 2022 as agreed with HCC.

Sustainable Travel

10.25 To encourage the use of more sustainable travel modes a Travel Plan for both the phase 1 and phase 2 developments will be instigated and information on the options for travel will be provided to future residents to enable them to choose the most appropriate and sustainable mode of travel for their journeys.

10.26 The Travel Plan will be administered by the developers Travel Plan Coordinator who will report back to HCC as required. The Travel plan will be fully funded by the developer and will include a variety of measures aimed at reducing travel by car. The first principle of planning for sustainable travel is to ensure that the location of development provides opportunities to access everyday facilities by means other than the car. The position of the phase 1 site within walking distance of existing facilities and the phase 2 sites provision of a community hub including nursery and primary education means that this primary aim is achieved. Considering this a notable reduction in trips on the primary highway network as set out in the for those assumed for the junction testing in the TA are considered attainable.

10.27 The Travel Plan will introduce initiatives such as a car club, car share database and personalised travel planning for households. It will provide information on local walking cycling and bus routes and will provide a contribution to fund the introduction of public transport during the phase 2 development. These measures are expected for the phase 1 development to reduce single occupancy vehicles by 5%. Increase bus patronage by 2%. Increase walk and cycle journeys by 3%. Similar targets will also be set for the phase 2 development in concert with a future detailed application for that development.

Assessment of Impacts – Non-Car Modes

10.28 It is generally the case that transport effects of non-car modes of travel are unlikely to have a significant impact upon the transport networks. This is particularly the case for walking and cycling trips.

10.29 The development provides a network of internal pedestrian and cycle routes as well as a comprehensive range of connections to the surrounding roads and footways. In addition, the development provides improvements to the existing pedestrian facilities at the access points to the site as well as renewal and improvement of the pedestrian and cycle facilities at key junctions in the area. Connection to the existing on road cycle routes are also provided.

10.30 Considering the proposals, it is clearly anticipated that walk and cycle trips can be accommodated.

10.31 It is possible for an increase in public transport trips to have an impact if this leads to buses or trains becoming overcrowded.

10.32 The proposed phase 2 development will provide developer contributions to provide a diversion to the existing bus services which

are considered to provide sufficient capacity to serve the development. These funds will be paid to and administered by Dacorum Borough Council.

Assessment of Impacts – Vehicle Trips

10.33 There will be additional vehicle trips on the local and wider highway networks as a consequence of the proposed development. The provision of the Long Chaulden access, the extension of The Avenue as well as a dedicated access to the proposed Travellers site provide access to the site with ample junction capacity.

10.34 On the local highways network a series of comprehensive junction improvements will minimise the effects on local roads by providing additional capacity at these junctions. In each case it has been demonstrated that the additional traffic demand can be catered for through the provision of junction improvements resulting in either a nil detriment solution or in several cases an improvement over the without development situation.

10.35 The schedule and timing of junction improvements will be agreed with the highways authority in order to provide these junction improvements at appropriate stages of the development so as to minimise the impact of the development as it is built out.

Conclusion

10.36 The proposed development of 1100 homes, two form primary school and the community hub would without mitigation measures have a significant impact on the operation of the local transport networks. Where these are significant, such as at existing junctions; improvements are proposed to provide additional capacity to accommodate the development traffic in each case it has been demonstrated that the proposed improvements either

result in a nil detriment or more generally result in the junctions operating with additional capacity over and above that specifically required to accommodate the development.

10.37 In regards to access to bus services and public transport it has been demonstrated in the TA and in C&A TN006 that the existing services are accessible from the proposed bus stops on long Chaulden during phase 1 and that during phase 2 a suitable bus service can be achieved through the diversion of bus services this will require developer subsidy for a period of 5 years.

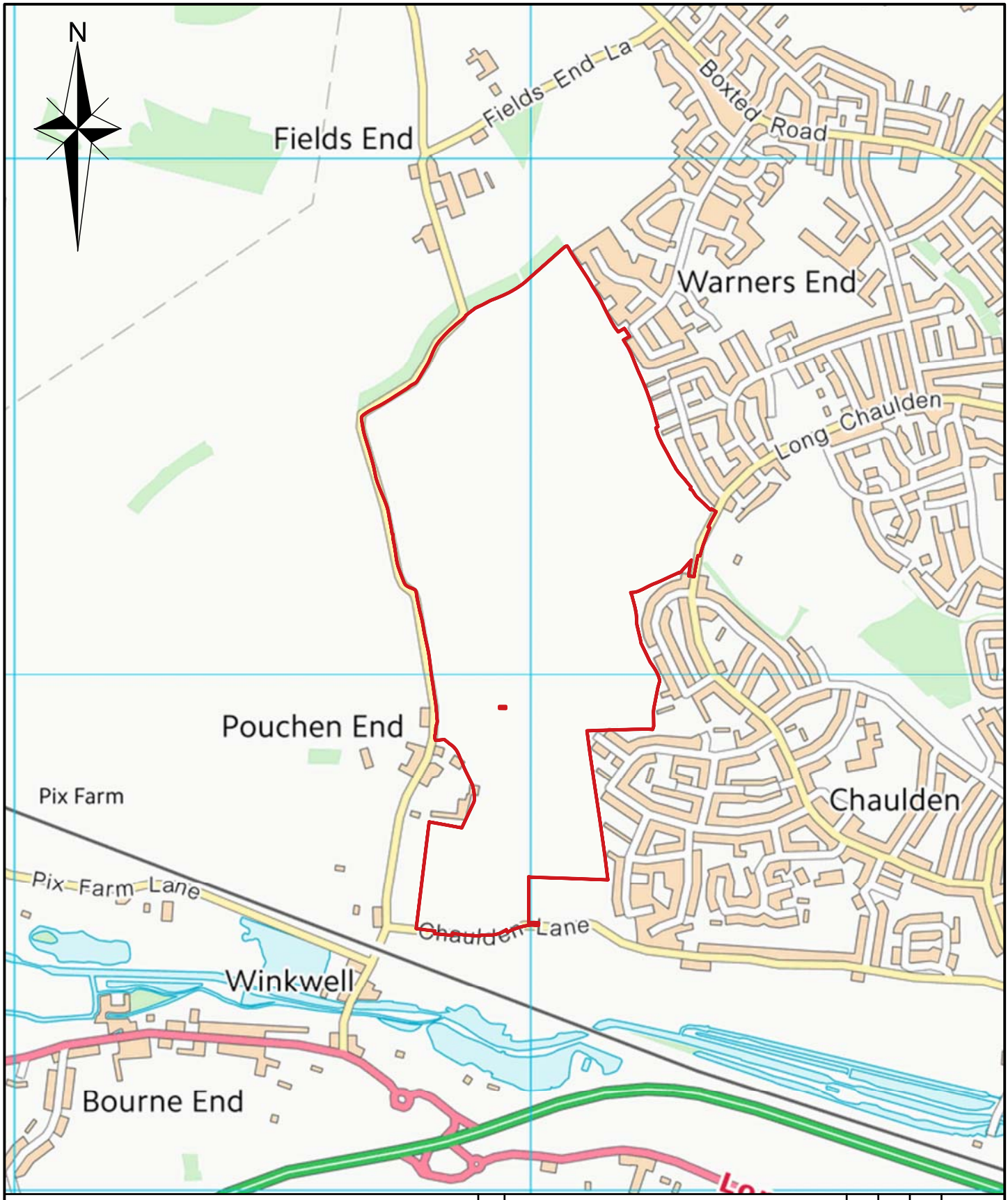
10.38 The development includes a range of beneficial improvements for walking, cycling and public transport trips both internally to the site and off site. In addition, the site benefits from a number of connections to the existing residential areas as well as a number of PROW and on road cycle routes providing a highly permeable layout which will encourage the use of sustainable modes.

10.39 The provision of a Full travel plan for the phase 1 detailed development and an outline Travel Plan for the phase 2 outline development will further encourage the use of non-car modes.

10.40 The local and wider transport networks would therefore be able to accommodate the proposed development with only small residual effects in a few cases and in some notable cases with capacity improvements over the existing conditions.

10.41 Subsequent to the analysis and mitigations to be provided it is considered that there are no severe transport impacts arising from either the phase 1 detailed or phase 2 outline developments and as such the development on highways grounds should be permitted in accordance with NPPF.

FIGURES



Site Boundary

Rev	Amendments	Drn	Chk	App	Date
A	Site boundary & masterplan amended	DK	SPS	GC	Dec 17

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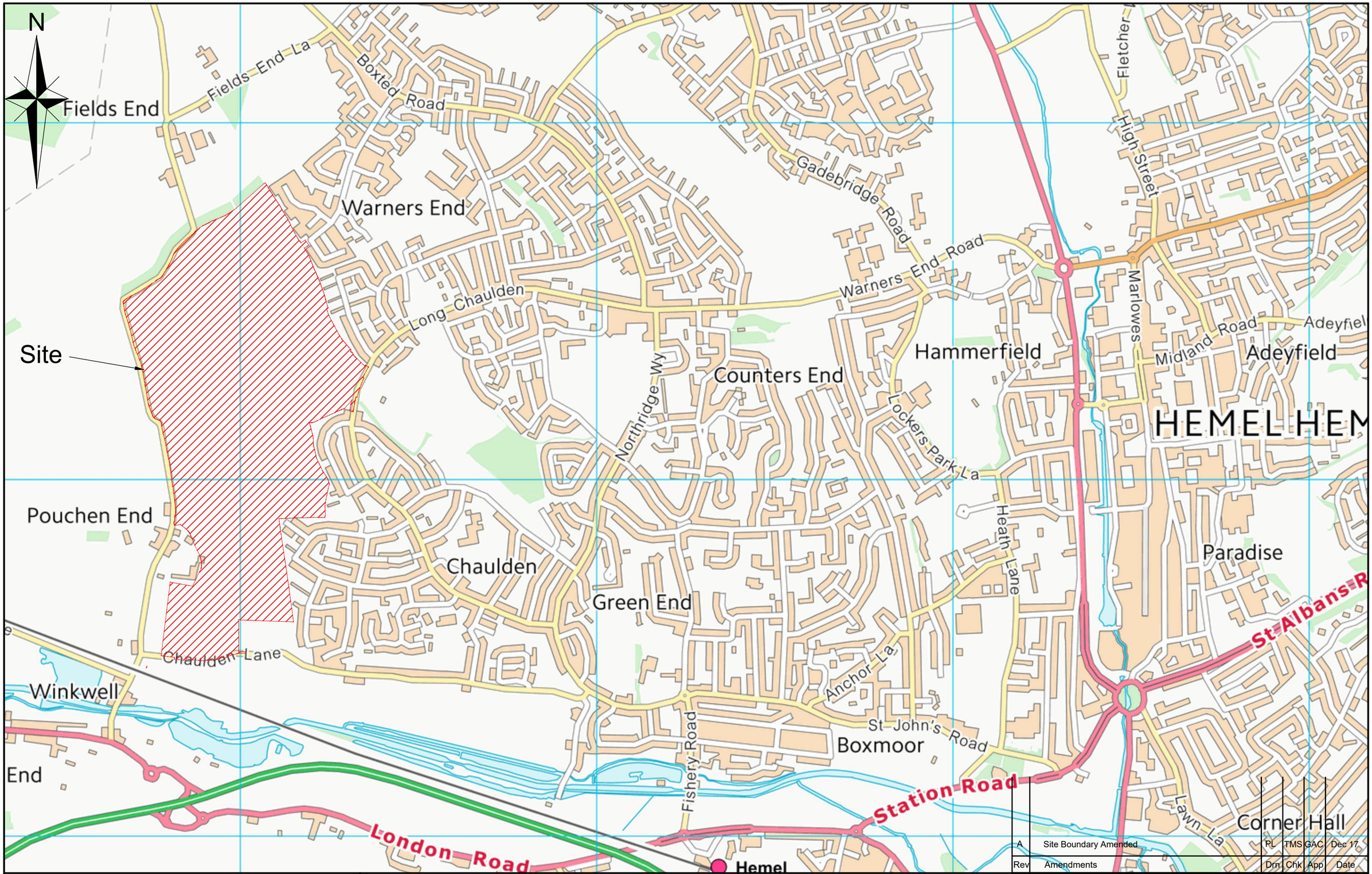
Job Title: Land West of Hemel Hempstead	Scale: NTS @A4	Date: May 16	Designed: N/A
Drawing Title: Site Location Plan	Drawn: BL	Checked: SS	Approved: SS
Client: Taylor Wimpey UK ltd Barratt Homes	Job No: 16-021	Figure No: FIGURE 1	Rev: A



Rev	Amendments	Drn	Chk	App	Date
A	Site Boundary Amended	PL	TMS	GAC	Dec 17

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Job Title
Land West of Hemel Hempstead

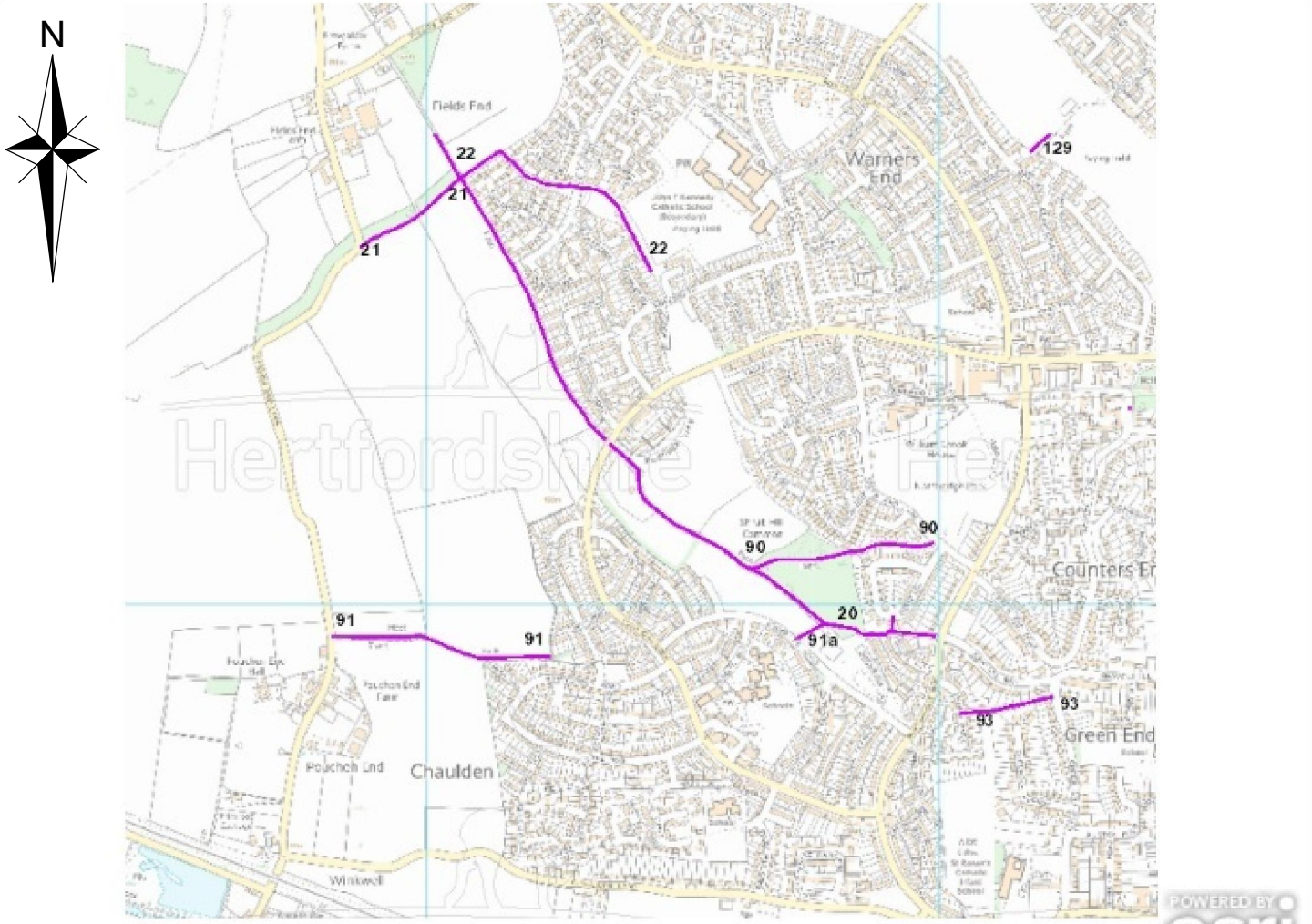
Drawing Title
Local Highway Network

Client
Taylor Wimpey / Barratt Homes

Scale	Date	Designed
1:10,000@A3	May 17	PL
Drawn	Checked	Approved
PL	TMS	GAC
Job No	Figure No	Rev
16-021	Figure 2	A

16-021-092

Rights of Way map



Legend

- Byway Open to All Traffic
- Restricted Byway
- Bridleway
- Footpath
- Temporary Footpath
- Temporarily Closed Footpath
- Unmetalled Unclassified County Road
- Rights of Way PTRO

Rev	Amendments	Drn	Chk	App	Date

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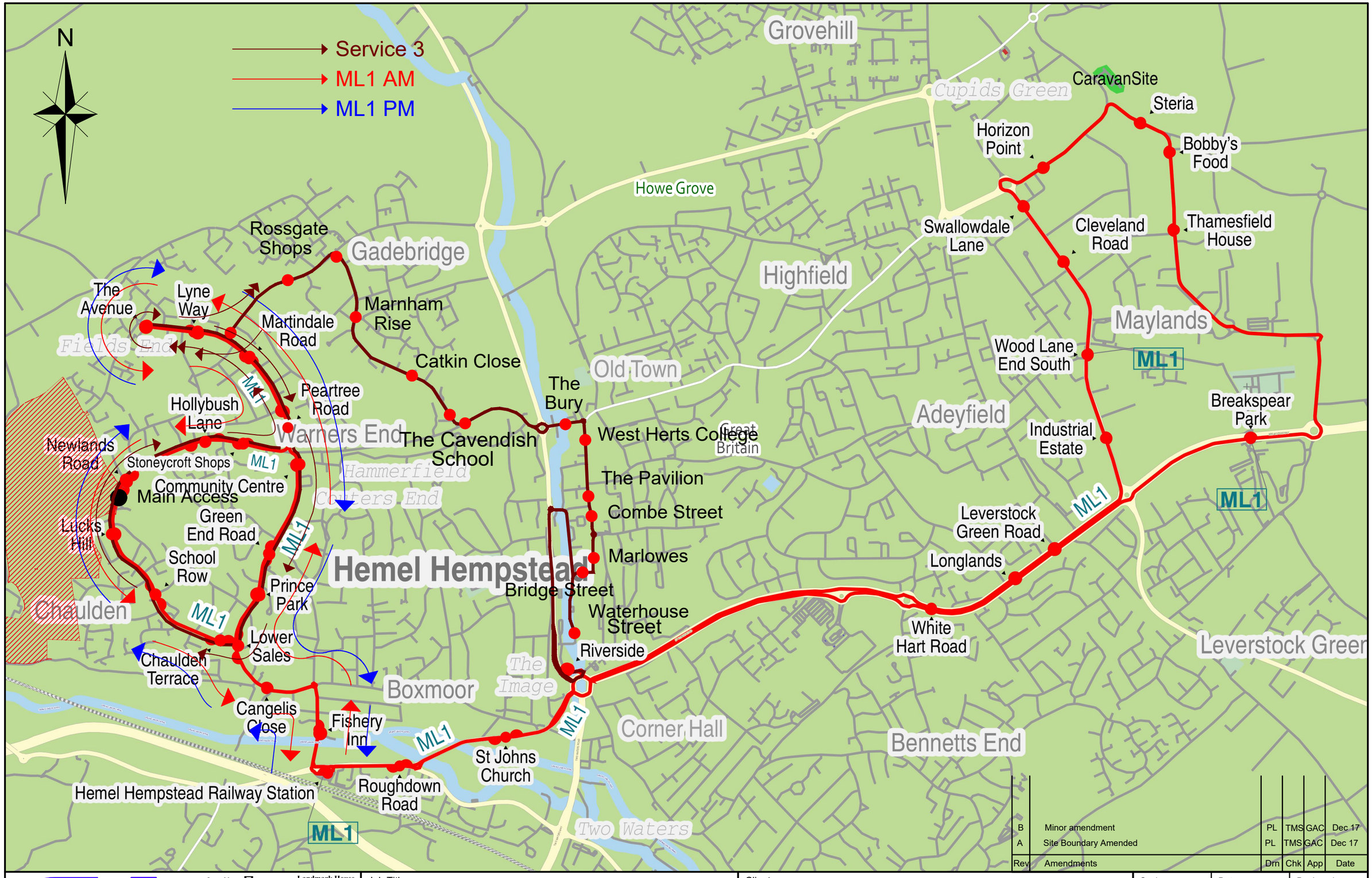
Job Title: Land West of Hemel Hempstead	Client: Taylor Wimpey Barratt Homes	Scale: NTS@A4	Date: Nov 16	Designed: PL
Drawing Title: Public Rights of Way Map		Drawn: PL	Checked: TMS	Approved: GAC
		Job No: 16-021	Figure No: Figure 3	Rev: -

16-021-036



Rev	Amendments	Drn	Chk	App	Date
B	Minor amendment	PL	TMS	GAC	Dec 17
A	Site Boundary Amended	PL	TMS	GAC	Dec 17

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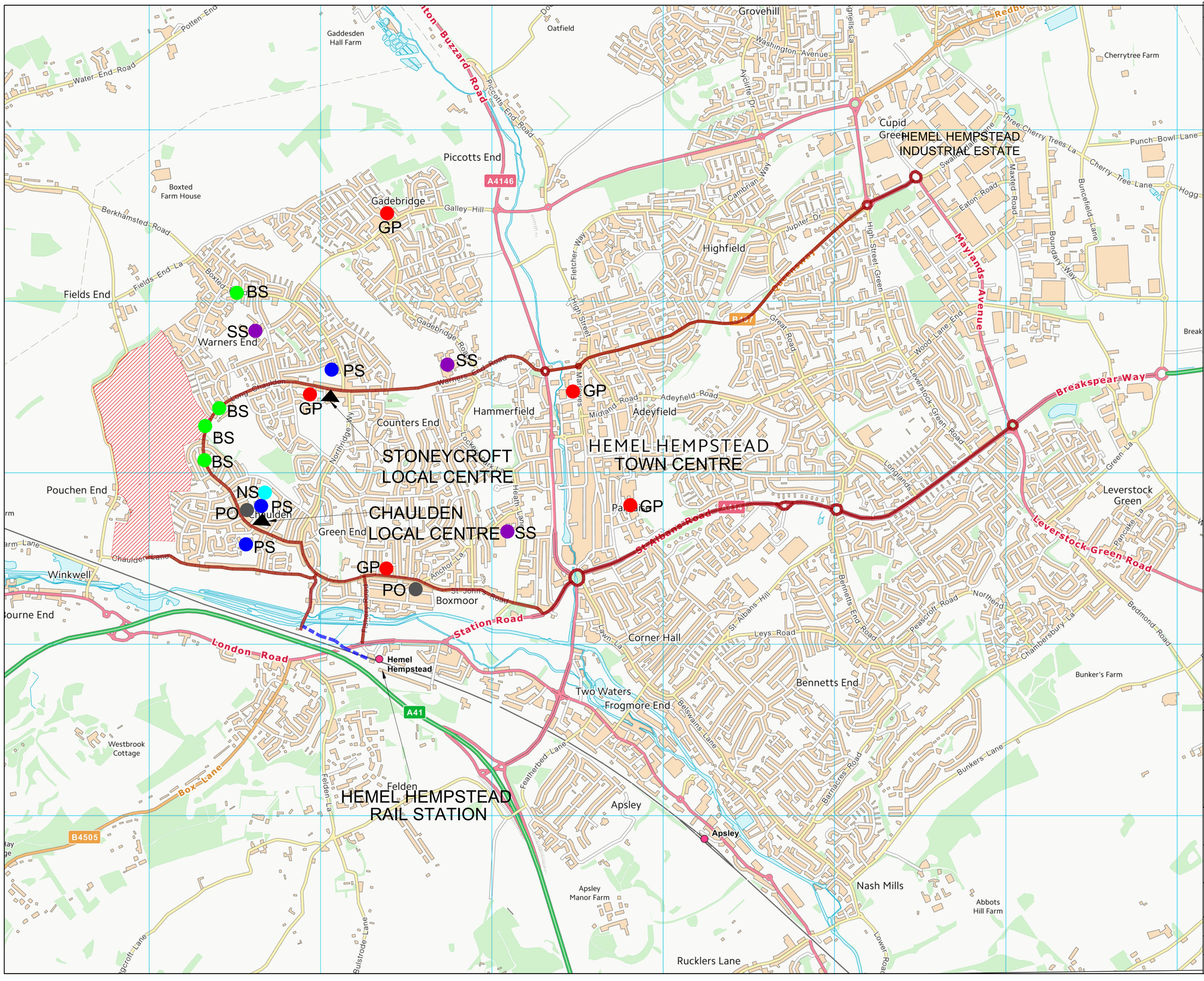
Job Title: Land West of Hemel Hempstead

Drawing Title: Bus Services Route Map

Client: Taylor Wimpey / Barratt Homes

Scale	Date	Designed
NTS @A3	Nov' 16	PL
Drawn	**Checked**	**Approved**
PL	TMS	GAC
Job No	**Figure No**	**Rev**
16-021	Figure 4	B

16-021-047



NOTES

Legend

- Existing Public Right of Way (PROW)
- 1.5 / 2.0 m leisure footpath
- 3.0m leisure corridor
- 3.0m segregated cycleway / footway
- 2m footway to both sides of new carriageway
- Existing PROW / New 3.0m leisure corridor
- Connection into existing network
- Site Location
- PS Primary School
- SS Secondary School
- NS Nursery School
- PO Post Office
- BS Local Bus Stops
- GP GP Surgery
- LC Local Centre
- On Carriageway Cycle routes
- Informal Route to Station Along Towpath
- 1km Boundary
- 2km Boundary
- 3km Boundary

Rev	Amendments	Dm	Chk	App	Date
A	Site boundary updated.	PL	TMS	GAC	17 Dec

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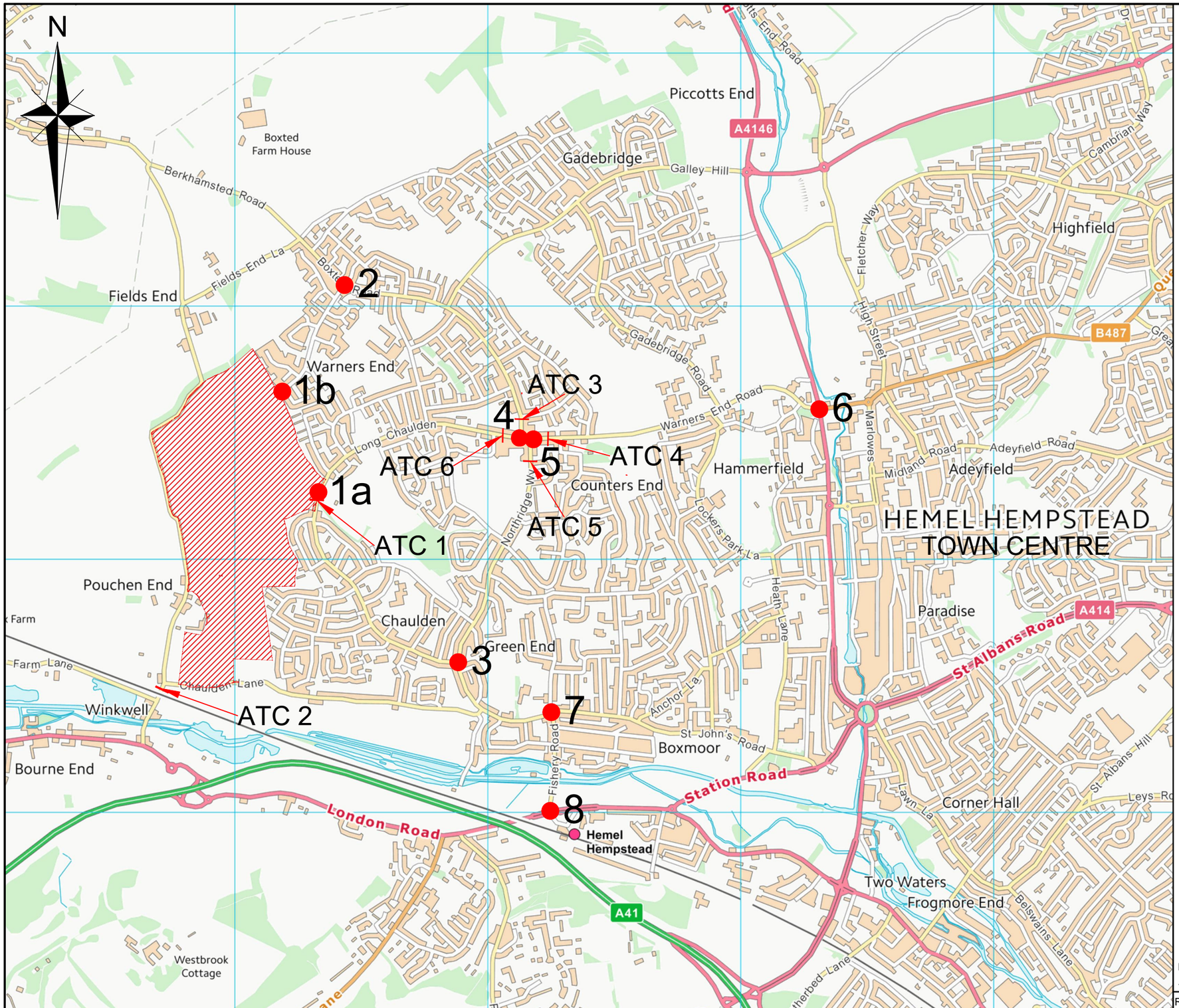
Job Title: Land West of Hemel Hempstead

Drawing Title: Local Facilities

Client: Taylor Wimpey Barratt Homes

Scale	Date	Designed
1:10,000@A1	Jan 17	PL
Drawn	**Checked**	**Approved**
PL	TMS	GAC
Job No	**Figure No**	**Rev**
16-021	Figure 5	A

16-021-058



LEGEND

- Proposed Site Location
- 1a Proposed Long Chaulden (Drawing No.16-021-071)
- 1b Proposed The Avenue Access
- 2 Boxted Road / The Avenue (RBT)
- 3 Long Chaulden / Northridge Way (RBT)
- 4 Long Chaulden / Hollybush Lane (RBT)
- 5 Long Chaulden / Boxted Road (RBT)
- 6 Warners End Road / Leighton Buzzard Road (RBT)
- 7 Northridge Way / Fishery Road (RBT)
- 8 Fishery Road / A4251 (RBT)

Rev	Amendments	Drn	Chk	App	Date
B	Site Boundary Amended	PL	TMS	GAC	Dec 17
A	ATC Locations updated	PL	TMS	GAC	May 17

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Job Title: Land West of Hemel Hempstead

Drawing Title: Offsite Junctions Location Plan

Client: Taylor Wimpey / Barratt Homes

Scale	Date	Designed
NTS@A3	May 16	PL
Drawn	**Checked**	**Approved**
PL	TMS	GC
Job No	**Figure No**	**Rev**
16-021	Figure 6	B

N

Field End Lane

Fields End Farmhouse

Follyman

The Avenue

Phase 1 Boundary

Proposed The Avenue Access

Gated Access

Gated Access

Pouchen End Lane

Proposed Long Chaulden Access

Long Chaulden

Proposed Stile

Pouchen End Lane

Chaulden Lane Emergency Access

Pouchen End Hall

Poachers Barn

Derrydown

Pouchen End Farm House

Pond

Primrose Cottage

Bluebell Cottage

Timberdene

Winkwell

Lavender Cottage

Orchard Cottage

Old Barn

Barn Court

Oak Trees

Ivy Dwelling

Cedars Cottage

Chaulden Advent

Myrtle Green

Juniper Green

Rosemount

Woodcroft

Clematis Green

Shepherds Green

Rowancroft

Playing Field

1FE SCHOOL

2FE SCHOOL

CARE HOME

NEAP

LEAP

ATTENUATION BASIN

COMMUNITY GAMES AREA

AMENITY GREEN SPACE

TRAVELLERS SITE

INDICATIVE ATTENUATION AREA

SHARED SURFACE

PRIVATE DRIVE

TERTIARY STREET

SECONDARY STREET

PRIMARY STREET

HONEYSUCKLE ROAD

CHAULDEN LANE

LONG CHAULDEN

MIDDLE HILL

OLDFIELD ROAD

SPEEDWELL CLOSE

PRIMROSE CLOSE

BLUEBELL CLOSE

THISTLE CLOSE

SHEPHERDS GREEN

DAMSON GREEN

LINDLINGS

KESTREL ROAD

NEW PANNELL ROAD

BRANCH ROAD

BRANLEY

THE COLTSFOOT

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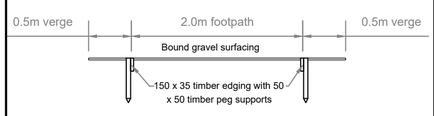
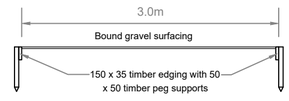
NOTES

Legend

- Existing Public Right of Way (PROW)
- 2.0m leisure footpath (refer section 1 below)
- 3.0m leisure corridor (refer section 2 below)
- 2m footway to both sides of new carriageway
- Existing PROW / New 3.0m leisure corridor
- Existing PROW/ New 2.0m leisure footpath
- Connection into existing network



SECTION 1
2.0m leisure footpath (1:50@A1)



SECTION 2
3.0m leisure corridor (1:50@A1)

Rev	Amendments	Drn	Chk	App	Date
H	Site boundary and masterplan amended.	PL	TMS	GAC	Dec 17
G	Revised phase 1 boundary.	PL	TMS	GAC	Sep 17
F	Revised masterplan.	PL	TMS	GAC	July 17
E	Masterplan and 3.0m leisure corridor updated	PL	TMS	GAC	Apr 17
D	External connections updated and Existing PROW/ New 2.0m leisure footpath	PL	TMS	GAC	Mar 17
C	On carriageway cycle route at Long Chaulden Access updated	PL	TMS	GAC	Feb 17
B	Section 1 and 2 updated	PL	TMS	GAC	Feb 17
A	Revised Line type.	PL	TMS	GAC	Jan 17

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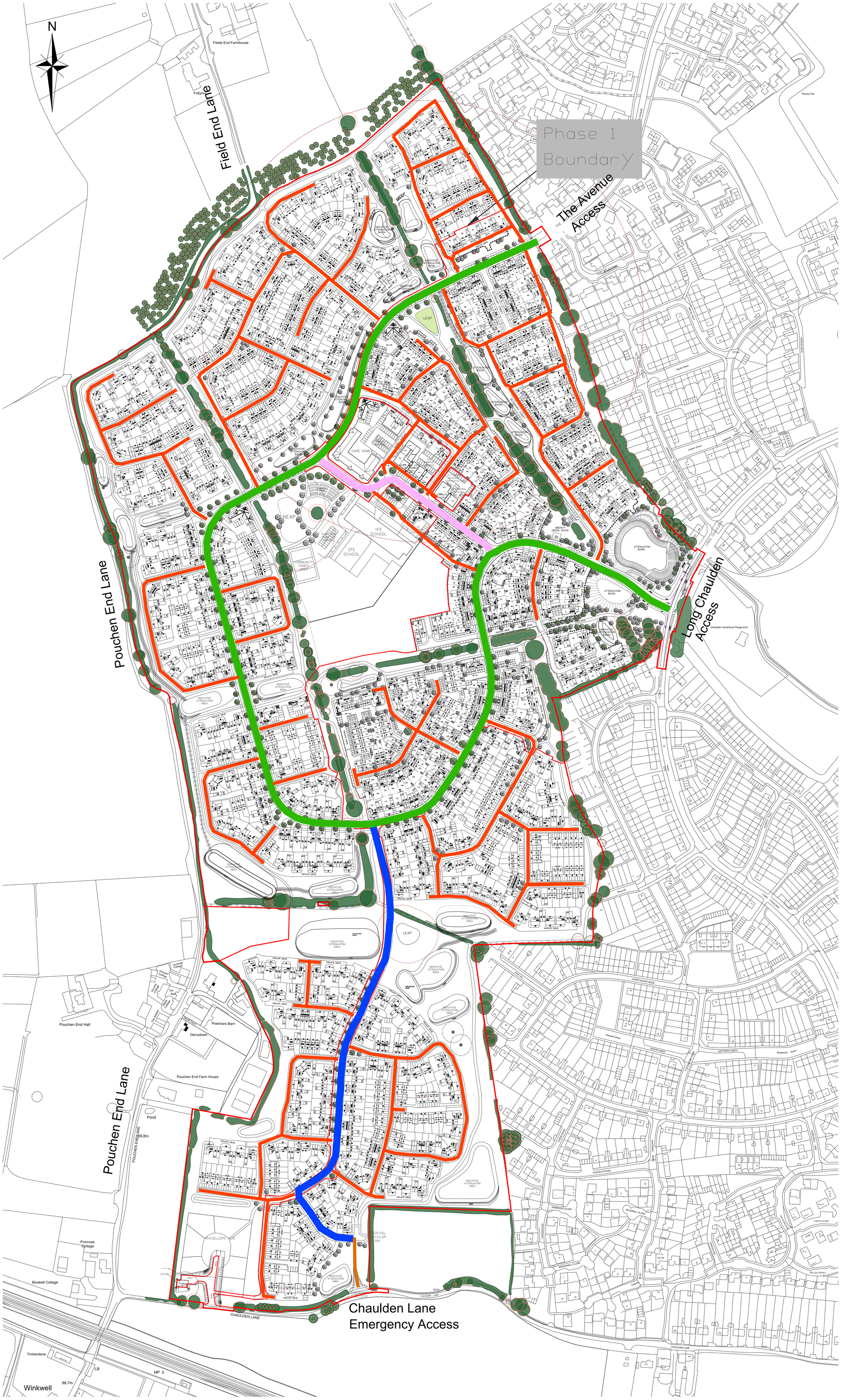
Job Title
Land West of Hemel Hempstead

Drawing Title
Proposed footway / cycleway Provision

Client
Taylor Wimpey
Barratt Homes

Scale	Date	Designed
1:2000@A1	Jan 17	TMS
Drawn	Checked	Approved
GG	TMS	GAC
Job No	Figure No	Rev
16-021	Figure 7	H

16-021-053



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NOTES

Legend

- Primary Road / Bus Route
- Secondary Road / Bus Route
- Secondary Access Road
- Tertiary Roads
- Emergency Access

Rev	Amendments	Drn	Chk	App	Date
D	Site boundary updated.	PL	TMS	GAC	Dec 17
C	Revised phase 1 boundary.	PL	TMS	GAC	Sep 17
B	Revised masterplan.	PL	TMS	GAC	July 17
A	Masterplan and tertiary roads updated	PL	TMS	GAC	Apr 17

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Job Title

Land West of Hemel Hempstead

Drawing Title

On site Road Hierarchy

Client

Taylor Wimpey
Barratt Homes

Scale	Date	Designed
1:2000@A1	Jan 17	TMS
Drawn	**Checked**	**Approved**
GG	TMS	GAC
Job No	**Figure No**	**Rev**
16-021	Figure 8	D

16-021-054

N

Phase 1 Boundary

Field End Lane

Pouchen End Lane

Long Chaulden

The Avenue

Chaulden Lane

Fields End Farmhouse

Follyms

Pouchen End Hall

Poachers Barn

Derrydown

Pouchen End Farm House

Pond

Primrose Cottage

Bluebell Cottage

Timberdene

Winkwell

Chaulden Adventure Playground

NOTES

Legend

Proposed bus stops

400m walking distance from bus stop

Rev	Amendments	Drn	Chk	App	Date
C	Site boundary and masterplan amended.	PL	TMS	GAC	Dec 17
B	Revised phase 1 boundary.	PL	TMS	GAC	Sep 17
A	Revised masterplan.	PL	TMS	GAC	July 17

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Job Title

Land West of Hemel Hempstead

Drawing Title

Onsite Public Transort Phase 1

Client

Taylor Wimpey Barratt Homes

Scale	Date	Designed
1:2000@A1	Apr 17	GG
Drawn	**Checked**	**Approved**
PL	TMS	GAC
Job No	**Figure No**	**Rev**
16-021	Figure 9	C

NOTES

Legend

- Bus route for 1100 units
- Future Potential Bus Link
- Proposed Bus stops
- 400m distance from Bus Stop
- 400m distance from Bus Stop
- 400m distance from Bus Stop

Phase 1 Boundary

N

Field End Lane

Pouchen End Lane

Long Chaulden

The Avenue

Chaulden Lane

Fields End Farmhouse

Follyms

Pouchen End Hall

Derrydown

Poachers Barn

Pouchen End Farm House

Pond

Lavender Cottage

Orchard Cottage

Cobbetts Cottage

Old Barn

The Stables

Primrose Cottage

Bluebell Cottage

Timberdene

Winkwell

Spring

Chaulden Adventure Playground

CARE HOME

1FE SCHOOL

2FE SCHOOL

NEAP

LEAP

Rev	Amendments	Drn	Chk	App	Date
C	Site boundary and masterplan amended.	PL	TMS	GAC	Dec 17
B	Revised phase 1 boundary.	PL	TMS	GAC	Sep 17
A	Revised masterplan.	PL	TMS	GAC	July 17

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Job Title

Land West of Hemel Hempstead

Drawing Title

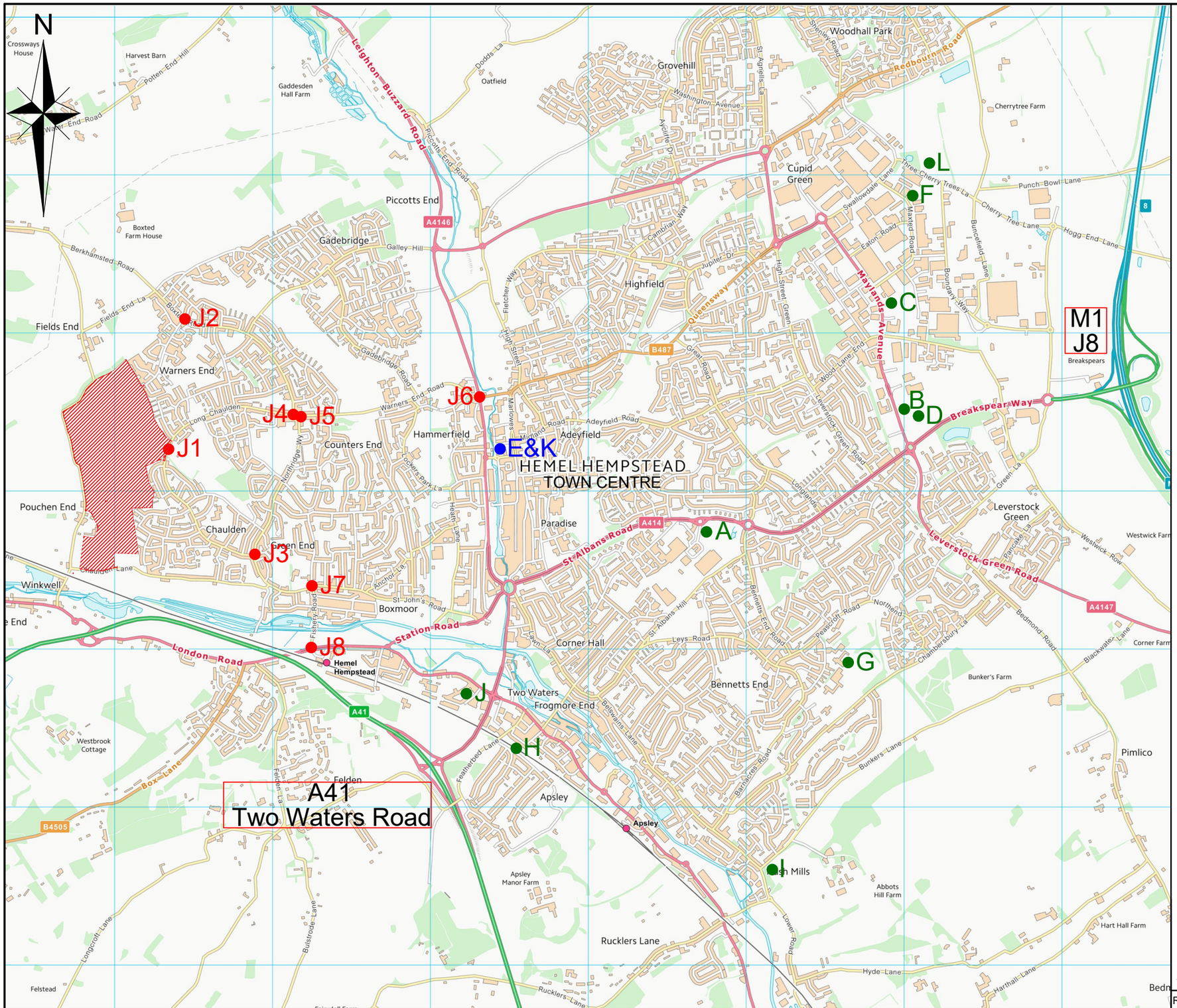
Onsite Public Transport Phase 2

Client

Taylor Wimpey
Barratt Homes

Scale	Date	Designed
1:2000@A1	Apr 17	GG
Drawn	**Checked**	**Approved**
PL	TMS	GAC
Job No	**Figure No**	**Rev**
16-021	Figure 10	C

16-021-090



Proposed Site Location

Committed Developments

- A — Jarman Park, Jarman Way. Planning Ref: 4/00424/15/MOA Date: 10/02/2015
- B — Lucas Site Building 2, Maylands Avenue. Planning Ref: 4/00851/01 Date: 16/05/2001
- C — The Campus, Maylands Avenue Planning Ref: 4/01399/13 Date: 26/07/2013
- D — Land at Breakspear House, Maylands Avenue. Planning Ref: 4/02124/08 Date: 13/10/2008
- F — Century House, Maxted Road. Planning Ref: 4/02107/15/MFA Date: 26/05/2015
- G — Longdean School, Rumballs Road. Planning Ref: 4/01487/14/MFA Date: 30/06/2014
- H — Land Adjacent to the Manor Estate. Planning Ref: 4/02419/04 Date: 20/10/2004
- I — Former Sappi Site, Lower Road. Planning Ref: 4/01382/09 Date: 24/08/2009
- J — Symbio House, Whiteleaf Road. Planning Ref: 4/02320/14/MOA Date: 03/09/2014
- L — Land at NE Hemel Hempstead, Three Cherry Trees Lane. Planning Ref: 4/02351/13/RES Date: 16/12/2013

Committed Developments taken into account

- E — Library and Adjacent Land, Coombe Street. Planning Ref: 4/03355/14/MFA Date: 21/11/2014
- K — Land off Dacorum Way. Planning Ref: 4/03624/14/MOA Date: 10/12/2014

Junction Capacity Assessments

- J1 — Proposed Long Chaulden
- J2 — Existing Boxted Road / The Avenue (RBT)
- J3 — Existing Long Chaulden / Northridge Way (RBT)
- J4 — Existing Long Chaulden / Boxted Road (RBT)
- J5 — Existing Long Chaulden / Northridge Way (RBT)
- J6 — Existing Warners End Road / Leighton Buzzard Road (RBT)
- J7 — Existing Northridge Way / Fishery Road (RBT)
- J8 — Existing Fishery Road / A4251 (RBT)

Rev	Amendments	Drn	Chk	App	Date
A	Site Boundary Amended	PL	TMS	GAC	Dec 17

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Job Title: Land West of Hemel Hempstead

Drawing Title: Committed Developments and Junctions to be Assessed

Client: Taylor Wimpey / Barratt Homes

Scale	Date	Designed
NTS@A3	Oct 16	PL
Drawn	**Checked**	**Approved**
PL	TMS	GAC
Job No	**Figure No**	**Rev**
16-021	Figure 11	A

16-021-026

TRAFFIC FIGURES

Junction Locations

N

INDICATIVE

J2 — Warmark Rd, Boxted Rd, The Avenue, Hollybush Lane, Galley Hill

The Avenue Access B

	Arrivals	Departures
The Avenue Access B	1.2%	1.2%
Long Chaulden Access A	98.9%	98.9%
Total Development	100.0%	100.0%

AREA	%
16	1%

Long Chaulden

J4 — Long Chaulden

J5 — Warner's End Rd

Northridge Way

J1 — Long Chauden Access A — Long Chaulden

AREA	%
11	1%

Long Chaulden

Chaulden Ln

AREA	%
14	2%

J3 — Northridge Way

Leighton Buzzard Rd — Galley Hill — Link Rd

AREA	%
1	1%
Milton Keynes	1%

AREA	%
5	0.2%
7	1%
St Albans 1/2	3%
E Hertfordshire	1%
N Hertfordshire	1%
Central Bedfordshire	2%

Leighton Buzzard Rd

Warner's End Rd — B487

J6 — Leighton Buzzard Rd

AREA	%
13	13%
10	2%
8	1%

AREA	%
15	11%
17	1%
Watford 1/2	3%
St Albans 1/2	3%
Luton	2%
Brent Cam Harrow	3%
Stevenage	1%

Green End Rd — Fishery Rd

AREA	%
22	3%
19	2%
20	1%
South Bucks	1%

AREA	%
21	3%
Dacorum 2,3,4,6,9,12	6%
Aylesbury	3%
Chiltern	2%
Wycombe	1%

AREA	%
18	5%
Watford 1/2	3%
Three Rivers	4%
Welwyn Hatfield	4%
Hertsmere	2%
Barnet	1%
Hillingdon	1%
Broxbourne	1%
Slough E E H E	2%

St John's Rd

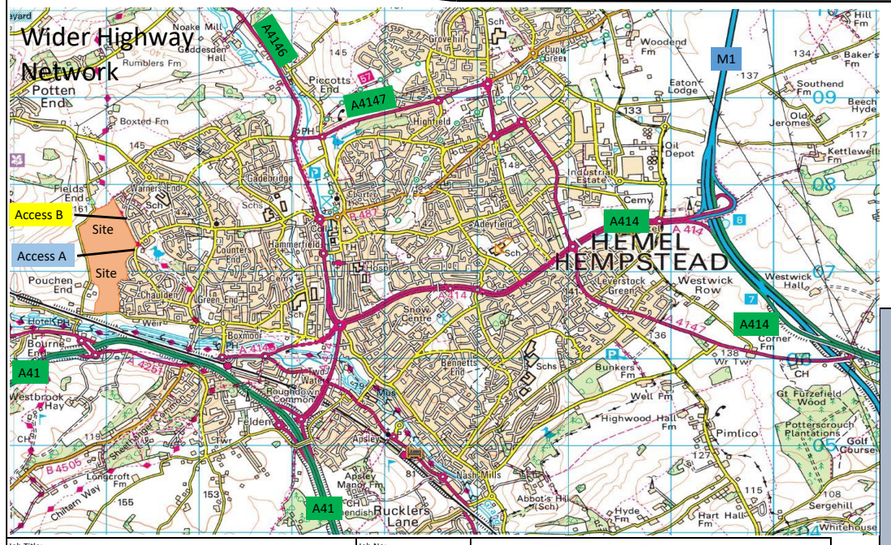
J7 — Northridge Way

J8 — A4251 — A4251

Exit only From Station Carpark

Hemel Hempstead Rail Station

Wider Highway Network



Key

- Work within Dacourum Super Output Area
- Work outside of Dacourum

50% Arrivals
50% Departures

Not to Scale
Not all Roads and Routes are Shown

A41 With Two Waters Rd

TO J8 East

A41 — Two Waters Rd — A41 — M25 J 20 With A41

AREA	%
Aylesbury	3%
Chiltern	2%

AREA	%
Watford 1/2	3%
Three Rivers	4%
Welwyn Hatfield	4%
Hertsmere	2%
Barnet	1%
Hillingdon	1%
Broxbourne	1%
Slough E E H E	2%

M1 J8 with A414

M1 — A414

AREA	%
Luton	2%

AREA	%
Watford 1/2	3%
St Albans 1/2	3%
Brent Cam Harrow	3%
Stevenage	1%

M25 J20 with A41

M25 — A41 / Two Waters — A41 — A41 — M25

AREA	%
Welwyn Hatfield	4%
Hertsmere	2%

AREA	%
Three Rivers	4%
Hillingdon	1%
South Bucks	1%
Broxbourne	1%
Slough E E H E	2%

AREA	%
Watford 1/2	3%
Barnet	1%

Job Title: Land West of Hemel Hempstead LA3

Job No: 16-021

Fig No: 1

Drawing Title: Long Chaulden Access % JTW Distribution & Assignment

Date: Apr-17

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Junction Locations

N

INDICATIVE

AREA	%
18	5%
14	2%
Aylesbury	3%
Wycombe	1%

AREA	%
1	1%
Milton Keynes	1%
Luton	2%

AREA	%
5	0%
7	1%
13	13%
8	1%

St Albans 1/2	3%
E Hertfordshire	1%
N Hertfordshire	1%
Central Bedfordshire	2%
Broxbourne	1%
Watford 1/2	3%

AREA	%
16	1%

AREA	%
10	2%

AREA	%
20	1%
19	2%
22	3%
15	11%
17	1%

St Albans 1/2	3%
Luton	0%
Barnet	1%
Brent Cam Harrow	3%
Stevenage	1%
Welwyn Hatfield	4%

AREA	%
11	1%

AREA	%
21	3%
Dacorum 2,3,4,6,9,12	6%
Chiltern	2%

AREA	%
Watford 1/2	3%
Three Rivers	4%
Hertsmere	2%
South Bucks	1%
Hillingdon	1%
Slough E E H E	2%

AREA	%
Watford 1/2	3%
St Albans 1/2	3%
Brent Cam Harrow	3%
Stevenage	1%
Welwyn Hatfield	4%
Barnet	1%
Broxbourne	1%

AREA	%
Three Rivers	4%
Hillingdon	1%
South Bucks	1%
Broxbourne	1%
Slough E E H E	2%

AREA	%
Hertsmere	2%
Watford 1/2	3%

Arrivals	
The Avenue Access B	98.5%
Long Chaulden Access A	1.5%
Total Development	100.0%

Departures	
The Avenue Access B	98.5%
Long Chaulden Access A	1.5%
Total Development	100.0%

250 Residential Dwellings

The Avenue Access B

Long Chauden Access A

J1 J2 J3 J4 J5 J6 J7 J8

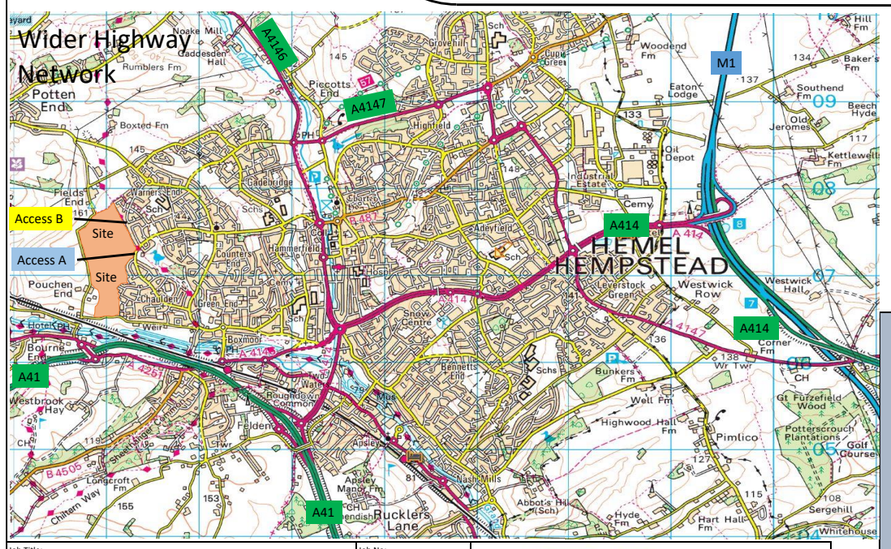
Warmark Rd · The Avenue · Boxted Rd · Galley Hill · Hollybush Lane · Long Chaulden · Northridge Way · Chaulden Ln · Green End Rd · Fishery Rd · St John's Rd · Warner's End Rd · Leighton Buzzard Rd · Link Rd · B487

Galley Hill · Leighton Buzzard Rd · Warner's End Rd · Northridge Way · A4251

Exit only From Station Carpark

Hemel Hempstead Rail Station

Wider Highway Network



Key

Work within Dacourum Super Output Area

Work outside of Dacourum

50% Arrivals

50% Departures

Not to Scale

Not all Roads and Routes are Shown

A41 With Two Waters Rd

TO J8 East

A41 · Two Waters Rd · M25 J 20 With A41

M1 J8 with A414

M1 · A414

M25 J20 with A41

M25 · A41 · A41 / Two Waters

Job Title:	Job No: 16-021
Land West of Hemel Hempstead LA3	Fig No: 2
Drawing Title: The Avenue Access % JTW Distribution & Assignment	Date: Apr-17

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Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

Galley Hill

The Avenue

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

St John's Rd

Fishery Rd

A4251

J1 J2 J3 J4 J5 J6 J7 J8

The Avenue Access B

1200 Residential Dwellings

	Arrivals	Departures
Diverted Via The Avenue	1	2
Long Chaulden Access A	70	199
Total Long Chaulden	70	201

Long Chauden Access A

AREA	ARR	DEP
16	1	2
11	1	3
14	2	5

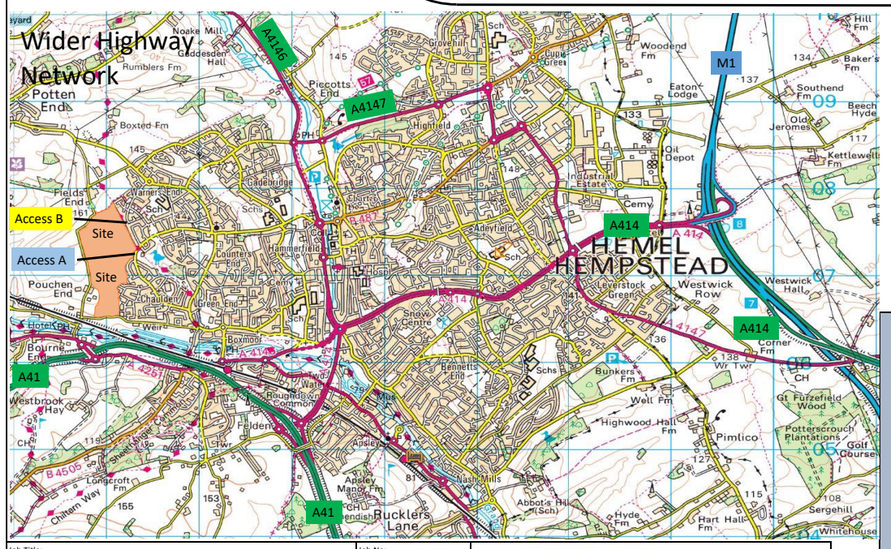
Chaulden Ln

Key

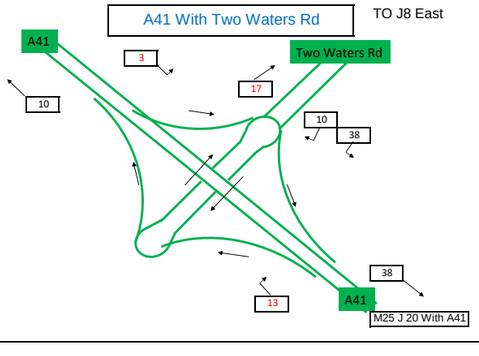
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

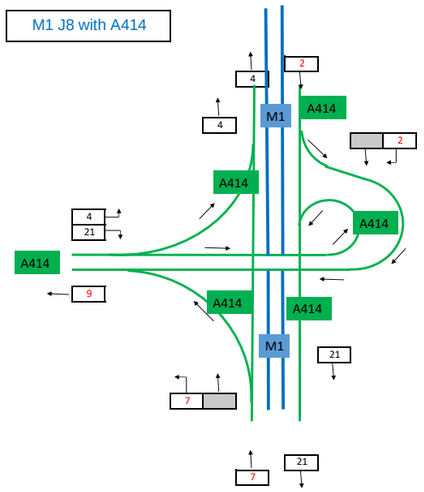
Wider Highway Network



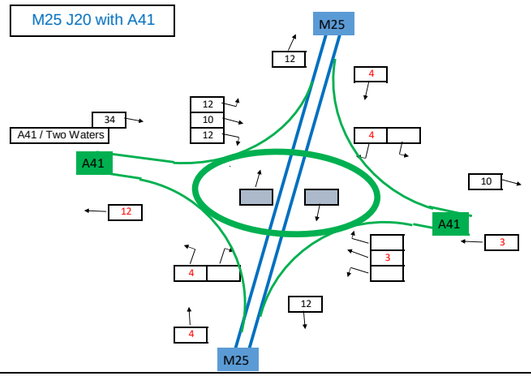
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 3
Drawing Title: Residential Trips Long Chaulden Access J1 (AM Peak)	Date: Apr-17

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'optimising development potential'
Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

Galley Hill

The Avenue

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

Fishery Rd

St John's Rd

Chaulden Ln

A4251

J1 J2 J3 J4 J5 J6 J7 J8

The Avenue Access B

Long Chauden Access A

AREA	ARR	DEP
16	1	2

AREA	ARR	DEP
11	1	3

250 Residential Dwellings

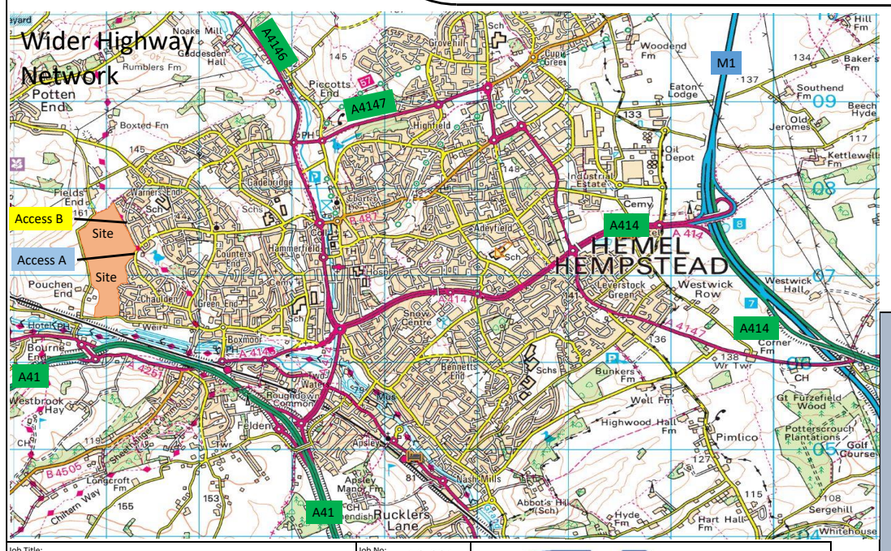
	Arrivals	Departures
The Avenue Access B	69	198
Diversion Via Long Chaulden	1	3
Total The Avenue	70	201

Key

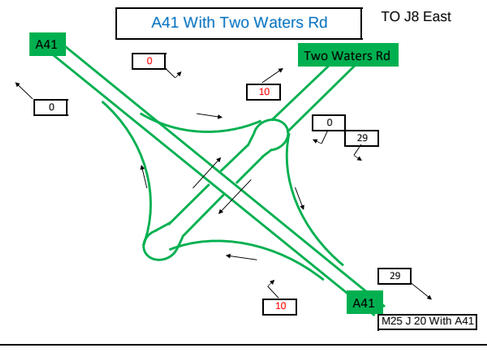
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

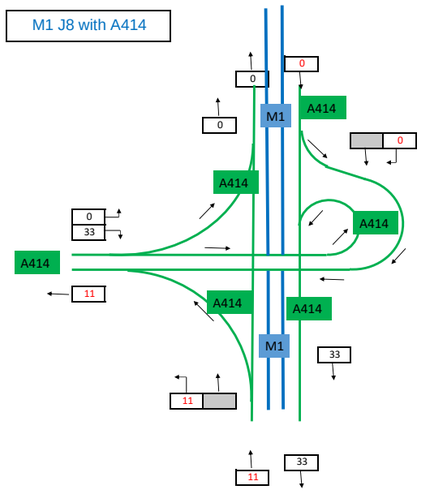
Wider Highway Network



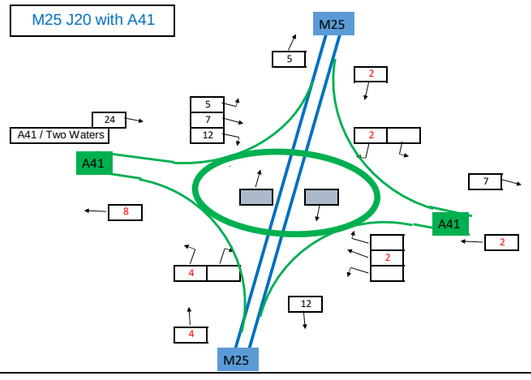
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	Residential Trips The Avenue Access J2 (AM Peak)
Job No:	16-021
Fig No:	4
Date:	Apr-17

Consulting Engineers Ltd
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Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

The Avenue

Hollybush Lane

Galley Hill

Leighton Buzzard Rd

Link Rd

Long Chaulden

Warner's End Rd

Northridge Way

Green End Rd

Fishery Rd

St John's Rd

B487

A4251

J1 J2 J3 J4 J5 J6 J7 J8

The Avenue Access B

250 Residential Dwellings

	Arrivals	Departures
Diverted Via The Avenue	2	1
Long Chaulden Access A	165	89
Total Long Chaulden	166	90

Long Chauden Access A

AREA	ARR	DEP
16	2	1
11	2	1
14	4	2

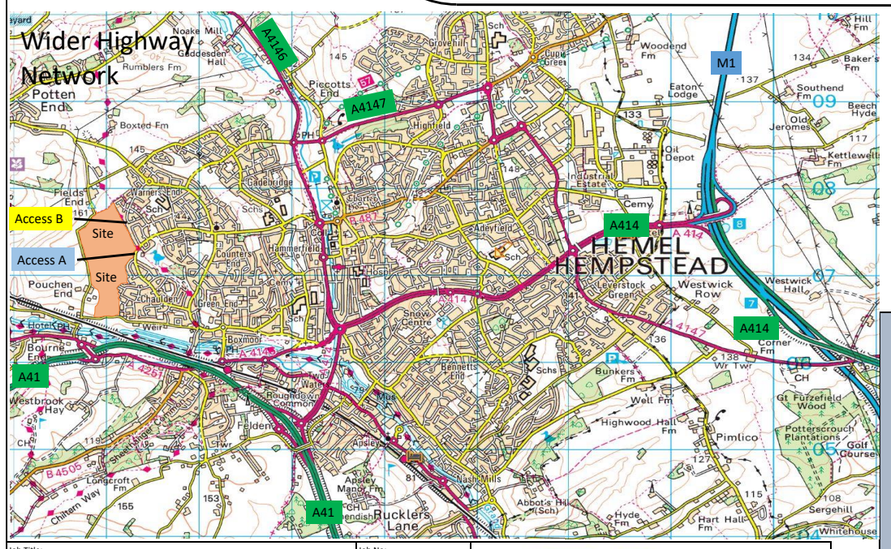
Chaulden Ln

Key

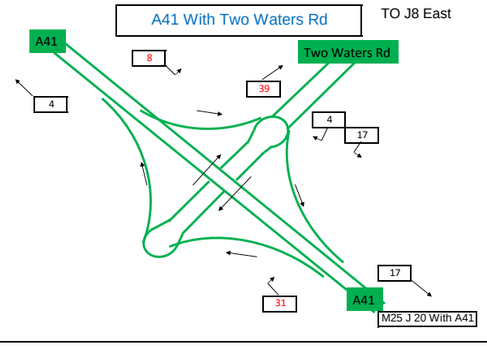
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

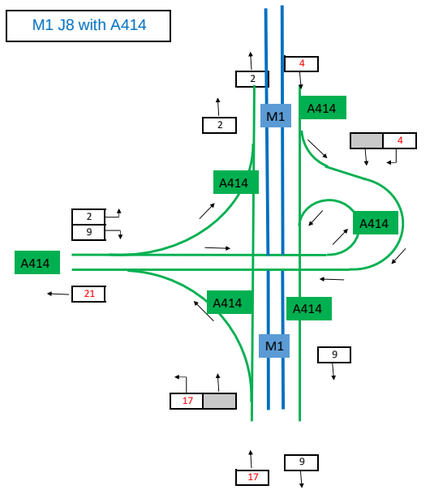
Wider Highway Network



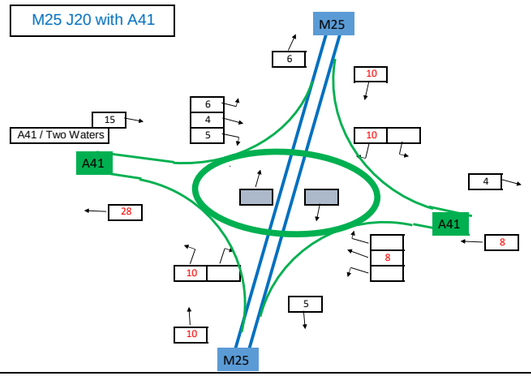
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 5
Drawing Title: Residential Trips Long Chaulden Access J1 (PM Peak)	Date: Apr-17

G&A Consulting Engineers Ltd
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Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

The Avenue

Galley Hill

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

St John's Rd

Fishery Rd

Chaulden Ln

A4251

J1 J2 J3 J4 J5 J6 J7 J8

The Avenue Access B

Long Chauden Access A

250 Residential Dwellings

	Arrivals	Departures
The Avenue Access B	164	89
Diversion Via Long Chaulden	2	1
Total The Avenue	166	90

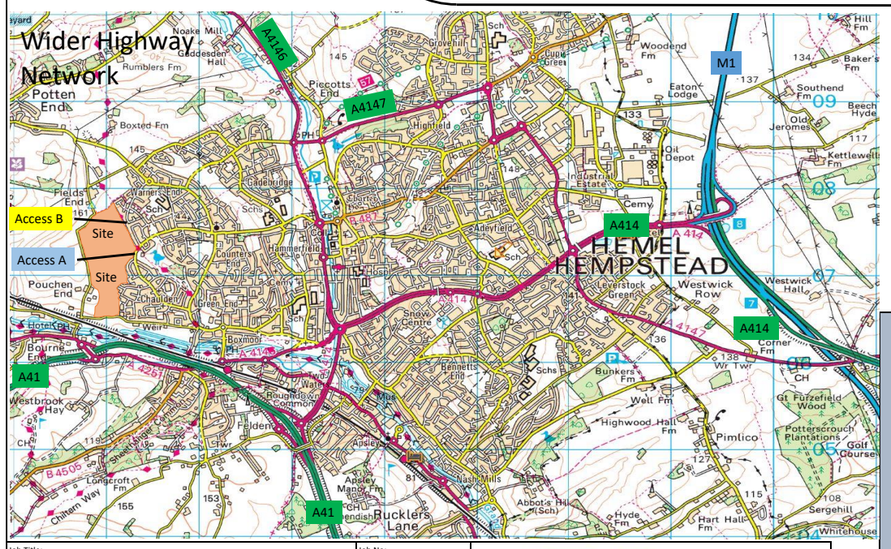
AREA	ARR	DEP
16	2	1

AREA	ARR	DEP
11	2	1

Exit only From Station Carpark

Hemel Hempstead Rail Station

Wider Highway Network

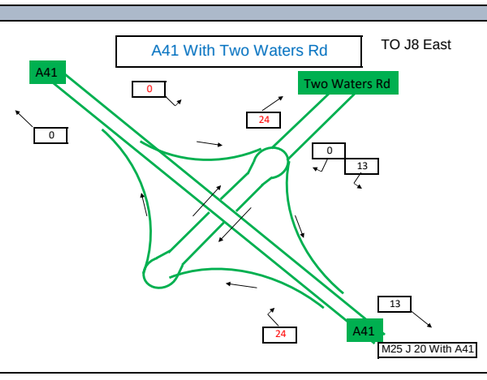


Key

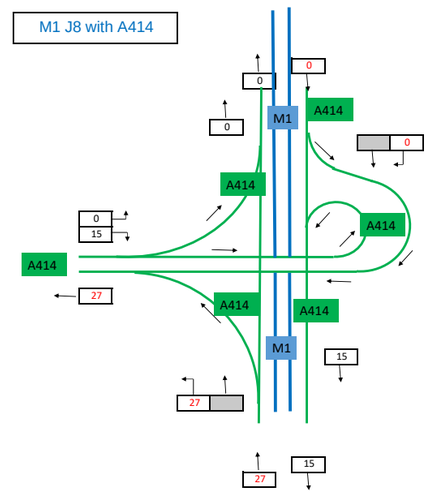
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

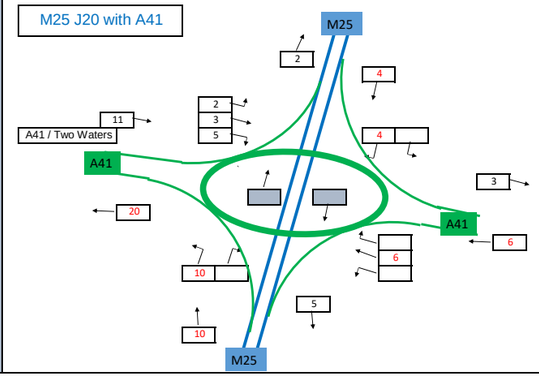
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 6
Drawing Title: Residential Trips The Avenue Access J2 (PM Peak)	Date: Apr-17

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Junction Locations

N

INDICATIVE

J1 J2 J3 J4 J5 J6 J7 J8

Warmark Rd · The Avenue · Boxted Rd · Galley Hill · Hollybush Lane · Long Chaulden · Chaulden Ln · Northridge Way · Warner's End Rd · Green End Rd · St John's Rd · Fishery Rd · Leighton Buzzard Rd · Link Rd · B487 · A4251

The Avenue Access B

250 Residential Dwellings

	Arrivals	Departures
The Avenue Access B	22.9%	22.9%
Long Chaulden Access A	77.1%	77.1%
Total Development	100.0%	100.0%

Long Chauden Access A

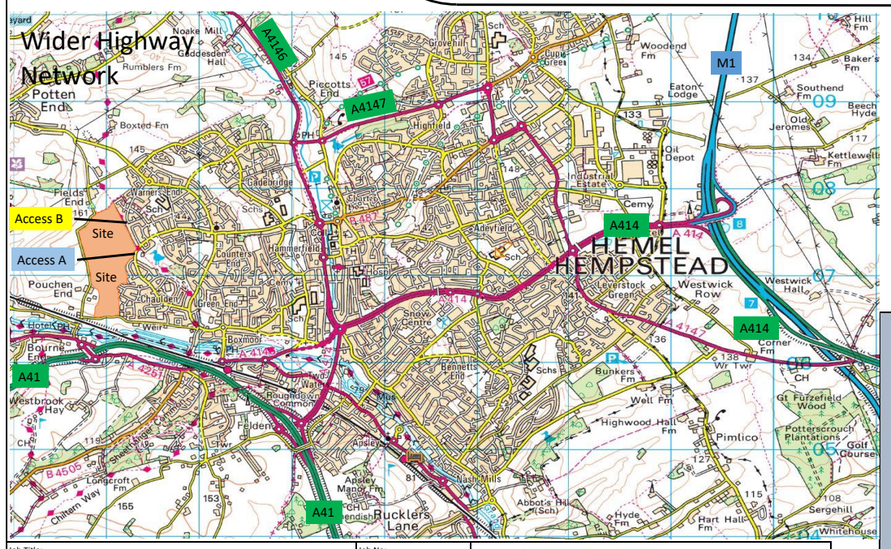
Key

Work within Dacourum Super Output Area
Work outside of Dacourum

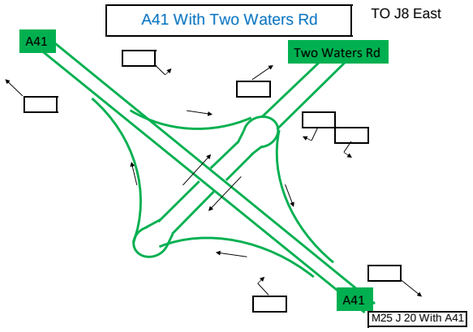
50% Arrivals
50% Departures

Not to Scale
Not all Roads and Routes are Shown

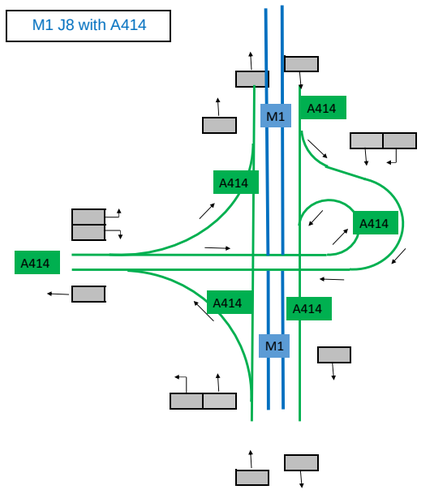
Wider Highway Network



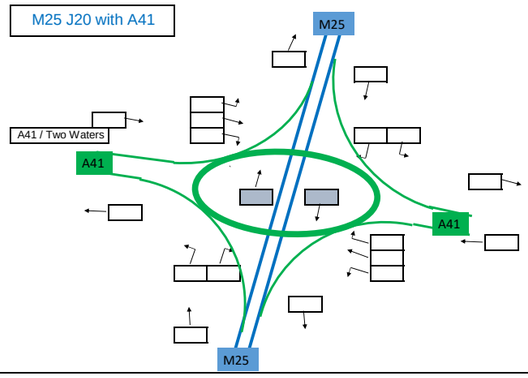
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 7
Drawing Title: School % Distribution & Assignment	Date: Apr-17

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Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

Galley Hill

The Avenue

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

Fishery Rd

St John's Rd

Chaulden Ln

J1 J2 J3 J4 J5 J6 J7 J8

AREA	ARR	DEP
011C	1	1
011B	4	4
011C	5	5
011B	4	4
011D	3	3
011D	3	3
016C	7	7
016B	7	7
016A	6	6
016B	1	1
011D	3	3
016B	1	1

The Avenue Access B

	Arrivals	Departures
The Avenue Access B	10	10
Long Chaulden Access A	35	35
Total Development	45	45

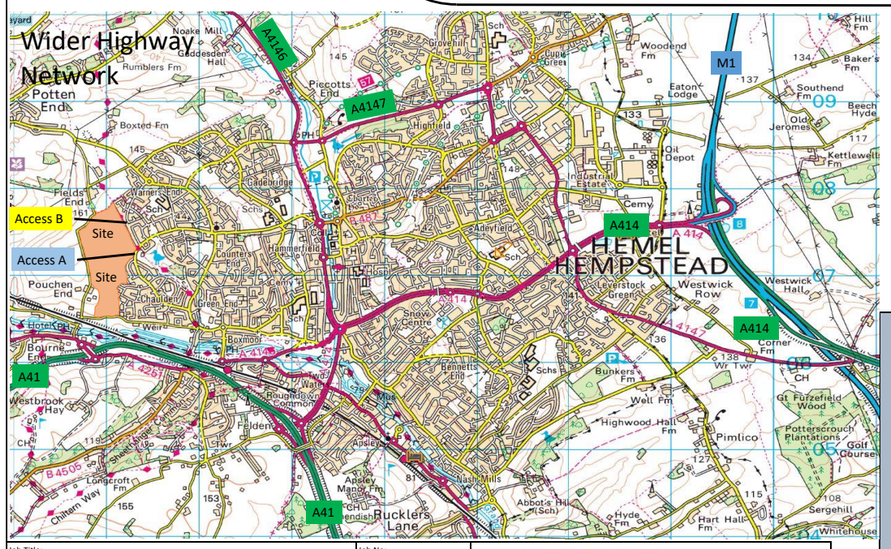
Long Chauden Access A

Key

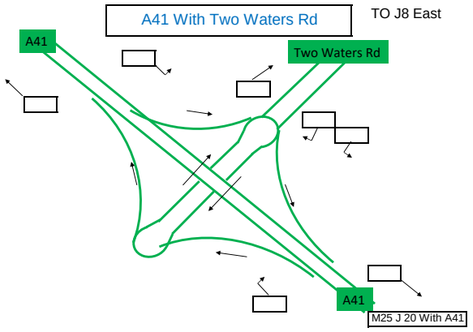
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

Wider Highway Network



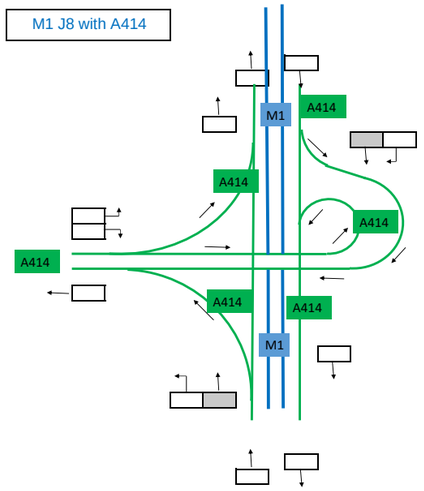
A41 With Two Waters Rd



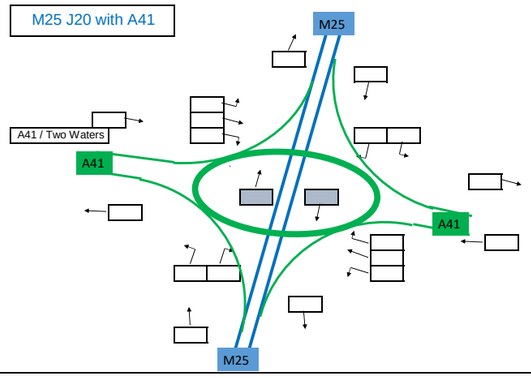
Exit only From Station Carpark

Hemel Hempstead Rail Station

M1 J8 with A414



M25 J20 with A41



Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 8
Drawing Title: School Catchment (AM Peak)	Date: Apr-17

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Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

Galley Hill

The Avenue

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

Fishery Rd

St John's Rd

Chaulden Ln

J1 J2 J3 J4 J5 J6 J7 J8

The Avenue Access B

Long Chauden Access A

AREA	ARR	DEP
011C	0	0
011B	0	0
011D	0	0
016C	0	0
016B	0	0
016A	0	0

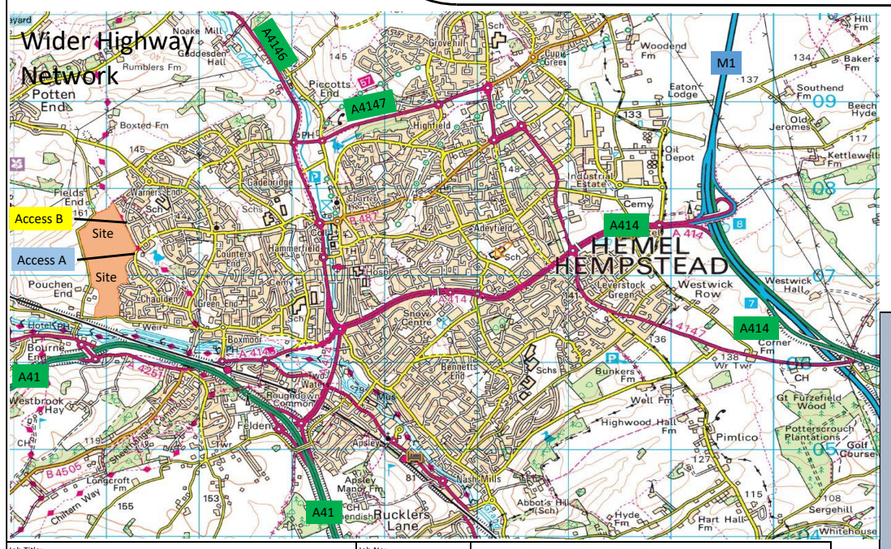
	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	1	1
Total Development	2	1

Key

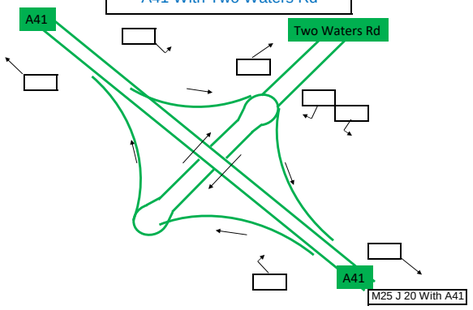
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

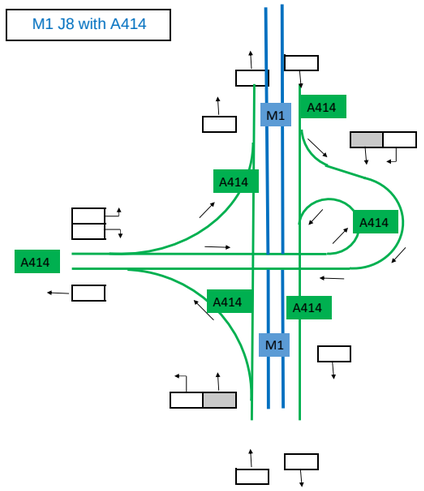
Wider Highway Network



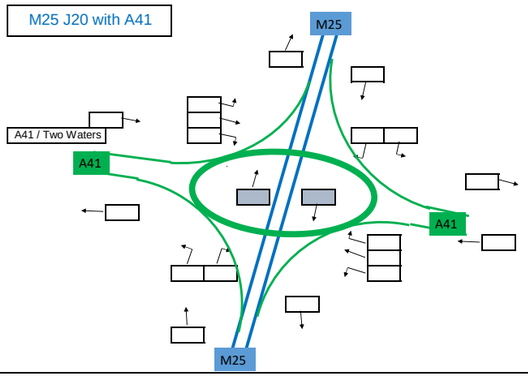
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



A4251 A4251

Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 9
Drawing Title: School Catchment (PM Peak)	Date: Apr-17

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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

The Avenue

Boxted Rd

Galley Hill

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

Fishery Rd

St John's Rd

Chaulden Ln

A4251

Long Chauden Access A

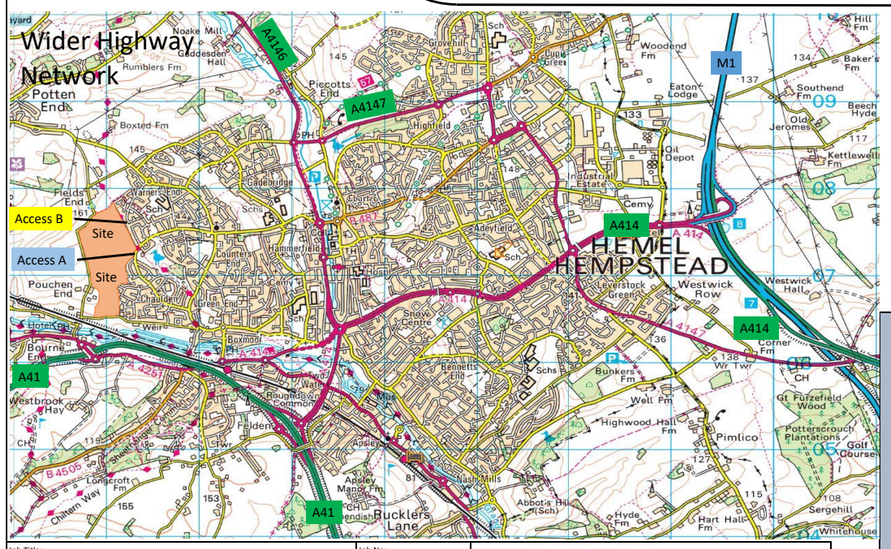
The Avenue Access B

J1 J2 J3 J4 J5 J6 J7 J8

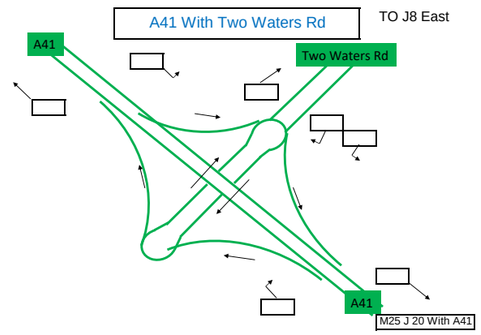
AREA	ARR	DEP
011C		
011B		
011D		
016C		
016B		
016A		

	Arrivals	Departures
The Avenue Access B	2	0
Long Chaulden Access A	14	0
Total Development	16	0

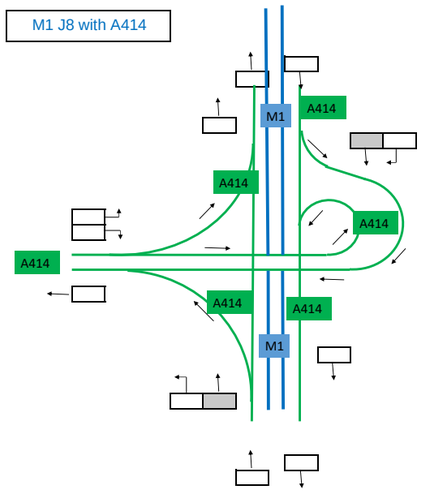
Wider Highway Network



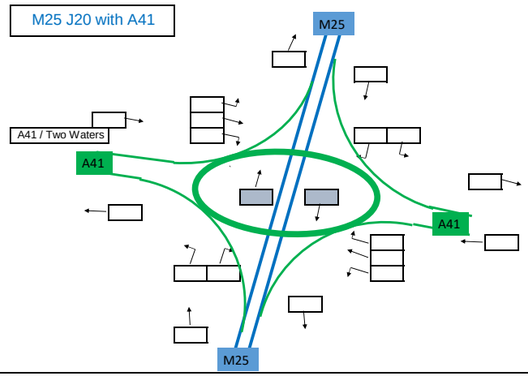
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Key

50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021	G&A Consulting Engineers Ltd 'optimising development potential'
	Fig No: 10	
Drawing Title: External Staff (AM Peak)	Date: Apr-17	

Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

Galley Hill

The Avenue

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

Fishery Rd

St John's Rd

Chaulden Ln

Long Chauden Access A

The Avenue Access B

J1 J2 J3 J4 J5 J6 J7 J8

AREA	ARR	DEP
011C		
011B		
011D		
016C		
016B		
016A		

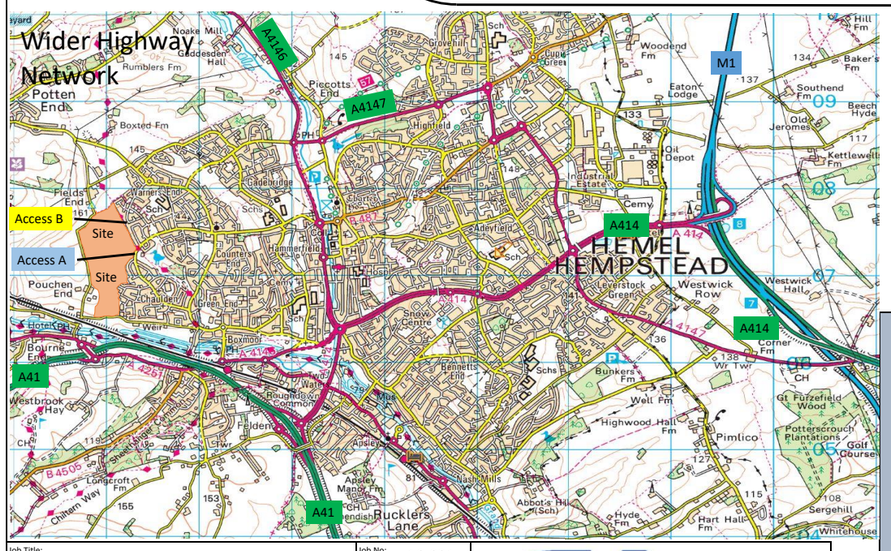
	Arrivals	Departures
The Avenue Access B	0	1
Long Chaulden Access A	0	11
Total Development	0	12

Key

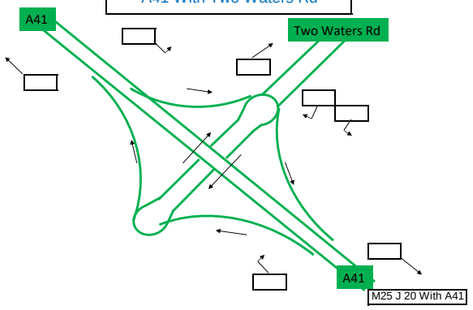
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

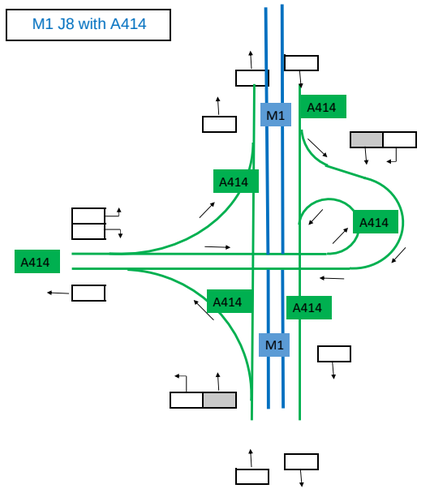
Wider Highway Network



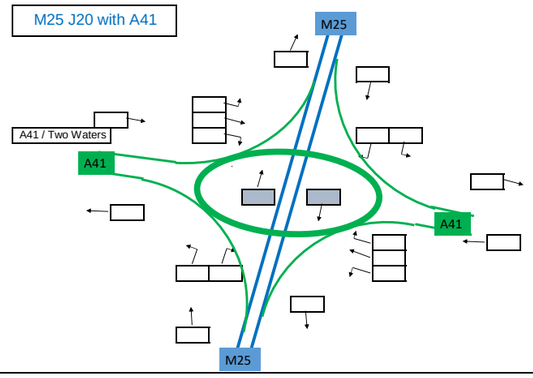
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 11
Drawing Title: External Staff (PM Peak)	Date: Apr-17

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Junction Locations

N

INDICATIVE

	Arrivals	Departures
The Avenue Access B	83	211
Long Chaulden Access A	119	237
Total Development	202	448

AREA	ARR	DEP
16	2	5

AREA	ARR	DEP
11	2	6

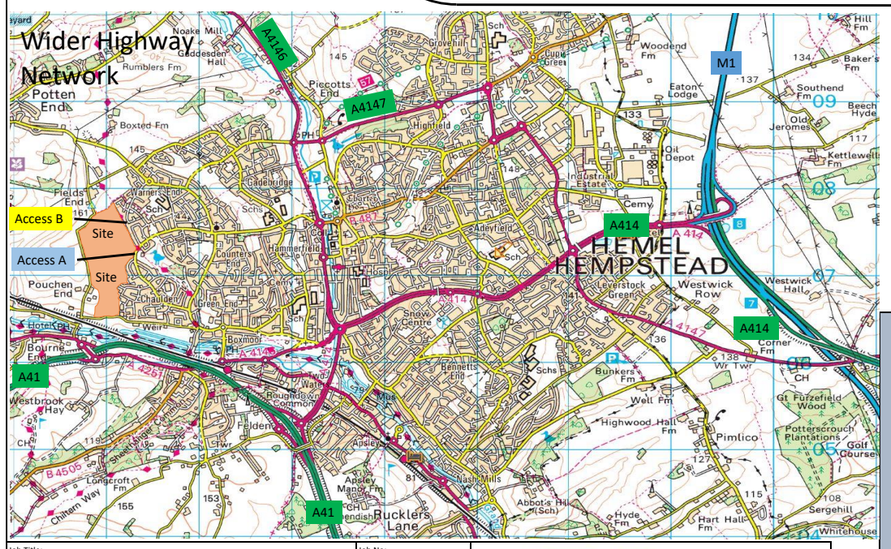
AREA	ARR	DEP
14	2	5

Key

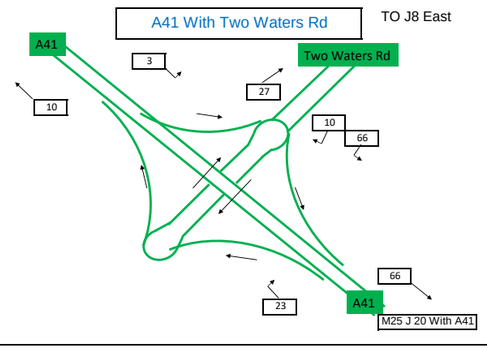
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

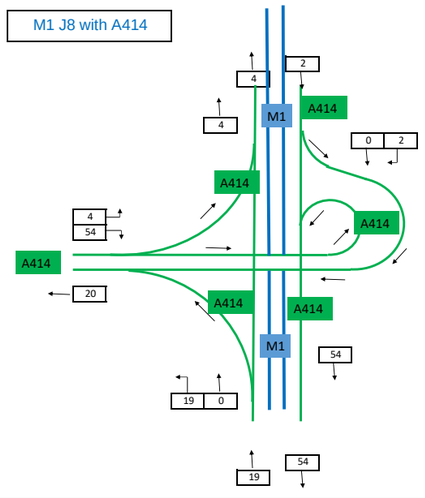
Wider Highway Network



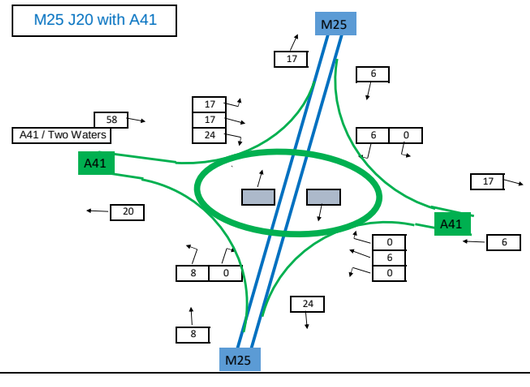
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
Drawing Title: Total Development (AM Peak)	Fig No: 12
	Date: Apr-17

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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

Galley Hill

The Avenue

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

Northridge Way

Green End Rd

Fishery Rd

St John's Rd

Chaulden Ln

A4251

B487

J1

J2

J3

J4

J5

J6

J7

J8

The Avenue Access B

Long Chauden Access A

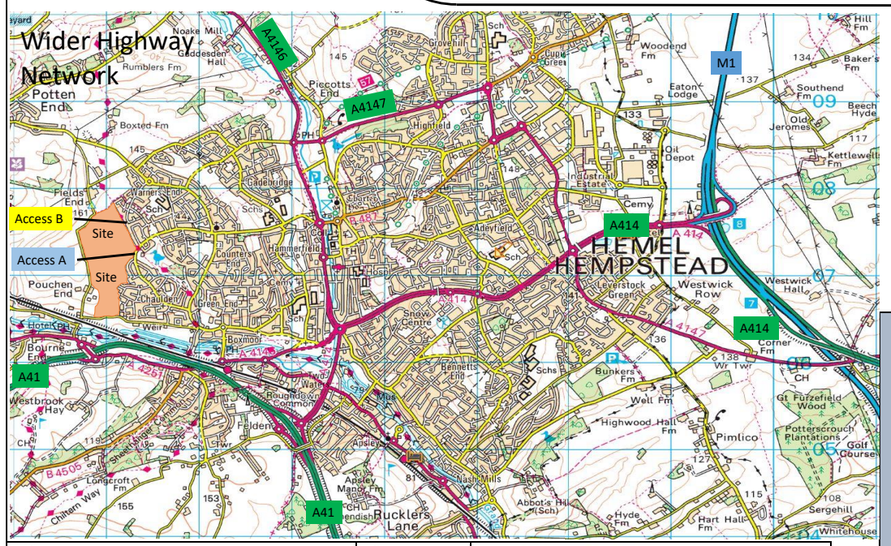
AREA	ARR	DEP
16	4	2

AREA	ARR	DEP
11	5	3

AREA	ARR	DEP
14	4	2

	Arrivals	Departures
The Avenue Access B	166	91
Long Chaulden Access A	168	102
Total Development	335	193

Wider Highway Network

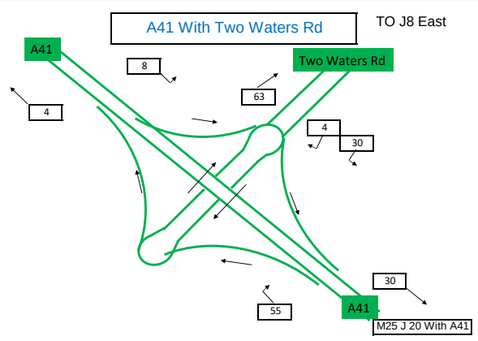


Key

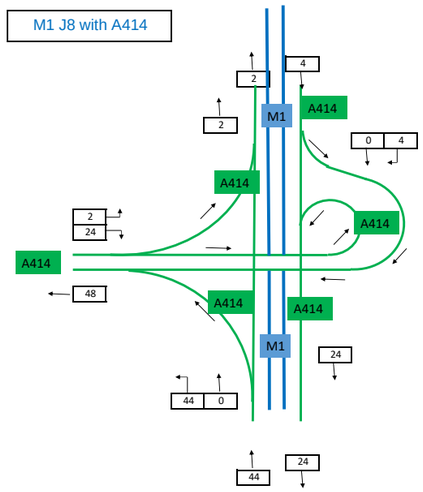
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

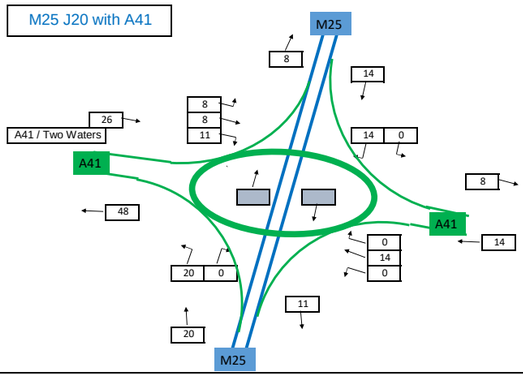
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	Total Development (PM Peak)
Job No:	16-021
Fig No:	13
Date:	Apr-17

Consulting Engineers Ltd
'optimising development potential'

Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

J1 — 8.00AM - 9.00AM

J2 — 7.30AM - 8.30AM

J3 — 8.00AM - 9.00AM

J4 — 8.00AM - 9.00AM

J5 — 8.00AM - 9.00AM

J6 — 7.45AM - 8.45AM

J7 — 7.45AM - 8.45AM

J8 — 7.30AM - 8.30AM

Warmark Rd
Boxted Rd
Galley Hill
The Avenue
Hollybush Lane
Long Chaulden
Warner's End Rd
Northridge Way
Leighton Buzzard Rd
Link Rd
B487
Green End Rd
St John's Rd
Fishery Rd
Chaulden Ln

The Avenue Access B

Long Chauden Access A

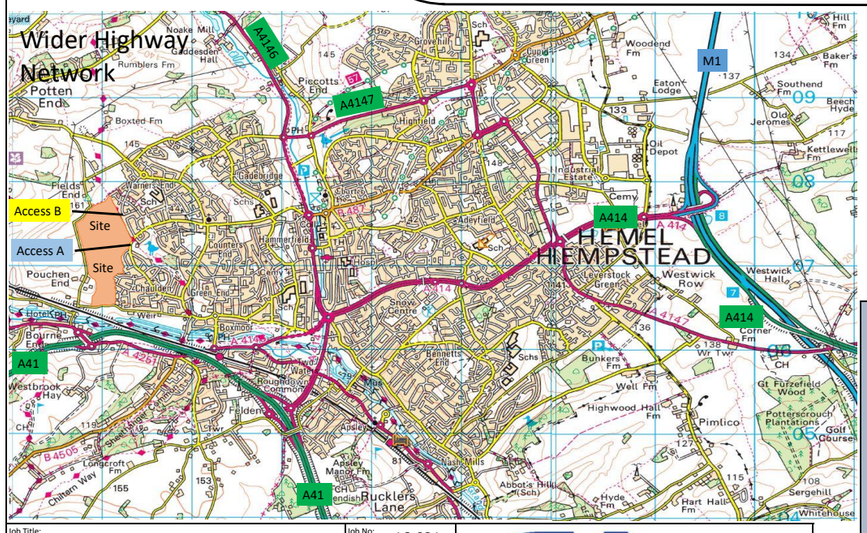
	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

Key

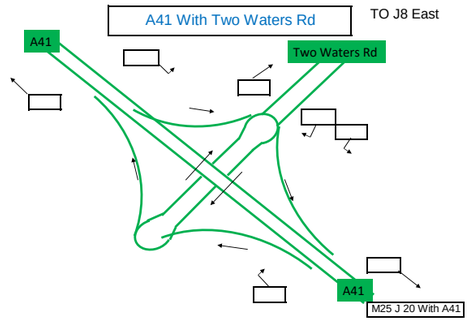
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

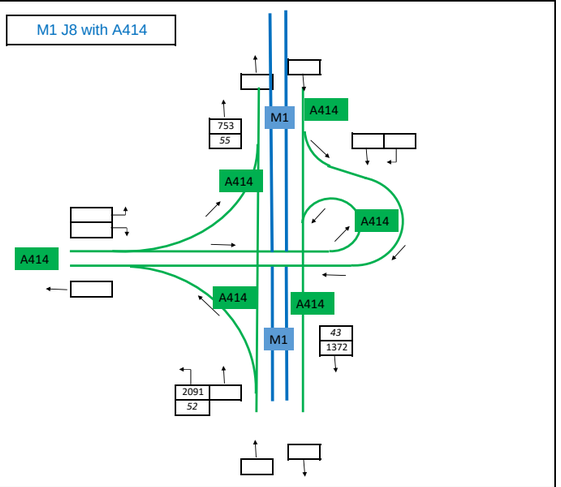
Wider Highway Network



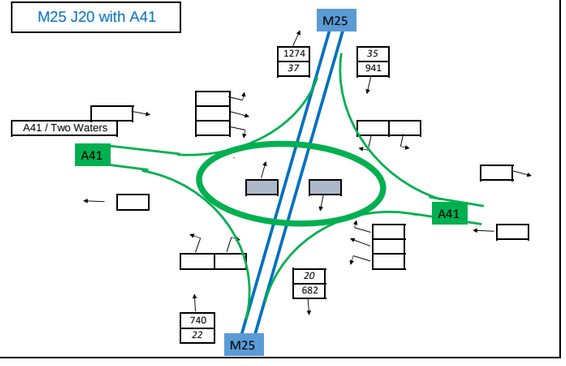
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Hemel Hempstead Rail Station

Exit only From Station Carpark

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 14
Drawing Title: Observed 2016 (AM Peak)	Date: Apr-17

G&A Consulting Engineers Ltd
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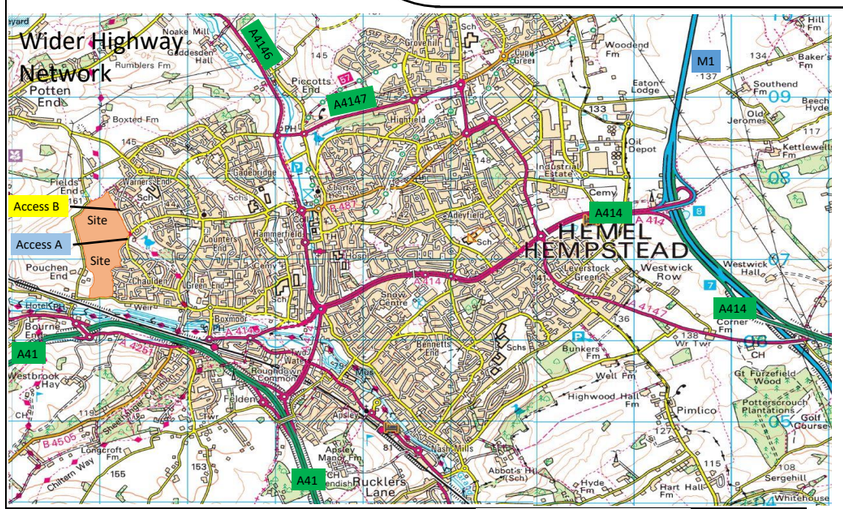
Junction Locations

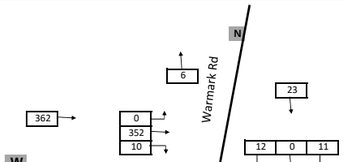
N

INDICATIVE

Wider Highway Network



Junction J2



J2	E	S	W	N	Tot
E	0	35	375	6	416
S	125	0	46	0	171
W	352	10	0	0	362
N	11	0	12	0	23
Tot	488	45	433	6	972

J1	A	B	C	Tot
A	0	0	272	272
B	0	0	0	0
C	277	0	0	277
Tot	277	0	272	549

J4	E	W	N	Tot
E	0	223	267	490
W	337	0	76	413
N	514	65	0	579
Tot	851	288	343	1482

J5	E	S	W	Tot
E	0	178	281	459
S	235	0	208	443
W	468	383	0	851
Tot	703	561	489	1753

J6	E	S	W	N	Tot
E	0	133	373	201	707
S	207	0	100	584	891
W	622	106	0	222	950
N	306	377	185	0	868
Tot	1135	616	658	1007	3416

J3	N	S	W	Tot
N	0	489	57	546
S	293	0	189	482
W	60	265	0	325
Tot	353	754	246	1353

J7	E	S	W	N	Tot
E	0	126	149	14	289
S	117	0	314	31	462
W	199	561	0	20	780
N	20	87	8	0	115
Tot	336	774	471	65	1646

J8	E	S	W	N	Tot
E	0	0	454	84	538
S	161	0	65	67	293
W	579	0	0	194	773
N	362	0	396	0	758
Tot	1102	0	915	345	2362

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

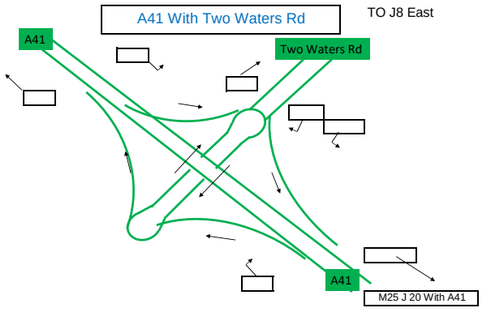
AREA	ARR	DEP

Key

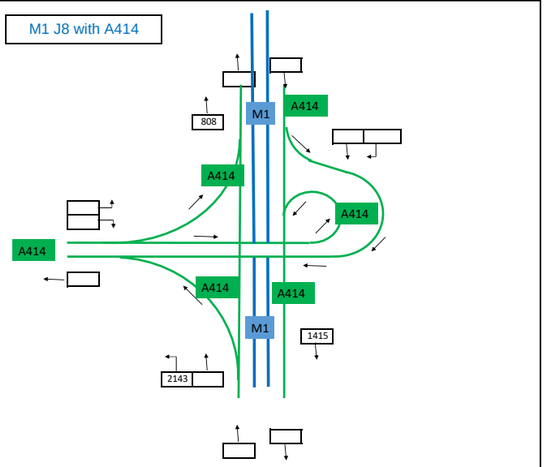
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

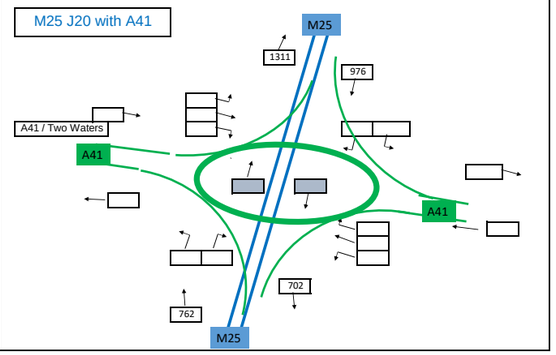
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021	G&A Consulting Engineers Ltd 'optimising development potential'
Drawing Title: Observed 2016 (AM Peak, PCU)	Fig No: 15	
	Date: Apr-17	

Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

J1 J2 J3 J4 J5 J6 J7 J8

Warmark Rd · The Avenue · Boxted Rd · Galley Hill · Hollybush Lane · Long Chaulden · Northridge Way · Chaulden Ln · Green End Rd · Fishery Rd · Northridge Way · Leighton Buzzard Rd · Link Rd · Galley Hill · Warner's End Rd · B487 · St John's Rd · A4251

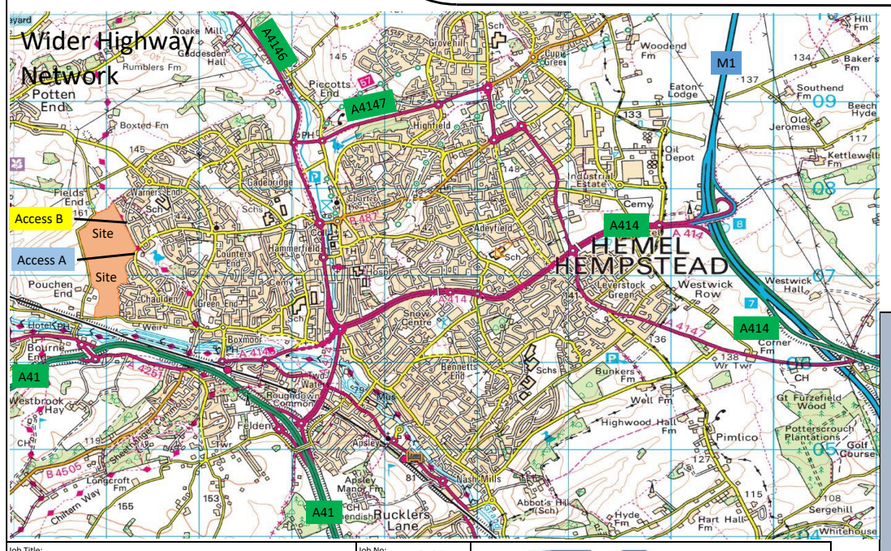
The Avenue Access B

Long Chauden Access A

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

AM GROWTH FACTORS 2016-2022
Dacorum 7,8,10,11,15,16,18 & 19 (Av) 1.06973

Wider Highway Network

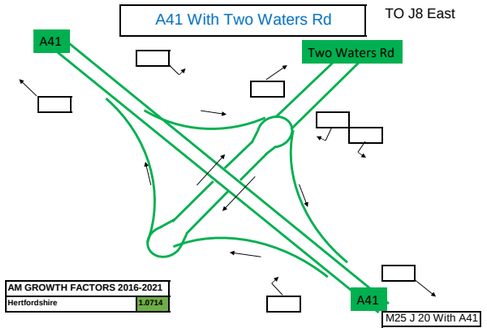


Key

50	Arrivals
50	Departures

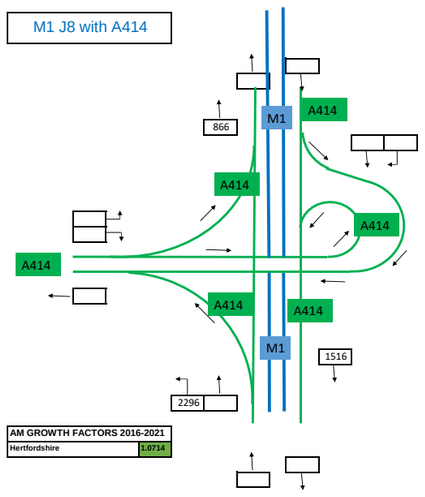
Not to Scale
Not all Roads and Routes are Shown

A41 With Two Waters Rd



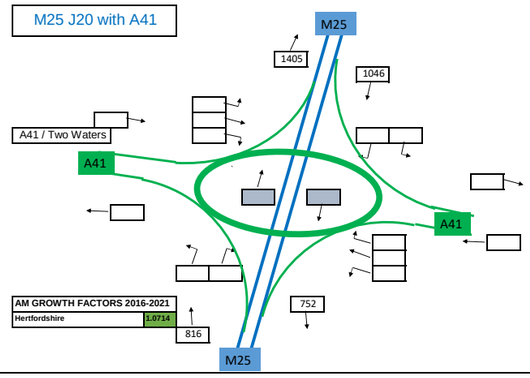
AM GROWTH FACTORS 2016-2021
Hertfordshire 1.0714

M1 J8 with A414



AM GROWTH FACTORS 2016-2021
Hertfordshire 1.0714

M25 J20 with A41



AM GROWTH FACTORS 2016-2021
Hertfordshire 1.0714

Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title:	Land West of Hemel Hempstead LA3
Job No:	16-021
Fig No:	16
Drawing Title:	2022 (AM Peak, PCU)
Date:	Apr-17

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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

J2

Boxted Rd

The Avenue

Galley Hill

Hollybush Lane

Leighton Buzzard Rd

Galley Hill

Link Rd

Leighton Buzzard Rd

The Avenue Access B

AREA	ARR	DEP

Long Chaulden

Long Chaulden

J4

J5

Warner's End Rd

Warner's End Rd

J6

B487

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

Dacorum Way and Combe Street Committment Developments

Long Chauden Access A

J1

Long Chaulden

Northridge Way

AREA	ARR	DEP

Long Chaulden

Chaulden Ln

J3

AREA	ARR	DEP

Green End Rd

Northridge Way

St John's Rd

J7

Fishery Rd

A4251

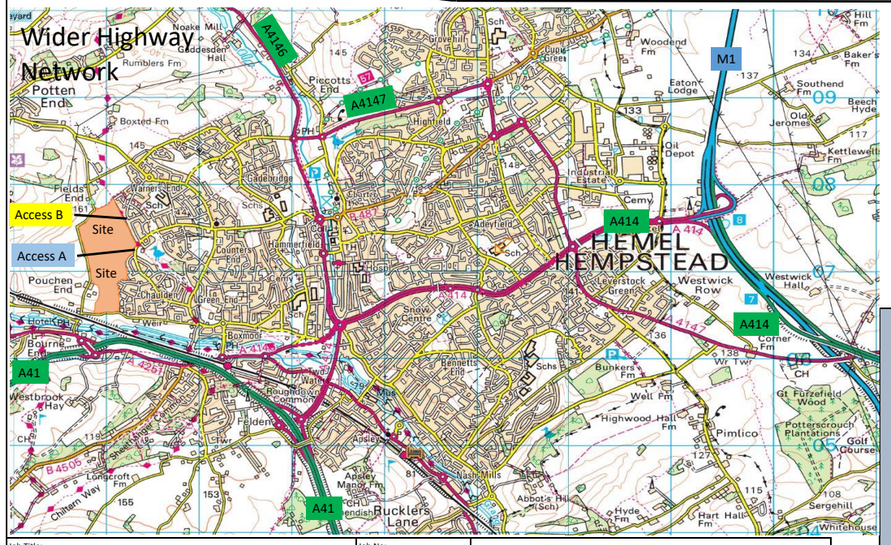
A4251

J8

Exit only From Station Carpark

Hemel Hempstead Rail Station

Wider Highway Network



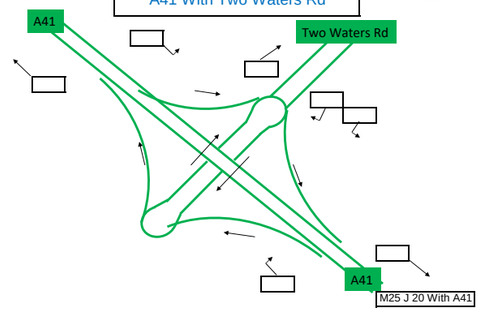
Key

50	Arrivals
50	Departures

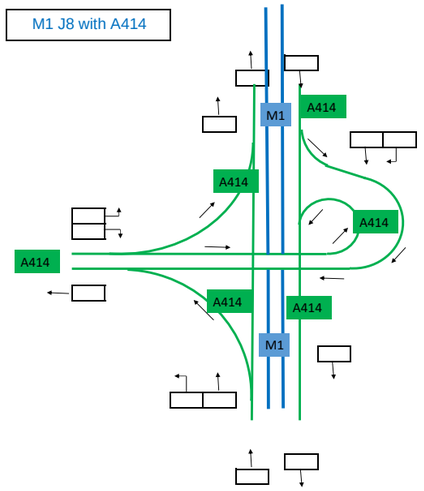
Not to Scale

Not all Roads and Routes are Shown

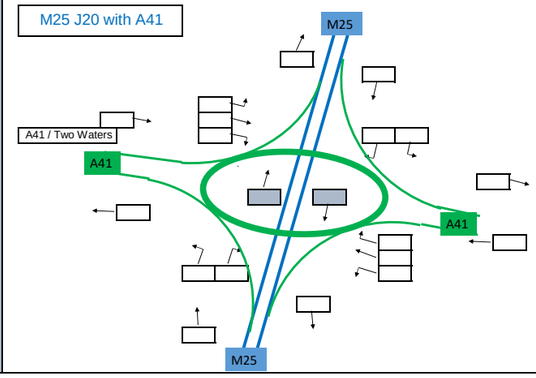
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	Committed Development (AM Peak, PCU)
Job No:	16-021
Fig No:	17
Date:	Apr-17

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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

J2

Pcu	E	S	W	N	Tot
E	0	37	##	6	445
S	##	0	49	0	183
W	##	11	0	0	387
N	12	0	13	0	25
Tot	##	48	##	6	1040

J4

Pcu	E	W	N	Tot
E	0	239	286	524
W	360	0	81	442
N	550	70	0	619
Tot	910	308	367	1585

J6

Pcu	E	S	W	N	Tot
E	0	144	399	215	758
S	221	0	107	628	956
W	665	115	0	237	1018
N	327	409	198	0	935
Tot	1214	669	704	1080	3667

J1

Pcu	A	B	C	Tot
A	0	0	##	291
B	0	0	0	0
C	##	0	0	296
Tot	##	0	##	587

J5

Pcu	E	S	W	Tot
E	0	190	301	491
S	251	0	223	474
W	501	410	0	910
Tot	752	600	523	1875

J3

Pcu	N	S	W	Tot
N	0	523	61	584
S	313	0	202	516
W	64	283	0	348
Tot	378	807	263	1447

J7

Pcu	E	S	W	N	Tot
E	0	135	159	15	309
S	125	0	336	33	494
W	213	600	0	21	834
N	21	93	9	0	123
Tot	359	828	504	70	1761

J8

Pcu	E	S	W	N	Tot
E	0	0	486	90	576
S	172	0	70	72	313
W	619	0	0	208	827
N	387	0	424	0	811
Tot	1179	0	979	369	2527

AREA	ARR	DEP

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

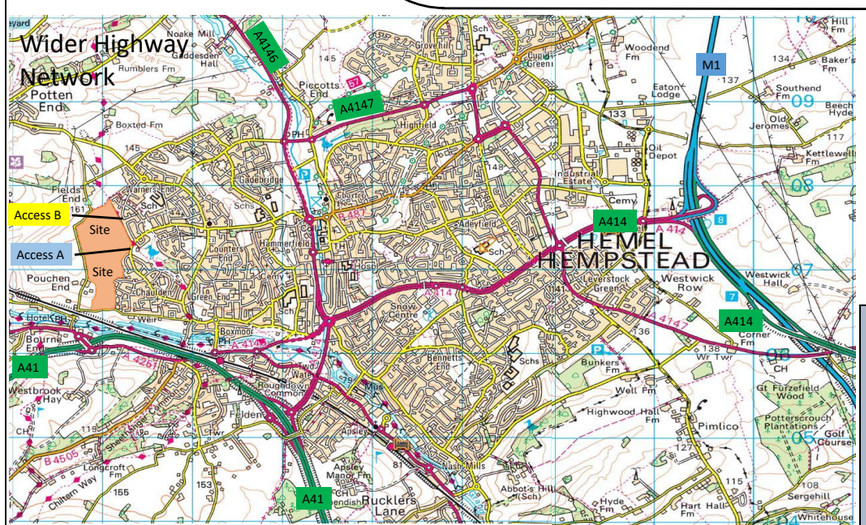
The Avenue Access B

Long Chauden Access A

Warmark Rd · The Avenue · Boxted Rd · Hollybush Lane · Galley Hill · Long Chaulden · Warner's End Rd · Northridge Way · Chaulden Ln · Leighton Buzzard Rd · Link Rd · B487 · Green End Rd · St John's Rd · Fishery Rd · A4251

J1 · J2 · J3 · J4 · J5 · J6 · J7 · J8

Wider Highway Network

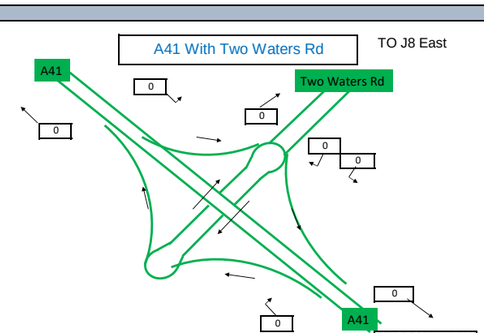


Key

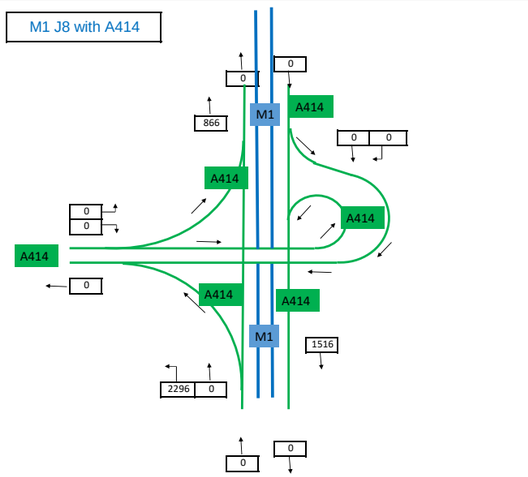
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

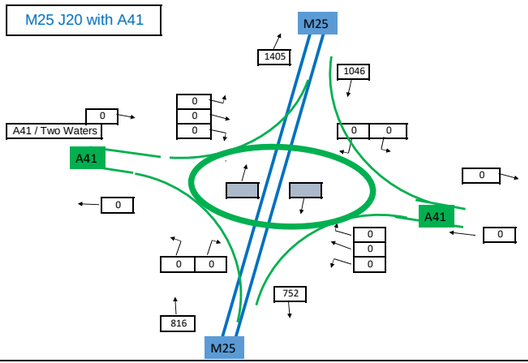
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 18
Drawing Title: 2022 + Committed (AM Peak, PCU)	Date: Apr-17

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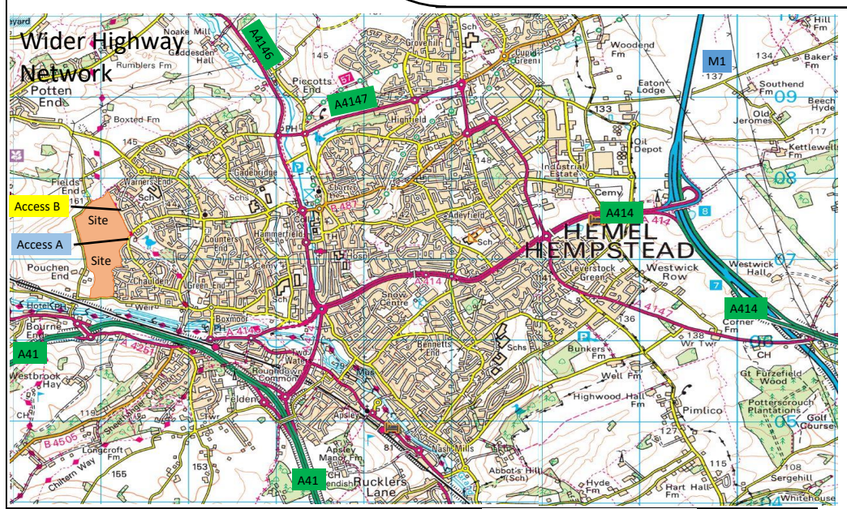
Junction Locations

N

INDICATIVE

Wider Highway Network



The Avenue Access B

	Arrivals	Departures
The Avenue Access B	83	211
Long Chaulden Access A	119	237
Total Development	202	448

J2

Pcu	E	S	W	N	Tot
E	0	106	401	6	513
S	317	0	72	0	388
W	377	19	0	0	396
N	12	0	13	0	25
Tot	705	125	486	6	1322

J4

Pcu	E	W	N	Tot
E	0	286	326	612
W	469	0	84	553
N	666	72	0	738
Tot	1134	359	410	1903

J5

Pcu	E	S	W	Tot
E	0	190	368	559
S	251	0	243	494
W	672	462	0	1134
Tot	923	653	611	2187

J6

Pcu	E	S	W	N	Tot
E	0	144	414	215	773
S	221	0	150	628	1000
W	702	228	0	257	1186
N	327	409	205	0	941
Tot	1251	781	769	1099	3900

J1

Pcu	A	B	C	Tot
A	0	58	291	349
B	115	0	122	237
C	296	61	0	358
Tot	411	119	413	943

J3

Pcu	N	S	W	Tot
N	0	523	62	585
S	331	0	242	573
W	65	374	0	439
Tot	396	897	304	1597

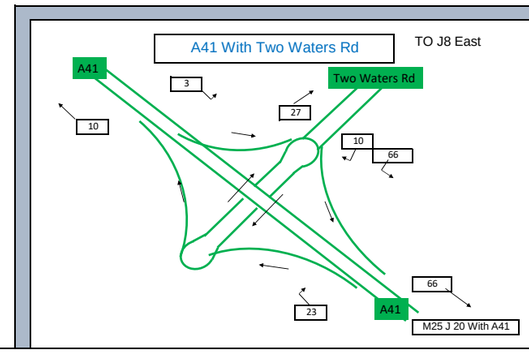
J7

Pcu	E	S	W	N	Tot
E	0	135	165	15	315
S	125	0	387	33	545
W	225	726	0	21	973
N	21	93	9	0	123
Tot	372	954	560	70	1956

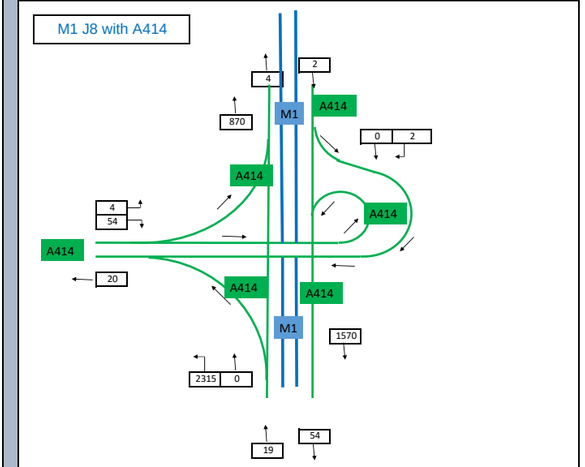
J8

Pcu	E	S	W	N	Tot
E	0	0	486	121	607
S	172	0	70	72	313
W	619	0	0	227	847
N	462	0	475	0	937
Tot	1254	0	1030	420	2704

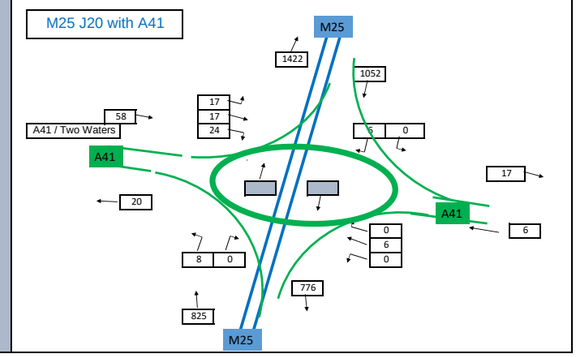
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Key

50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021	
	Fig No: 19	
Drawing Title: 2022 + Committed + Total Development (AM Peak, PCU)	Date: Apr-17	

Consulting Engineers Ltd
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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

5.00PM - 6.00PM

J2

Warmark Rd

Boxted Rd

Galley Hill

The Avenue

The Avenue Access B

Hollybush Lane

Long Chaulden

Long Chaulden

5.00PM - 6.00PM

J4

J5

Warner's End Rd

5.00PM - 6.00PM

Leighton Buzzard Rd

Galley Hill

Link Rd

Leighton Buzzard Rd

Warner's End Rd

B487

J6

Leighton Buzzard Rd

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

Long Chauden Access A

J1

5.15PM - 6.15PM

Long Chaulden

Long Chaulden

5.15PM - 6.15PM

Northridge Way

J3

Chaulden Ln

Long Chaulden

5.30PM - 6.30PM

Green End Rd

Northridge Way

J7

St John's Rd

Fishery Rd

5.30PM - 6.30PM

A4251

A4251

J8

Exit only From Station Carpark

Hemel Hempstead Rail Station

Wider Highway Network

Access B

Site

Access A

Site

A4146

A4147

M1

A414

A41

HEMEL HEMPSTEAD

Bucklers Lane

Key

50 Arrivals

50 Departures

Not to Scale

Not all Roads and Routes are Shown

A41 With Two Waters Rd

TO J8 East

Two Waters Rd

A41

A41

M25 J 20 With A41

M1 J8 with A414

M1

A414

A414

A414

A414

A414

M1

M25 J20 with A41

M25

A41 / Two Waters

A41

A41

M25

Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	Observed 2016 (PM Peak)
Job No:	16-021
Fig No:	20
Date:	Apr-17

G&A Consulting Engineers Ltd
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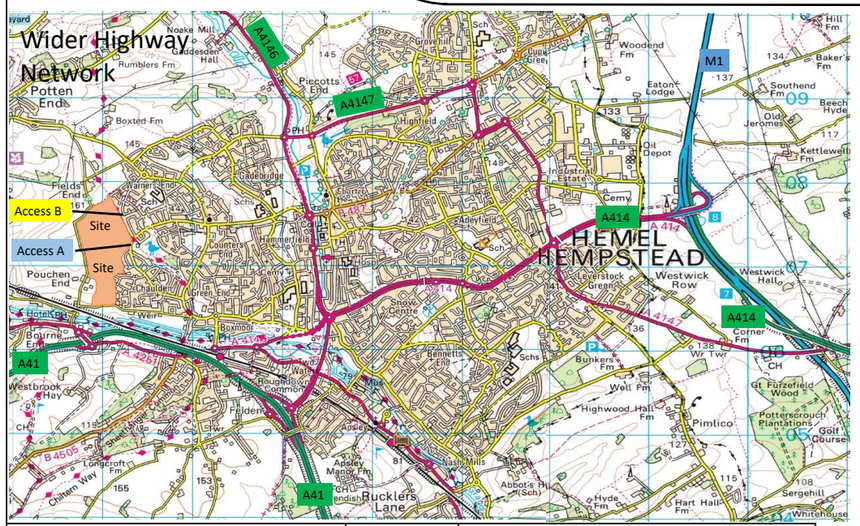
Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Wider Highway Network



Key

50	Arrivals
50	Departures

Not to Scale
Not all Roads and Routes are Shown

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

J2

Pcu	E	S	W	N	Tot
E	0	121	379	5	505
S	62	0	11	1	74
W	380	35	0	2	417
N	3	0	5	0	8
Tot	445	156	395	8	1004

J4

Pcu	E	W	N	Tot
E	0	321	498	819
W	209	0	133	342
N	346	100	0	446
Tot	555	421	631	1607

J6

Pcu	E	S	W	N	Tot
E	0	201	652	274	1127
S	153	0	152	478	783
W	339	83	0	162	584
N	185	626	249	0	1060
Tot	677	910	1053	914	3554

J1

Pcu	A	B	C	Tot
A	0	0	##	##
B	0	0	0	0
C	261	0	0	##
Tot	261	0	##	##

J5

Pcu	E	S	W	Tot
E	0	253	459	712
S	188	0	363	551
W	314	242	0	556
Tot	502	495	822	1819

J3

Pcu	N	S	W	Tot
N	0	346	58	404
S	484	0	278	762
W	37	172	0	209
Tot	521	518	336	1375

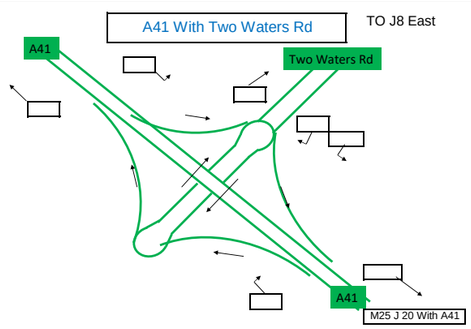
J7

Pcu	E	S	W	N	Tot
E	0	152	200	20	372
S	123	0	567	120	810
W	152	340	0	12	504
N	14	65	7	0	86
Tot	289	557	774	152	1772

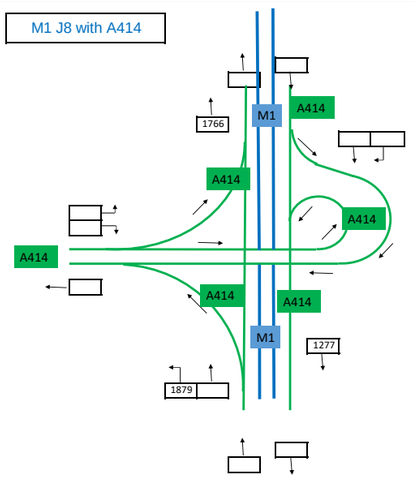
J8

Pcu	E	S	W	N	Tot
E	0	0	513	380	893
S	193	0	50	120	363
W	434	0	0	332	766
N	225	0	270	0	495
Tot	852	0	833	832	2517

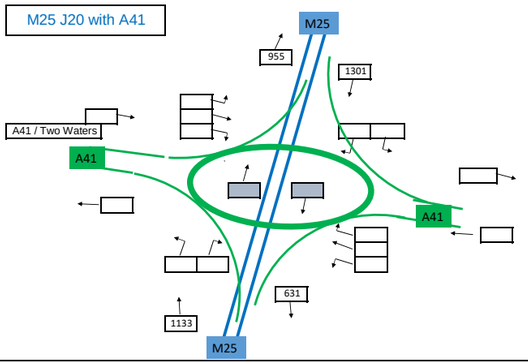
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	Observed 2016 (PM Peak, PCU)
Job No:	16-021
Fig No:	21
Date:	Apr-17

Consulting Engineers Ltd
'optimising development potential'
Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

J1 J2 J3 J4 J5 J6 J7 J8

Warmark Rd · Boxted Rd · Galley Hill · The Avenue · Hollybush Lane · Long Chaulden · Warner's End Rd · Northridge Way · Leighton Buzzard Rd · Link Rd · B487 · Green End Rd · Fishery Rd · St John's Rd · Chaulden Ln

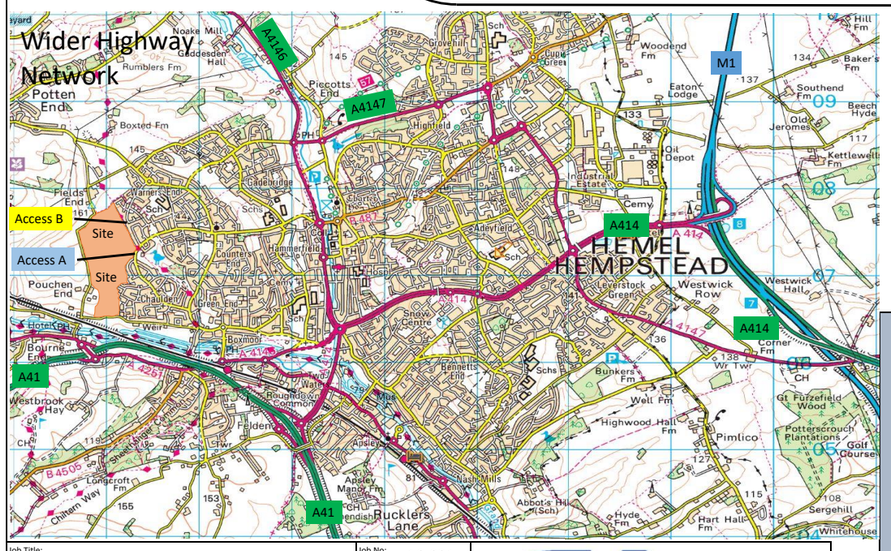
The Avenue Access B

Long Chauden Access A

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

PM GROWTH FACTORS 2016-2022
Dacorum 7,8,10,11,15,16,18 & 19 (Av) 1.07004

Wider Highway Network

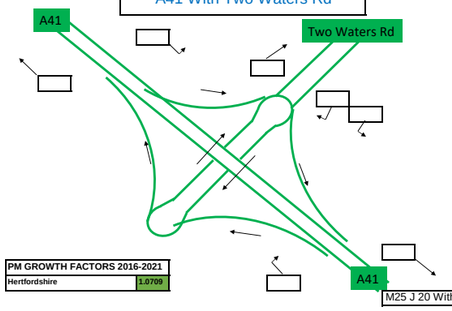


Key

50 Arrivals
50 Departures

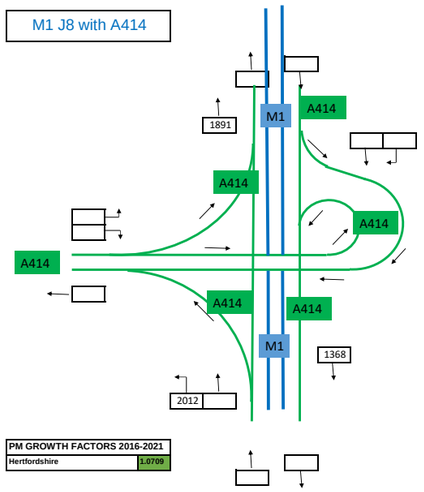
Not to Scale
Not all Roads and Routes are Shown

A41 With Two Waters Rd



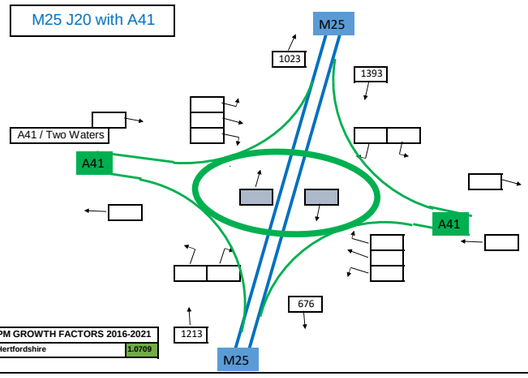
PM GROWTH FACTORS 2016-2021
Hertfordshire 1.0709

M1 J8 with A414



PM GROWTH FACTORS 2016-2021
Hertfordshire 1.0709

M25 J20 with A41



PM GROWTH FACTORS 2016-2021
Hertfordshire 1.0709

Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	2022 (PM Peak, PCU)
Job No:	16-021
Fig No:	22
Date:	Apr-17

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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

J2

Boxted Rd

The Avenue

Galley Hill

Hollybush Lane

The Avenue Access B

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

AREA | ARR | DEP

Long Chaulden

Long Chaulden

J4

J5

Warner's End Rd

Leighton Buzzard Rd

Galley Hill

Link Rd

Leighton Buzzard Rd

Warner's End Rd

J6

B487

Leighton Buzzard Rd

Dacorum Way and Combe Street Committment Developments

Long Chauden Access A

J1

Long Chaulden

AREA | ARR | DEP

Long Chaulden

Northridge Way

J3

Chaulden Ln

AREA | ARR | DEP

Green End Rd

Northridge Way

St John's Rd

J7

Fishery Rd

A4251

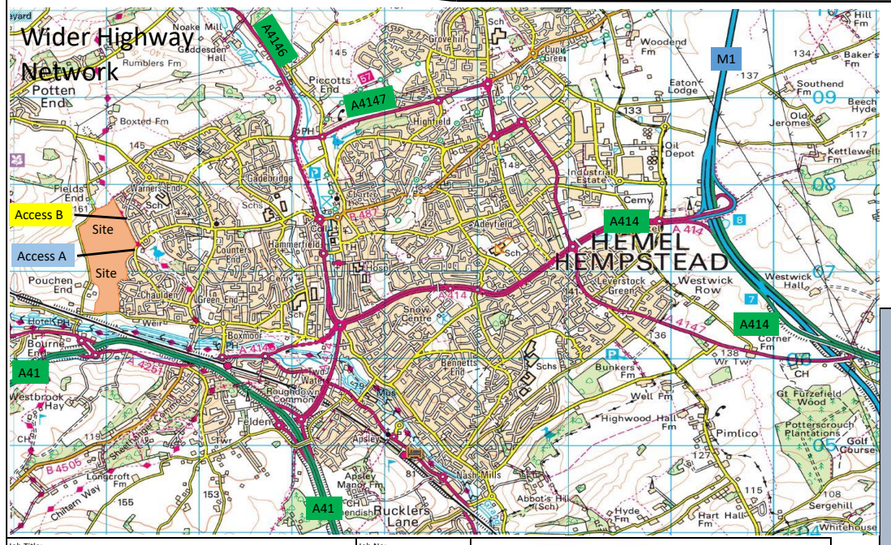
A4251

J8

Exit only From Station Carpark

Hemel Hempstead Rail Station

Wider Highway Network



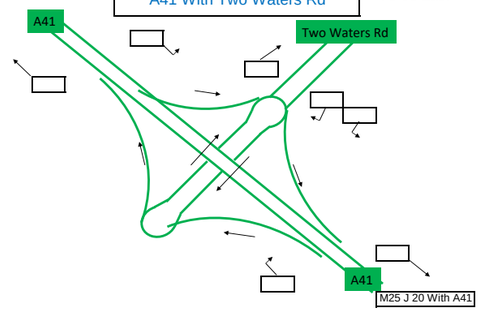
Key

50	Arrivals
50	Departures

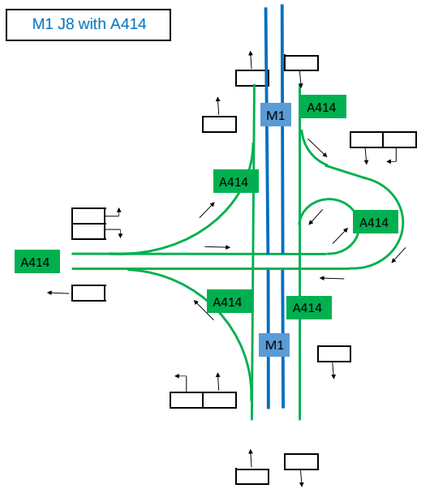
Not to Scale

Not all Roads and Routes are Shown

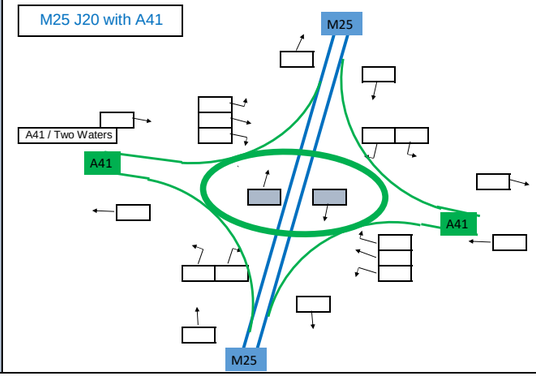
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 23
Drawing Title: Committed Development (PM Peak, PCU)	Date: Apr-17

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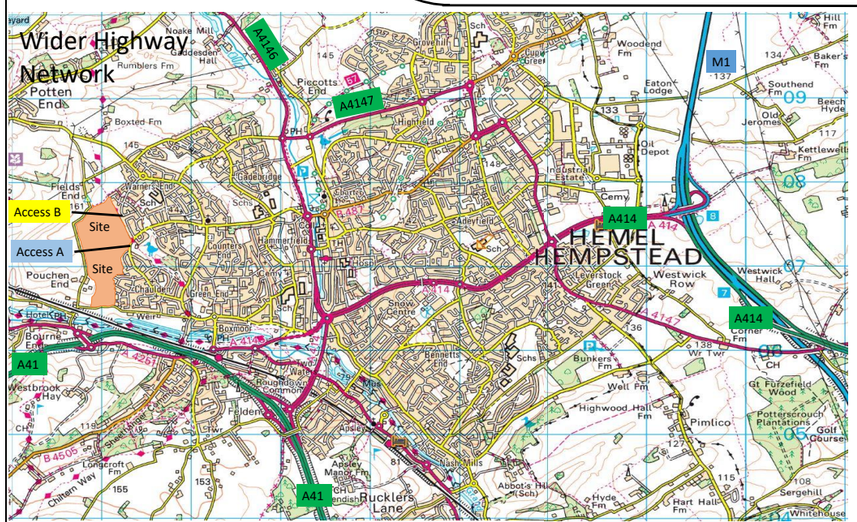
Junction Locations

N

INDICATIVE

Wider Highway Network



J2

Pcu	E	S	W	N	Tot
E	0	129	406	5	540
S	66	0	12	1	79
W	407	37	0	2	446
N	3	0	5	0	9
Tot	476	167	423	9	1074

J4

Pcu	E	W	N	Tot
E	0	343	533	876
W	224	0	142	366
N	370	107	0	477
Tot	594	450	675	1720

J6

Pcu	E	S	W	N	Tot
E	0	216	698	293	1207
S	164	0	163	512	839
W	363	90	0	173	626
N	198	674	266	0	1138
Tot	724	980	1127	979	3810

J5

Pcu	E	S	W	Tot
E	0	271	491	762
S	201	0	388	590
W	336	259	0	595
Tot	537	530	880	1946

J1

Pcu	A	B	C	Tot
A	0	0	260	260
B	0	0	0	0
C	279	0	0	279
Tot	279	0	260	539

J3

Pcu	N	S	W	Tot
N	0	370	62	432
S	518	0	297	815
W	40	184	0	224
Tot	557	554	360	1471

J7

Pcu	E	S	W	N	Tot
E	0	163	214	21	398
S	132	0	607	128	867
W	163	364	0	13	539
N	15	70	7	0	92
Tot	309	596	828	163	1896

J8

Pcu	E	S	W	N	Tot
E	0	0	549	407	956
S	207	0	54	128	388
W	464	0	0	355	820
N	241	0	289	0	530
Tot	912	0	891	890	2693

	Arrivals	Departures
The Avenue Access B	0	0
Long Chaulden Access A	0	0
Total Development	0	0

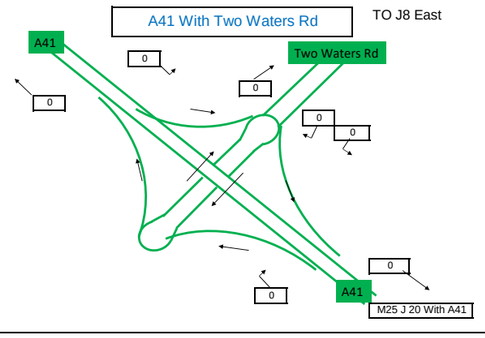
AREA	ARR	DEP

Key

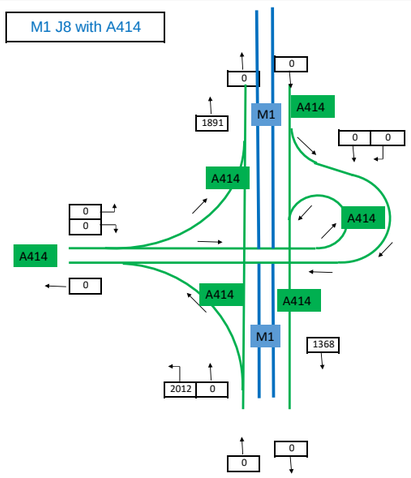
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

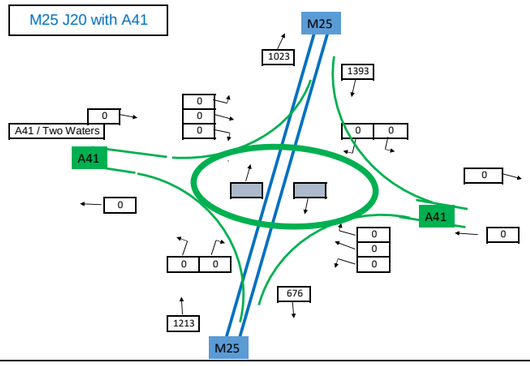
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 24
Drawing Title: 2022 + Committed (PM Peak, PCU)	Date: Apr-17

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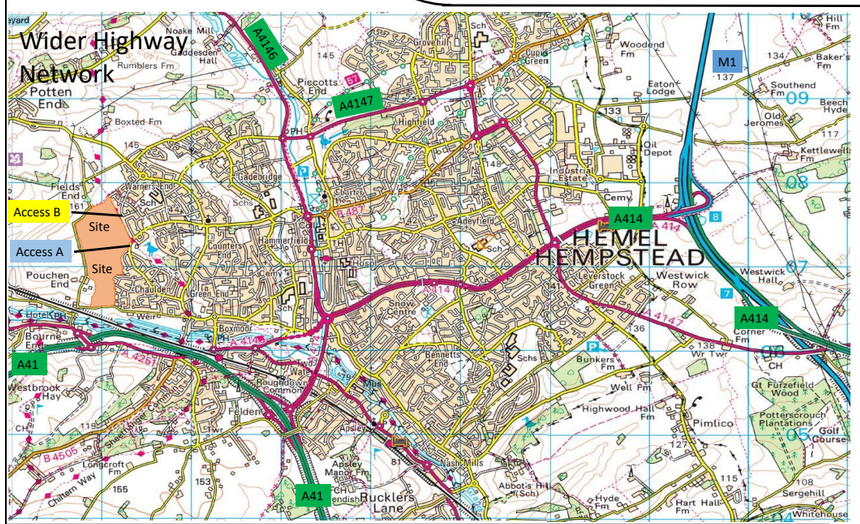
Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Wider Highway Network



Key

50	Arrivals
50	Departures

Not to Scale
Not all Roads and Routes are Shown

The Avenue Access B

	Arrivals	Departures
The Avenue Access B	166	91
Long Chaulden Access A	168	102
Total Development	335	193

Long Chauden Access A

J1

Pcu	A	B	C	Tot
A	0	83	260	343
B	51	0	51	102
C	279	85	0	364
Tot	330	168	311	810

J2

Pcu	E	S	W	N	Tot
E	0	278	406	5	689
S	148	0	21	1	170
W	407	55	0	2	464
N	3	0	5	0	9
Tot	557	333	432	9	1331

J3

Pcu	N	S	W	Tot
N	0	370	62	432
S	559	0	371	930
W	40	230	0	270
Tot	599	600	433	1632

J4

Pcu	E	W	N	Tot
E	0	428	629	1057
W	274	0	142	417
N	422	107	0	529
Tot	696	535	771	2003

J5

Pcu	E	S	W	Tot
E	0	271	630	901
S	201	0	430	631
W	416	281	0	698
Tot	617	552	1060	2229

J6

Pcu	E	S	W	N	Tot
E	0	216	728	293	1237
S	164	0	256	512	932
W	381	143	0	182	706
N	198	674	282	0	1154
Tot	743	1033	1266	988	4029

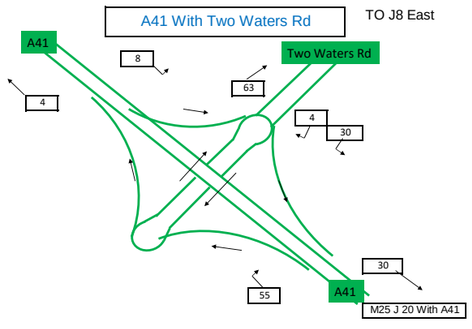
J7

Pcu	E	S	W	N	Tot
E	0	163	224	21	408
S	132	0	711	128	971
W	169	425	0	13	607
N	15	70	7	0	92
Tot	316	657	943	163	2079

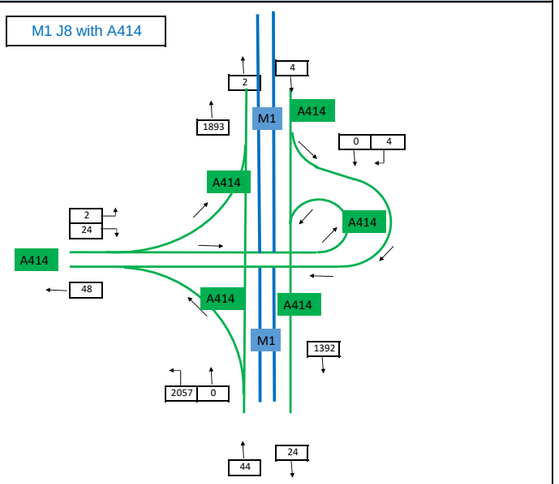
J8

Pcu	E	S	W	N	Tot
E	0	0	549	469	1018
S	207	0	54	128	388
W	464	0	0	398	862
N	277	0	314	0	591
Tot	948	0	916	995	2859

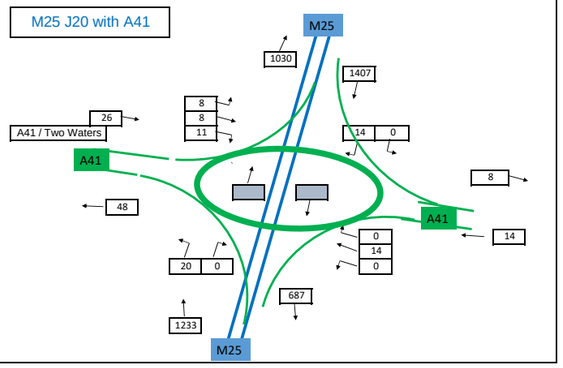
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	2022 + Committed + Total Development (PM Peak, PCU)
Job No:	16-021
Fig No:	25
Date:	Apr-17

Consulting Engineers Ltd
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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

The Avenue

Hollybush Lane

Galley Hill

Leighton Buzzard Rd

Link Rd

Long Chaulden

Warner's End Rd

Northridge Way

Green End Rd

St John's Rd

Fishery Rd

B487

A4251

J1 J2 J3 J4 J5 J6 J7 J8

The Avenue Access B

AREA	ARR	DEP
16	0	1

AREA	ARR	DEP
11	0	1

AREA	ARR	DEP
14	1	1

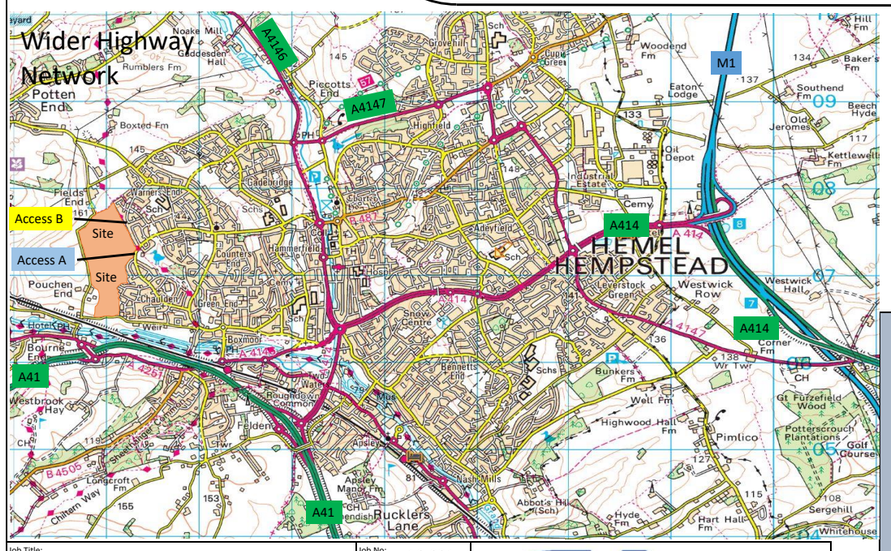
	Arrivals	Departures
Diverted Via The Avenue	0	1
Long Chaulden Access A	22	63
Total Long Chaulden	22	64

Long Chauden Access A

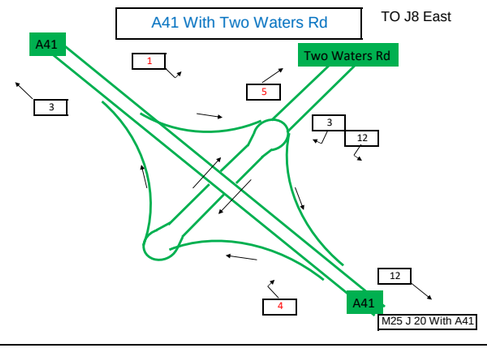
Exit only From Station Carpark

Hemel Hempstead Rail Station

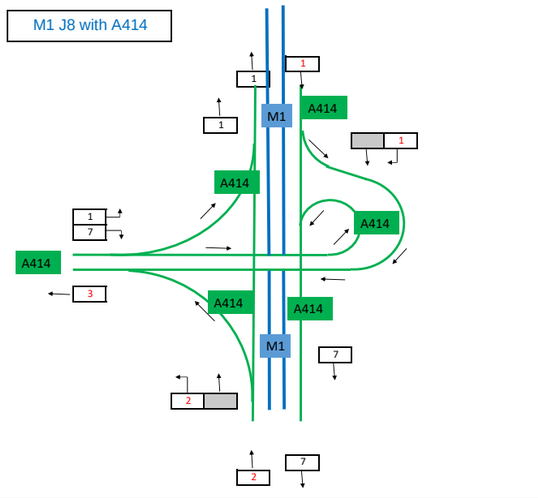
Wider Highway Network



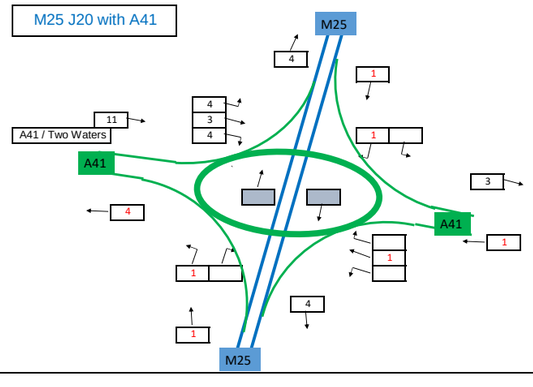
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Key

50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	Residential Trips Long Chaulden Access J1 (AM Peak) 350 Dwellings
Job No:	16-021
Fig No:	26
Date:	Apr-17

Consulting Engineers Ltd
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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

The Avenue

Galley Hill

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

Fishery Rd

St John's Rd

Chaulden Ln

A4251

J1 J2 J3 J4 J5 J6 J7 J8

The Avenue Access B

Long Chauden Access A

	Arrivals	Departures
The Avenue Access B	22	63
Diversion Via Long Chaulden	0	1
Total The Avenue	22	64

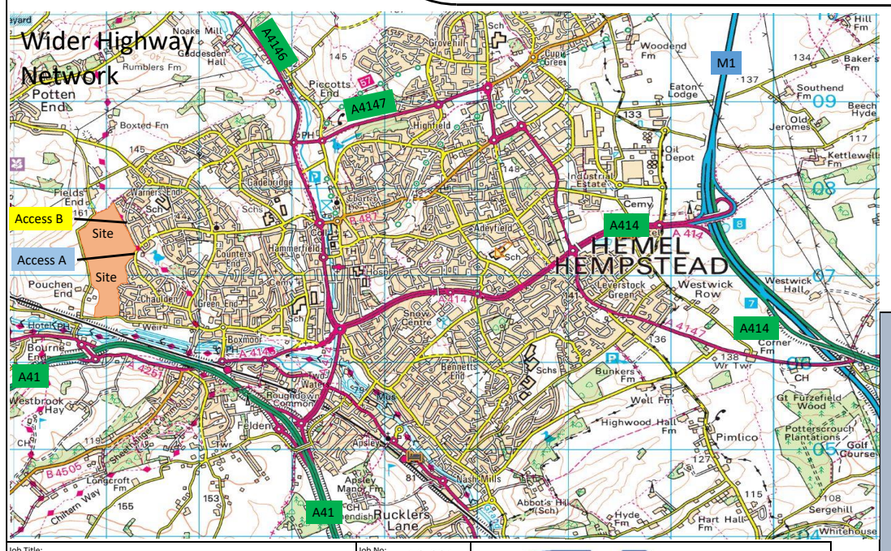
AREA	ARR	DEP
16	0	1

AREA	ARR	DEP
11	0	1

Exit only From Station Carpark

Hemel Hempstead Rail Station

Wider Highway Network

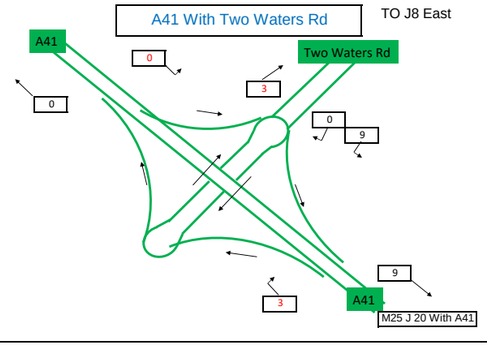


Key

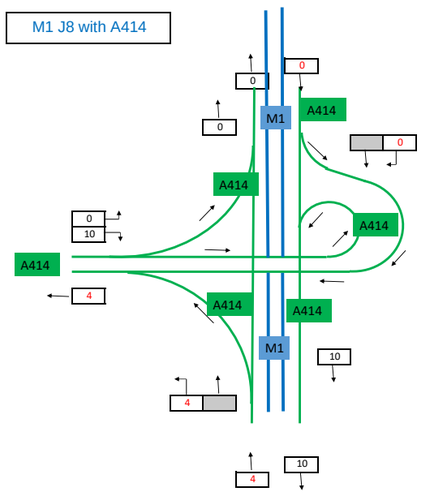
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

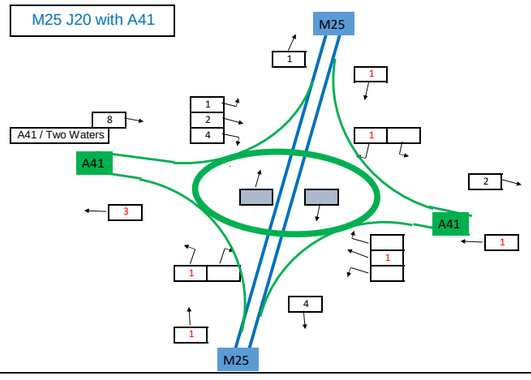
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	Residential Trips The Avenue Access J2 (AM Peak) 350 Dwellings
Job No:	16-021
Fig No:	27
Date:	Apr-17

Consulting Engineers Ltd
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Landmark House, Station Road, Hook, Hampshire, RG27 9HA

Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

The Avenue

Galley Hill

Hollybush Lane

Long Chaulden

Warner's End Rd

Leighton Buzzard Rd

Link Rd

B487

Northridge Way

Green End Rd

St John's Rd

Fishery Rd

A4251

Chaulden Ln

J1 J2 J3 J4 J5 J6 J7 J8

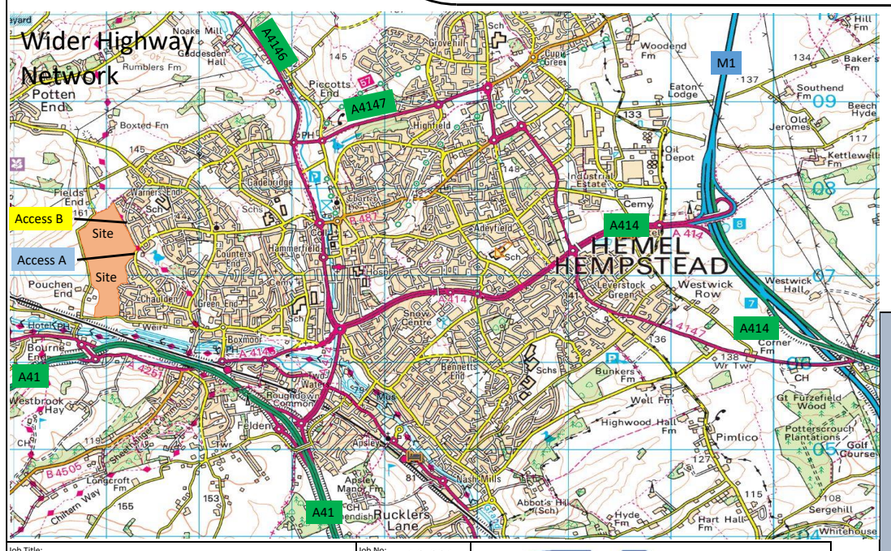
The Avenue Access B

Long Chauden Access A

AREA	ARR	DEP
16	1	0
11	1	0
14	1	1

	Arrivals	Departures
Diverted Via The Avenue	1	0
Long Chaulden Access A	52	28
Total Long Chaulden	53	29

Wider Highway Network

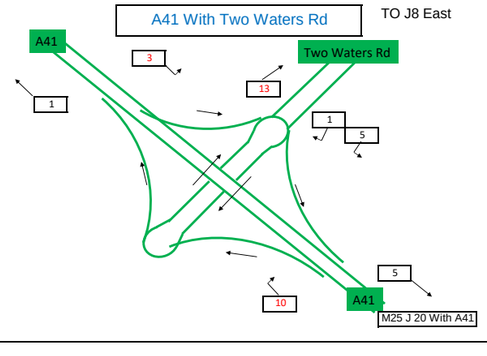


Key

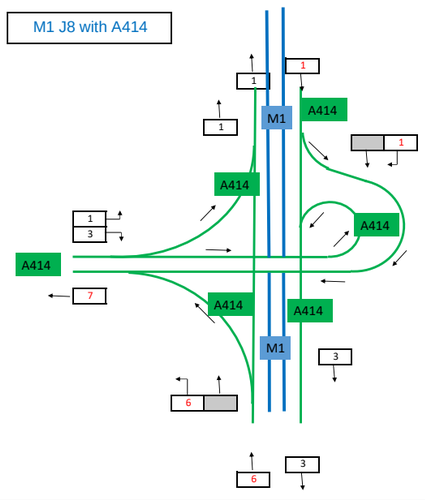
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

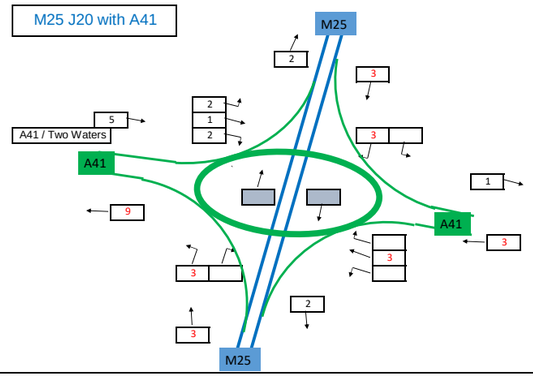
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 28
Drawing Title: Residential Trips Long Chaulden Access J1 (PM Peak) 350 Dwellings	Date: Apr-17

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Junction Locations

N

INDICATIVE

J1 J2 J3 J4 J5 J6 J7 J8

Warmark Rd · The Avenue · Boxted Rd · Galley Hill · Hollybush Lane · Long Chaulden · Northridge Way · Chaulden Ln · Green End Rd · Fishery Rd · Northridge Way · Leighton Buzzard Rd · Link Rd · Warner's End Rd · B487 · St John's Rd · A4251

The Avenue Access B

	Arrivals	Departures
The Avenue Access B	52	28
Diversion Via Long Chaulden	1	0
Total The Avenue	53	29

Long Chauden Access A

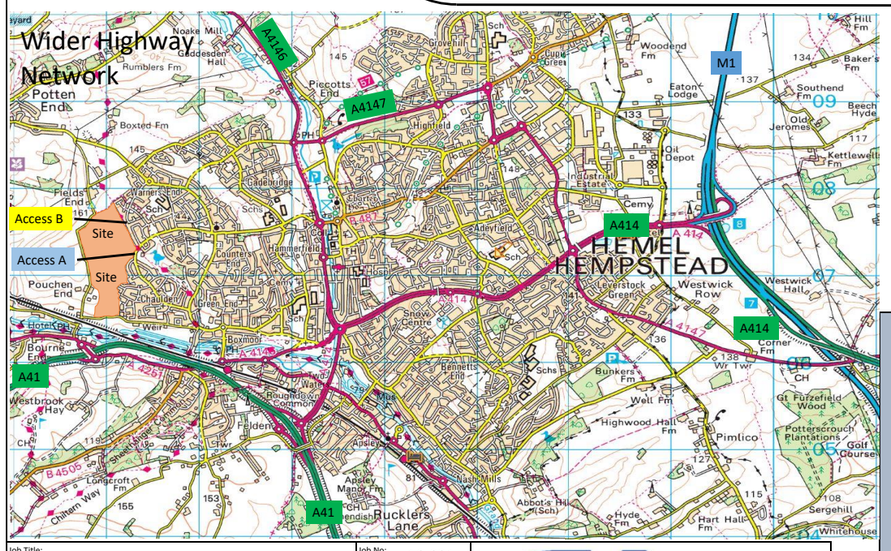
AREA	ARR	DEP
16	1	0
11	1	0

Key

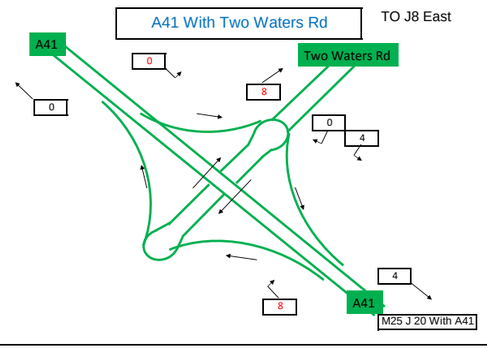
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

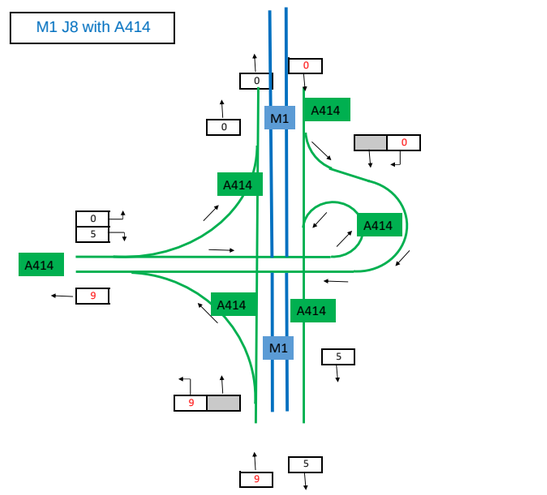
Wider Highway Network



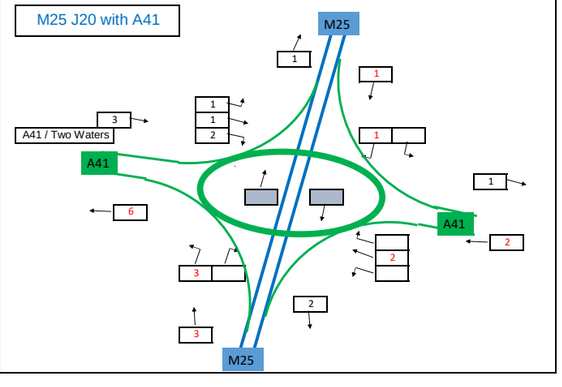
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title:	Land West of Hemel Hempstead LA3
Drawing Title:	Residential Trips The Avenue Access J2 (PM Peak) 350 Dwellings
Job No:	16-021
Fig No:	29
Date:	Apr-17

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Junction Locations

N

INDICATIVE

Warmark Rd

Boxted Rd

The Avenue

Galley Hill

Hollybush Lane

Long Chaulden

Leighton Buzzard Rd

Link Rd

Warner's End Rd

B487

Northridge Way

Green End Rd

St John's Rd

Fishery Rd

A4251

Chaulden Ln

J1 J2 J3 J4 J5 J6 J7 J8

The Avenue Access B

Long Chauden Access A

	Arrivals	Departures
The Avenue Access B	22	64
Long Chaulden Access A	22	64
Total Development	45	128

AREA	ARR	DEP
16	1	1

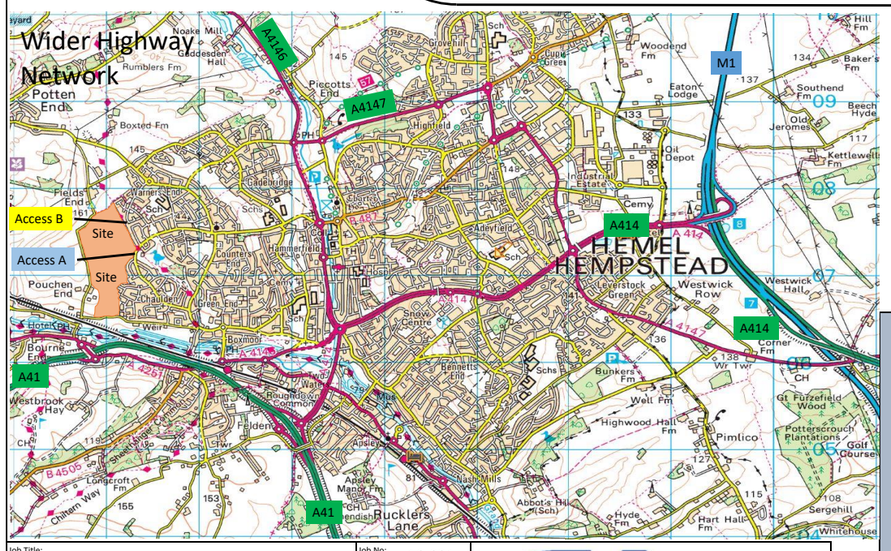
AREA	ARR	DEP
11	1	2

AREA	ARR	DEP
14	1	1

Exit only From Station Carpark

Hemel Hempstead Rail Station

Wider Highway Network

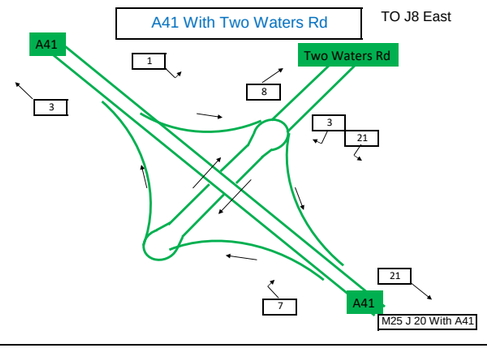


Key

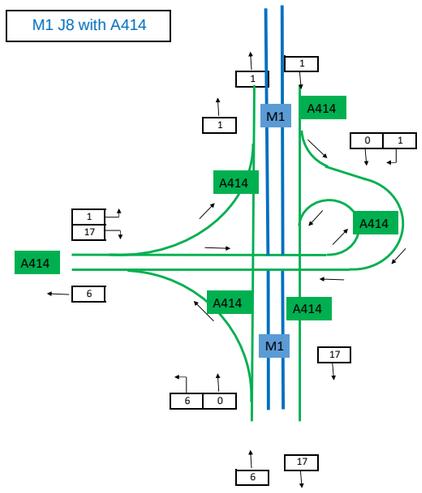
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

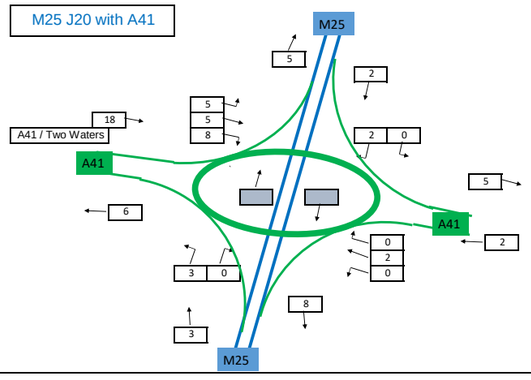
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41



Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 30
Drawing Title: Total Residential Development (AM Peak) 350 Dwellings	Date: Apr-17

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Junction Locations

N

INDICATIVE

Warmark Rd · Boxted Rd · Galley Hill · The Avenue · Hollybush Lane · Long Chaulden · Northridge Way · Green End Rd · Fishery Rd · Leighton Buzzard Rd · Link Rd · Warner's End Rd · B487 · St John's Rd · Chaulden Ln

J1 · J2 · J3 · J4 · J5 · J6 · J7 · J8

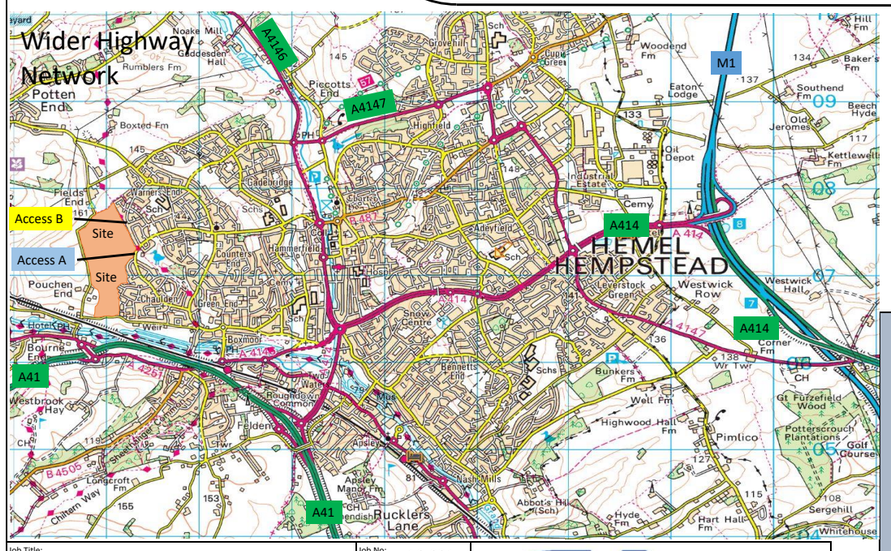
The Avenue Access B

	Arrivals	Departures
The Avenue Access B	53	29
Long Chaulden Access A	53	29
Total Development	106	57

Long Chauden Access A

AREA	ARR	DEP
16	1	1
11	2	1
14	1	1

Wider Highway Network

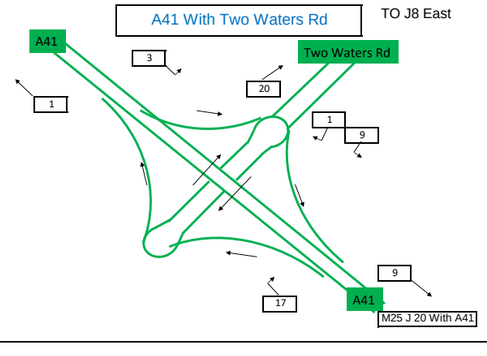


Key

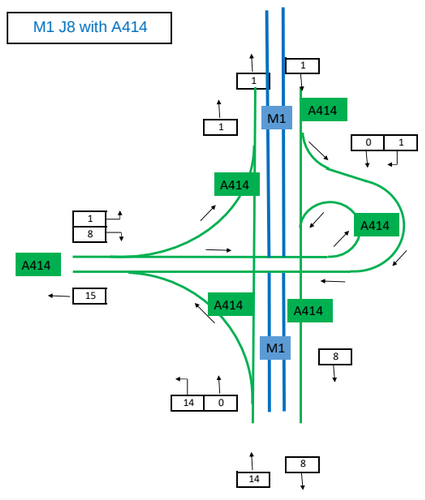
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

A41 With Two Waters Rd



M1 J8 with A414



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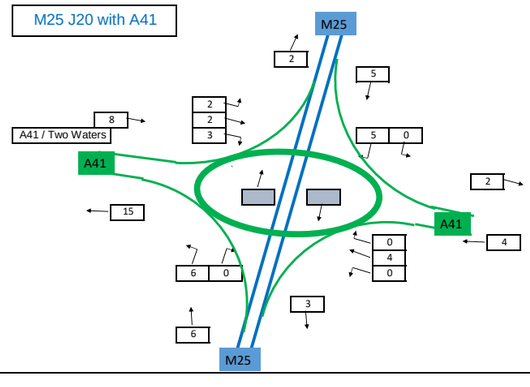

Exit only From Station Carpark

Hemel Hempstead Rail Station

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 31
Drawing Title: Total Residential Development (PM Peak) 350 Dwellings	Date: Apr-17

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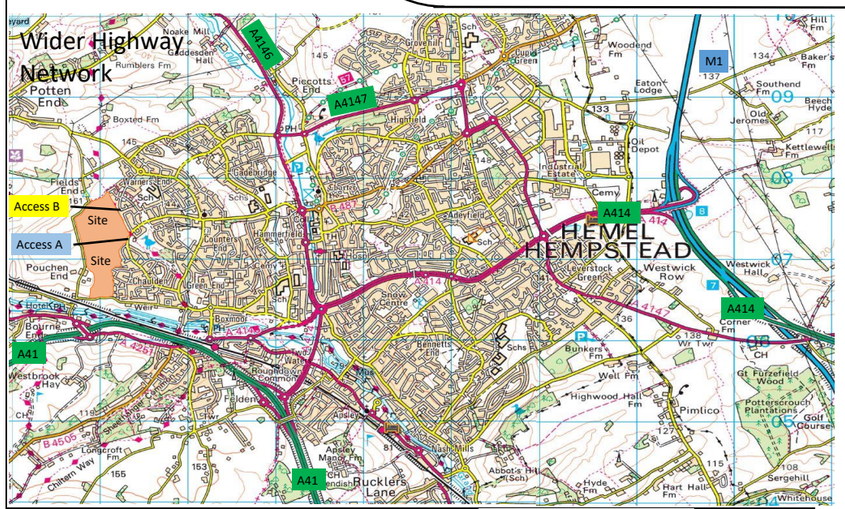
Junction Locations

N

INDICATIVE

Wider Highway Network



Job Title:	Job No:	16-021
Land West of Hemel Hempstead LA3	Fig No:	32
Drawing Title:	Date:	Apr-17
2022 + Committed + Total Development (AM Peak, PCU) 350 Dwellings		

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	Arrivals	Departures
The Avenue Access B	22	64
Long Chaulden Access A	22	64
Total Development	45	128

J2

Pcu	E	S	W	N	Tot
E	0	57	401	6	465
S	191	0	56	0	247
W	377	13	0	0	390
N	12	0	13	0	25
Tot	579	70	470	6	1126

J1

Pcu	A	B	C	Tot
A	0	11	291	302
B	32	0	32	64
C	296	11	0	308
Tot	328	22	323	674

J4

Pcu	E	W	N	Tot
E	0	250	299	548
W	393	0	81	474
N	587	70	0	656
Tot	980	319	380	1679

J5

Pcu	E	S	W	Tot
E	0	190	319	510
S	251	0	228	479
W	554	426	0	980
Tot	806	616	547	1969

J6

Pcu	E	S	W	N	Tot
E	0	144	403	215	762
S	221	0	120	628	969
W	677	151	0	244	1072
N	327	409	200	0	937
Tot	1226	705	723	1086	3739

J3

Pcu	N	S	W	Tot
N	0	523	61	584
S	319	0	212	531
W	64	312	0	376
Tot	383	835	273	1491

J7

Pcu	E	S	W	N	Tot
E	0	135	161	15	311
S	125	0	350	33	508
W	217	640	0	21	879
N	21	93	9	0	123
Tot	363	868	519	70	1820

J8

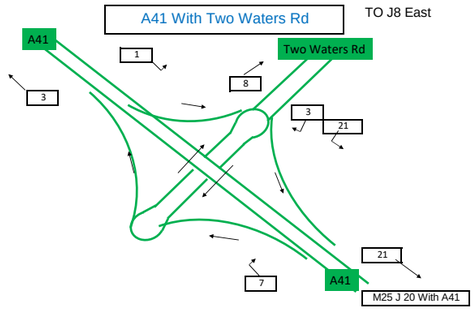
Pcu	E	S	W	N	Tot
E	0	0	486	98	584
S	172	0	70	72	313
W	619	0	0	213	833
N	411	0	440	0	851
Tot	1203	0	995	383	2581

Key

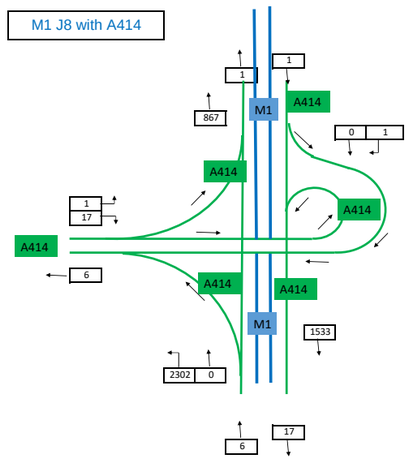
50 Arrivals
50 Departures

Not to Scale
Not all Roads and Routes are Shown

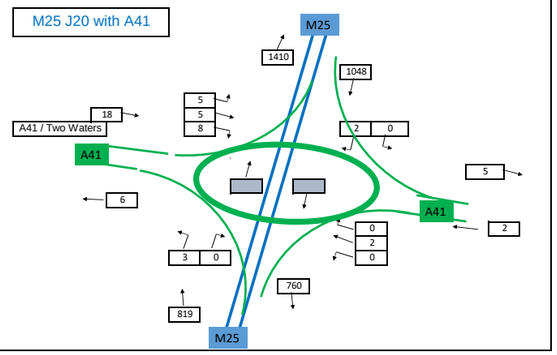
A41 With Two Waters Rd



M1 J8 with A414



M25 J20 with A41

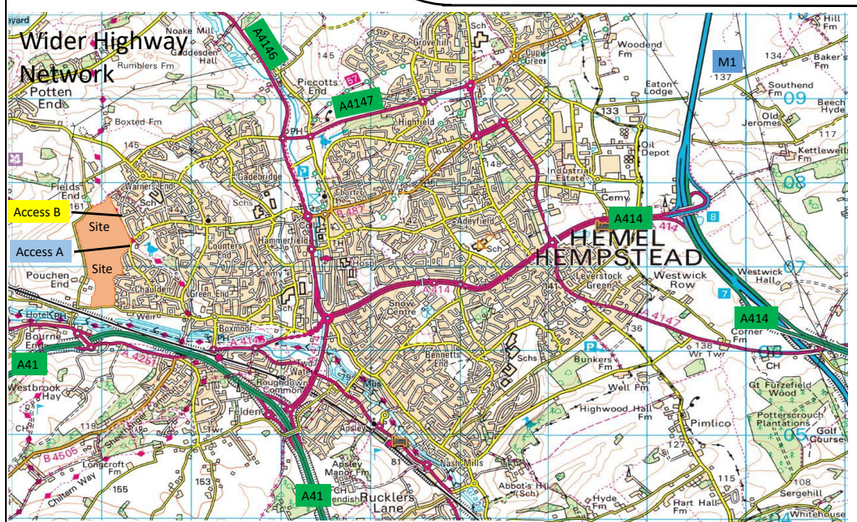


Junction Locations

N

INDICATIVE

Wider Highway Network



Key

50	Arrivals
50	Departures

Not to Scale
Not all Roads and Routes are Shown

The Avenue Access B

	Arrivals	Departures
The Avenue Access B	53	29
Long Chaulden Access A	53	29
Total Development	106	57

J2

Pcu	E	S	W	N	Tot
E	0	177	406	5	588
S	92	0	15	1	108
W	407	43	0	2	452
N	3	0	5	0	9
Tot	502	220	426	9	1156

J4

Pcu	E	W	N	Tot
E	0	370	563	934
W	238	0	142	380
N	387	107	0	494
Tot	625	477	706	1808

J5

Pcu	E	S	W	Tot
E	0	271	535	806
S	201	0	401	603
W	360	266	0	626
Tot	561	537	937	2035

J6

Pcu	E	S	W	N	Tot
E	0	216	707	293	1217
S	164	0	192	512	868
W	368	106	0	176	650
N	198	674	271	0	1143
Tot	730	996	1171	982	3878

J1

Pcu	A	B	C	Tot
A	0	26	260	286
B	14	0	15	29
C	279	27	0	306
Tot	293	53	275	621

J3

Pcu	N	S	W	Tot
N	0	370	62	432
S	531	0	321	852
W	40	197	0	236
Tot	571	567	383	1521

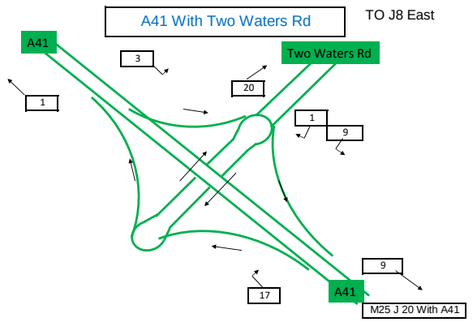
J7

Pcu	E	S	W	N	Tot
E	0	163	217	21	401
S	132	0	640	128	900
W	164	382	0	13	559
N	15	70	7	0	92
Tot	311	614	865	163	1952

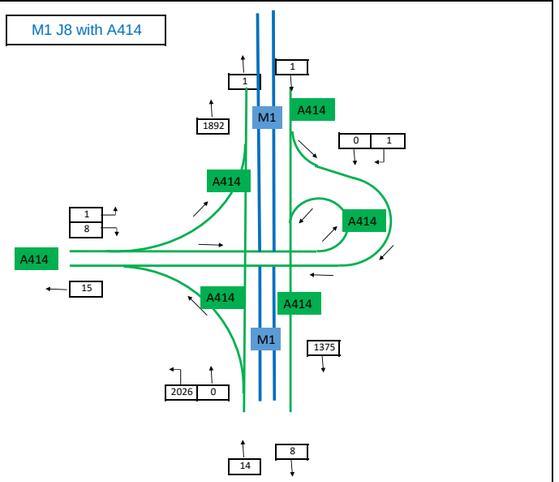
J8

Pcu	E	S	W	N	Tot
E	0	0	549	426	975
S	207	0	54	128	388
W	464	0	0	369	833
N	251	0	296	0	548
Tot	922	0	899	924	2745

A41 With Two Waters Rd TO J8 East



M1 J8 with A414



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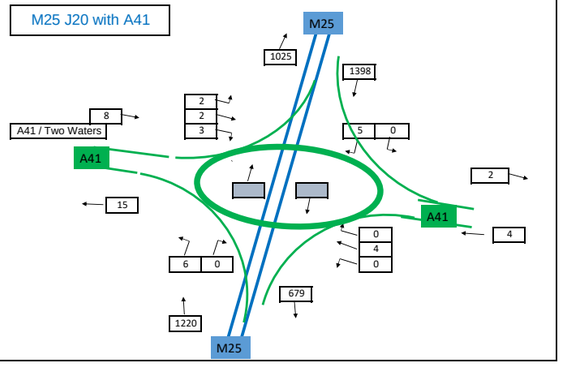

Job Title: Land West of Hemel Hempstead LA3	Job No: 16-021
	Fig No: 33
Drawing Title: 2022 + Committed + Total Development (PM Peak, PCU) 350 Dwellings	Date: Apr-17

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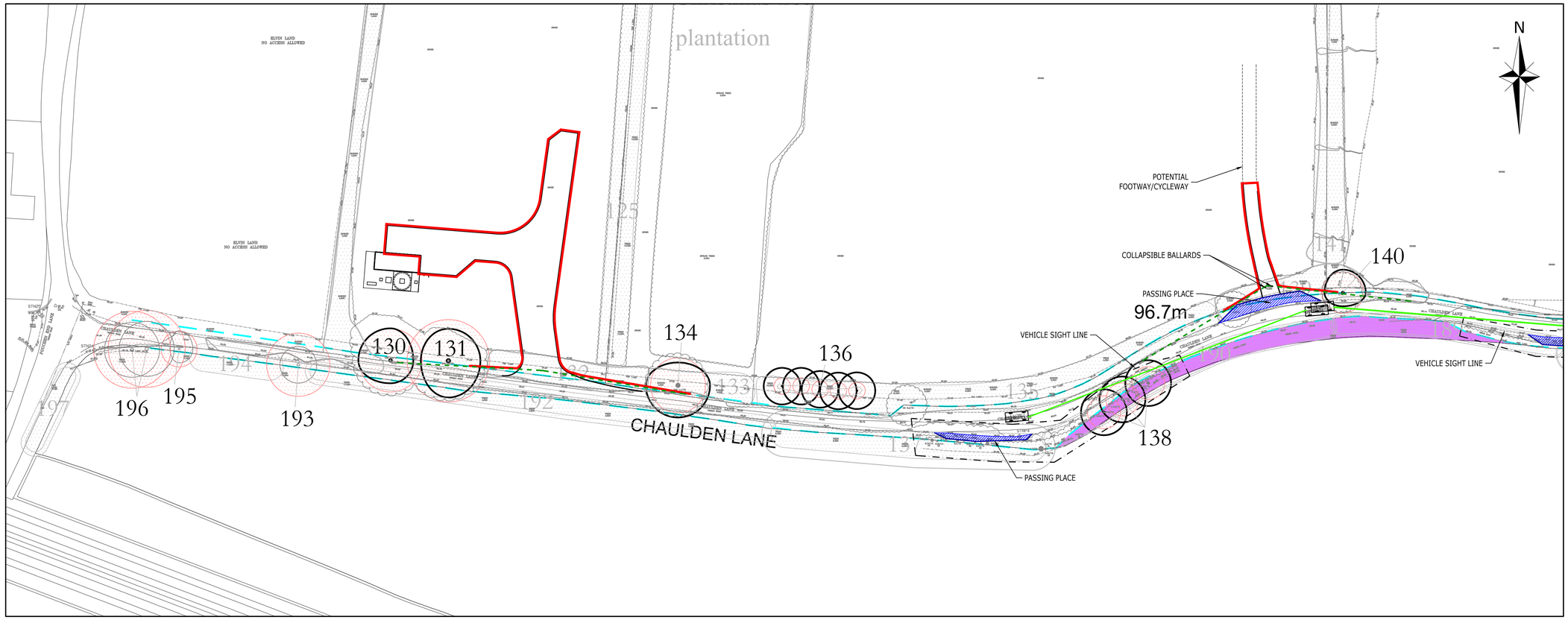
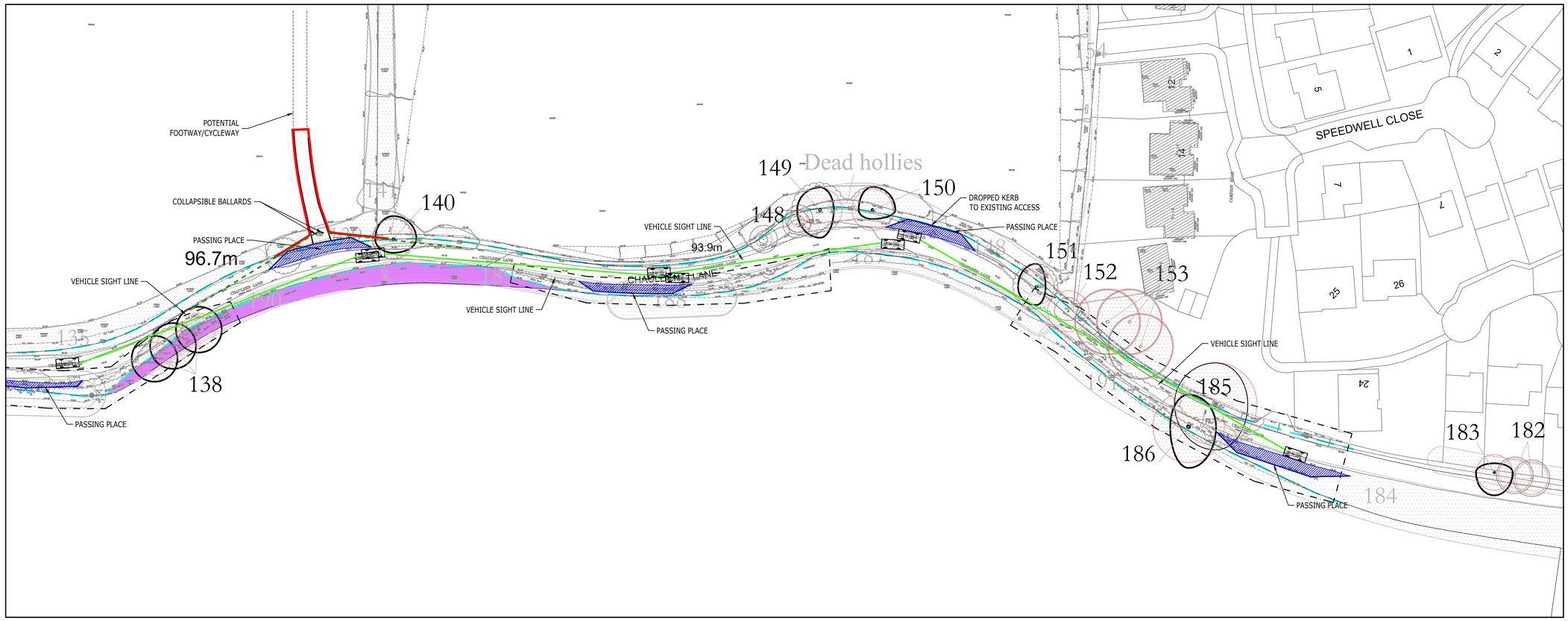
DRAWINGS





NOTES

1. GEOMETRY SUBJECT TO FURTHER TRAFFIC SURVEYS, VEHICLE TRACKING AND FURTHER DETAILED CAPACITY ASSESSMENTS
2. VISIBILITY SPLAYS SUBJECT TO SPEED SURVEYS AND AGREEMENT WITH HIGHWAYS AUTHORITY

LEGEND:

- ROOT PROTECTION AREA (RPA)
- HIGHWAY BOUNDARY
- MFS 2.4m x 31m VISIBILITY SPLAY FOR 25MPH SPEED
- ROAD TO BE ADOPTED S38
- SIGHT LINE
- UNMAINTAINED HIGHWAY
- S278

Rev	Amendments	Drn	Chk	App	Date
E	Minor amendments.	PL	TMS	GAC	Aug 17
D	Highway boundary, S38 and S278 added. Sight line revised.	PL	TMS	GAC	Aug 17
C	Travellers site access updated.	DF	GAC	GAC	Jun 17
B	Tree survey updated. Layby relocated to avoid root protection zone	BL	GAC	GAC	Nov 16
A	Highway boundary amended.	BL	GAC	GAC	Nov 16

G&A Consulting Engineers Ltd

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01252 939000

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www.c-a.uk.com

Job Title

LAND WEST OF HEMEL HEMPSTEAD

Drawing Title

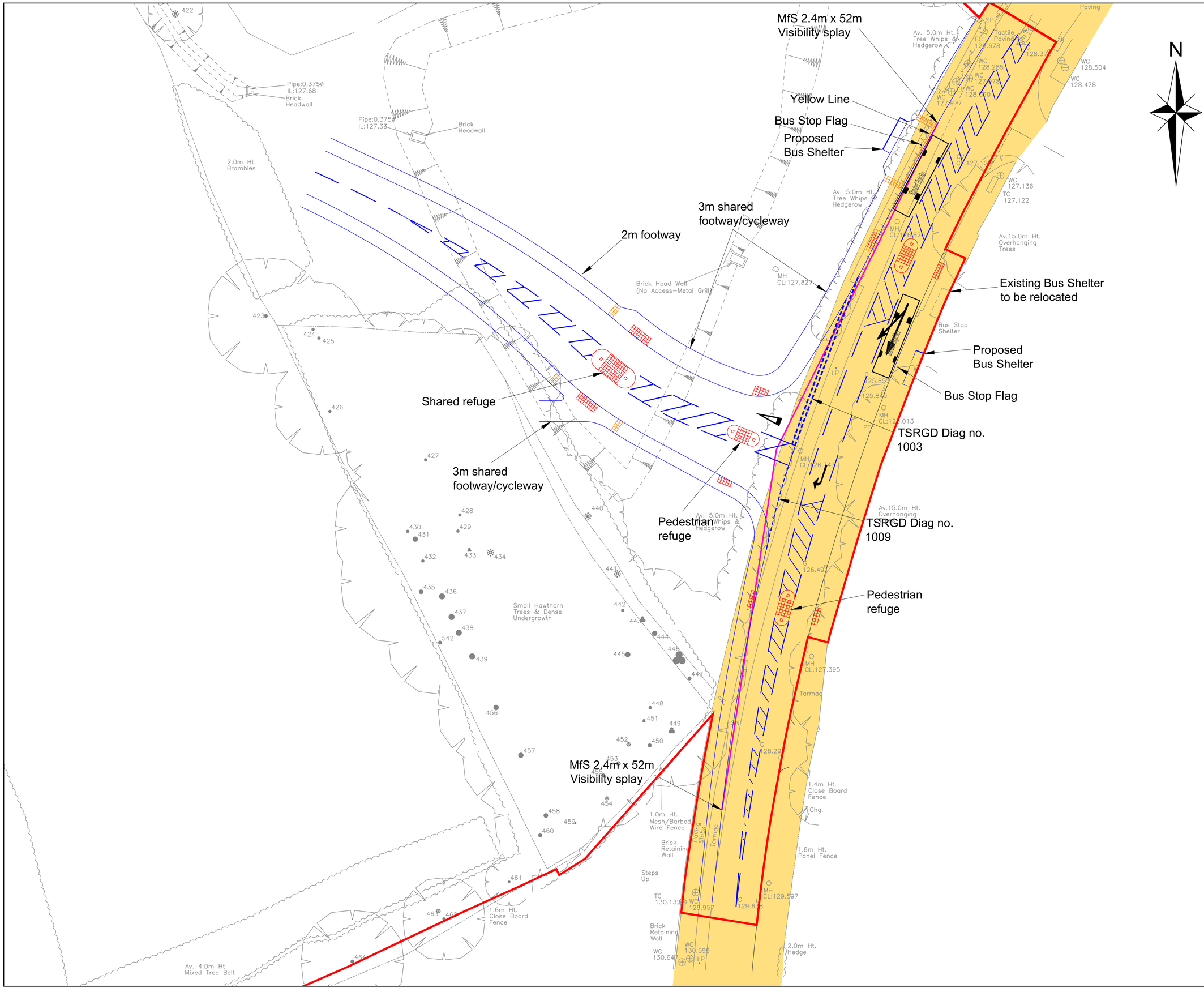
PROPOSED CHAULDEN LANE ACCESS AND INTERVISIBLE PASSING PLACES

Client

TAYLOR WIMPEY
BARRAT HOMES

Scale	Date	Designed
1:500@A1	NOV 16	BL
Drawn	**Checked**	**Approved**
BL/DF	TMS	GAC

Job No	Figure No	Rev
16-021	16-021-010	E



NOTES

Disclaimer: Design based on a third party topographical survey. C&A cannot be held responsible for any inaccuracies.

Note: Refer to Drawing No. 16-021-012 Rev A for junction location plan.
All crossings to be provided with dropped kerbs and tactile paving.

LEGEND

- Proposed kerb
- Proposed tactile paving
- Proposed ladder paving
- Proposed road markings
- Application Boundary
- Adopted Highway

Rev	Amendments	Drn	Chk	App	Date
E	Application boundary and adopted highway hatch added	EV	GG	GAC	Oct 17
D	Exit radius changed from 8m to 7m as requested	PL	TMS	GAC	Jun 17
C	Ladder paving added, Bus shelter amended	DF	TMS	GAC	Apr 17
B	Bus stops / ped crossing in Chaulden Lane updated	PL	TMS	GAC	Mar 17
A	Ladder updated	PL	TMS	GAC	Mar 17

Consulting Engineers Ltd

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East Malling Trust Estate
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ME20 6SN
01732 448120

enquiries@c-a.uk.com
www.c-a.uk.com

Job Title

Land West of Hemel Hempstead

Drawing Title

Proposed J1A Long Chaulden Access

Client

Taylor Wimpey
Barratt Homes

Scale	Date	Designed
1:250@A1	Feb 17	PL
Drawn	**Checked**	**Approved**
PL	TMS	GAC

Job No	Drawing No	Rev
16-021	16-021-071	E

Extension of existing road 'The Avenue' to tie in with proposed development.

Proposed footpath to tie into existing PROW

POPPY CLOSE

THE AVENUE

PRIVATE DRIVE

LANGDALE

KENILDALE

EASTON

R176.625

R180

R183.375

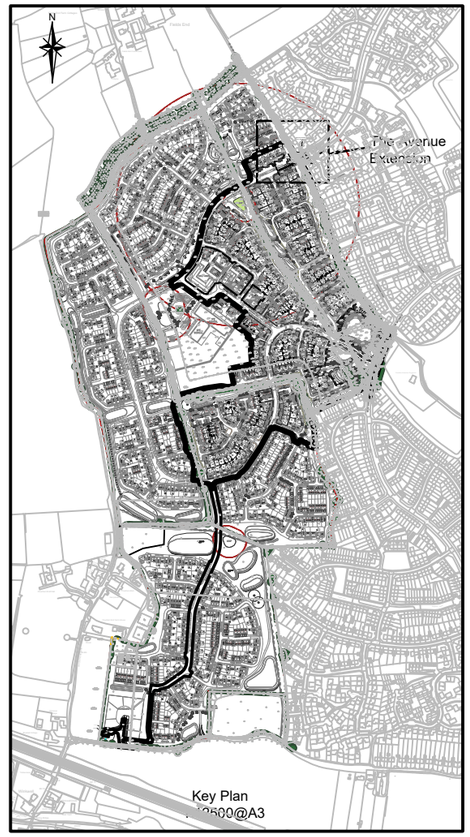
6.75

6.7

N

NOTES

1. Do not scale from this drawing.
2. Topographical survey provided by a third party. C&A can not be held responsible for any inaccuracies.
3. All dimensions are in metres unless otherwise stated.



Application Boundary

Adopted Highway

Phase 1 Boundary

HD 207586 (part)

Rev	Amendments	Drn	Chk	App	Date
C	Land parcel HD207586(part) boundary added	EV	GG	GC	Nov 17
B	Application boundary and adopted highway hatch added	EV	GG	GC	Oct 17
A	Revised Masterplan.	PL	TMS	GC	Jul 17

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☐ Park House, Park Farm, East Malling Trust Estate, Bradbourne Lane, Aylesford Kent ME20 6SN, 01732 448120

Job Title: Land West of Hemel Hempstead

Drawing Title: The Avenue Extension Plan

Client: Taylor Wimpey Barratt Homes

Scale	Date	Designed
1:500@A3	Jul 17	PL
Drawn	Checked	Approved
PL	TSH	GAC
Job No	Drawing No	Rev
16-021	16-021-149	C

N

NORTHRIDGE WAY

LONG CHAULDEN

LOWER SALES

NEIGHBOURING PROPERTIES

Diagram 611.1

Proposed kerbline

GIVE WAY SIGN TO BE RELOCATED

DMRB 4.5m x 25m Visibility Splay TD54/07 para. 6.19

Relocate Gully

Relocate Signpost

Relocate Lamppost

Relocate LP

Relocate Pedestrian Guardrailing

Revised Zebra Crossing

DMRB 4.5m x 35m Visibility Splay TD54/07 para. 6.19

BUS SHELTER

CHAULDEN DENTAL PRACTICE

NOTES

Disclaimer: Design based on a third party topographical survey. C&A cannot be held responsible for any inaccuracies.

Refer to Drawing No. 16-021-012 Rev A for junction location plan.

LEGEND

- Proposed kerb
- Proposed tactile pavings
- Proposed road markings

Visibility Comparison Table		
TD54/07 Fig6/5	Northern	Western
Existing	4.5m x 25m	4.5m x 35m
Proposed	4.5m x 25m	4.5m x 35m

Rev	Amendments	Drn	Chk	App	Date
F	Crossing added on Long Chaulden	PL	TMS	GAC	Jul 17
E	Minor amendments and visibility comparison table added	PL	TMS	GAC	Jun 17
D	Signage added	PL	TMS	GAC	May 17
C	Vehicle parking stand added on Northridge Way	DF	TMS	GAC	Apr 17
B	Visibility Splays updated	PL	TMS	GAC	Mar 17
A	Legend updated	PL	TMS	GAC	Mar 17

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Job Title

Land West of Hemel Hempstead

Drawing Title

Proposed J3 Long Chaulden Northridge Way Improvements

Client

Taylor Wimpey
Barratt Homes

Scale	Date	Designed
1:200@A2	Mar 16	DF
Drawn	Checked	Approved
DF/PL	TMS	GC
Job No	Drawing No	Rev
16-021	16-021-072	F

N

LONG CHAULDEN

NEIGHBOURING BUILDINGS

DMRB 4.5m x 25m
Visibility Splay
TD54/07 para. 6.19

Diagram 611.1
& 602

Diagram 1003.3

Proposed
kerbline

Diagram 611.1

Diagram 1003

Diagram 611.1
and 602

Proposed traffic
island

WARNERS END ROAD

Proposed
kerbline

Dropped kerb for
existing crossover

Diagram 611.1
and 602

Diagram 1023

Diagram 1003.3

Proposed
kerbline

Diagram 611.1

Diagram 1003.3

DMRB 4.5m x 25m
Visibility Splay
TD54/07 para. 6.19

Proposed
kerbline

Diagram 611.1
& 602

Petrol filling
station
entrance/exit

NORTHRIDGE WAY

CARPARK

TARMAC

NEIGHBOURING BUILDINGS

FOOTPATH (TARMAC)

BRICK WALL HT 1.0m

BRICK WALL HT 0.4m

BRICK WALL HT 0.8m

C/L FENCE HT 2.0m

I/R FENCE HT 1.2m

C/B FENCE HT 1.8m

HEDGE HT 1.2m

GATE

S1

S2

NOTES

Disclaimer: Design based on a third party topographical survey. C&A cannot be held responsible for any inaccuracies.

Refer to Drawing No. 16-021-012 Rev A for junction location plan.

Street furniture such as lamp post to be relocated as required.

LEGEND

- Proposed kerb
- Proposed tactile pavings
- Proposed road markings
- Proposed construction

Visibility Comparison Table		
TD54/07 Fig6/5	Boxted Rd	Northridge Way
Existing	9m x 23.8m	9m x 26.4m
Existing	4.5m x 28.8m	4.5m x 34.6m
Proposed	4.5m x 25m	4.5m x 25m

Rev	Amendments	Dm	Chk	App	Date
G	Changes as per RSA comments.	PL	TMS	GAC	Jul 17
F	Minor amendments in southern entry arm.	PL	TMS	GAC	Jul 17
E	Road markings updated.	PL	TMS	GAC	Jun 17
D	Visibility splays amended. Giveyway and mini roundabout signages added.	PL	TMS	GAC	April 17
C	Northridge Way Crossing and Petrol filling station entrance / exit amended.	DF	TMS	GAC	April 17
B	Northridge Way and Boxted Road Giveway adjusted.	PL	TMS	GAC	Mar 17
A	Legend updated	PL	TMS	GAC	Mar 17

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Job Title
Land West of Hemel
Hempstead

Drawing Title
Proposed J4&5 Long Chaulden
Warners End Rd Improvements

Client
Taylor Wimpey
Barratt Homes

Scale	Date	Designed
1:200@A1	Feb 17	DF

Drawn	Checked	Approved
DF/PL	TMS	GC

Job No	Drawing No	Rev
16-021	16-021-067	G

NOTES

Disclaimer: Design based on a third party topographical survey. C&A cannot be held responsible for any inaccuracies.

Refer to Drawing No. 16-021-012 Rev A for junction location plan.

LEGEND

- Proposed kerb
- Proposed tactile pavings
- Proposed road markings
- Proposed construction

Rev	Amendments	Dm	Chk	App	Date
C	Added circulatory road markings.	PL	TMS	GAC	Jun 17
B	The kerbline of the splitter islands amended to meet central island tangentially as per TD16/07 para 7.30.	PL	TMS	GAC	Apr 17
A	Legend updated and tactile paving	PL	TMS	GAC	Mar 17

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Job Title

Land West of Hemel Hempstead

Drawing Title

Proposed J6 Warners End Rd Leighton Buzzard Rd Improvements

Client

Taylor Wimpey
Barratt Homes

Scale	Date	Designed
1:500@A2	Feb 17	DF

Drawn	Checked	Approved
DF/PL	TMS	GAC

Job No	Drawing No	Rev
16-021	16-021-069	C

N

GREEN END ROAD

FISHERY ROAD

ST JOHNS R

Proposed kerbline

Proposed Retaining Wall

Relocate

PARKWOOD SURGERY

No. 286 / 288

No. 22

No. 33

NOTES

Disclaimer: Design based on a third party topographical survey. C&A cannot be held responsible for any inaccuracies.

Refer to Drawing No. 16-021-012 Rev A for junction location plan.

LEGEND

- Proposed kerb
- Proposed road markings
- Proposed construction

Rev	Amendments	Drn	Chk	App	Date
B	Retaining wall relocated.	PL	TMS	GAC	July 17
A	Legend updated.	PL	TMS	GAC	Mar 17

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Job Title

Land West of Hemel Hempstead

Drawing Title

Proposed J7 St Johns Rd Fishery Rd Improvements

Client

Taylor Wimpey Barratt Homes

Scale	Date	Designed
1:200@A2	Mar 16	DF
Drawn	Checked	Approved
DF/PL	TMS	GC
Job No	Drawing No	Rev
16-021	16-021-073	B

N

Path

Path

HORSE CHESTNUT
G 3.0
HT 17m

HORSE CHESTNUT
G 2.9
HT 12m

HORSE CHESTNUT
G 3.0
HT 10m

FISHERY ROAD

PROPOSED DROPPED KERB
FOR CYCLE ACCESS

EXISTING DROPPED KERB

PROPOSED EXTENSION TO SHARED
PEDESTRIAN / CYCLEPATH CONTINUES
UP TO EXISTING FACILITY OF LONDON ROAD

PROPOSED KERBLINE

EXISTING 7.5T
RESTRICTION

LIME
G 3.2
HT 30m

HORSE CHESTNUT
G 2.2
HT 12m

G 0.7
HT 7m

HORSE CHESTNUT
G 2.0
HT 12m

EXISTING PEDESTRIA

EXISTING DROPPED KERB

KEEP CLEAR

MAPLE
G 1.7
HT 16m

LONDON ROAD

BUS STOP

S1

S2

KEEP CLEAR

PROPOSED KERBLINE

ASH
MG 0.4
HT 12m

ASH
MG 0.4
HT 12m

AREA OF ASH TREES
APPROXIMATE POSITIONS

PINE
G 0.8
HT 27m

G 0.9
HT 23m

G 1.5
HT 22m

G 0.5
HT 11m

G 0.9
HT 21m

G 1.5
HT 13m

G 1.5
HT 12m

G 1.3
HT 11m

G 1.6
HT 14m

NOTES

DISCLAIMER: DESIGN BASED ON A THIRD PARTY TOPOGRAPHICAL SURVEY. C&A CANNOT BE HELD RESPONSIBLE FOR ANY INACCURACIES.

REFER TO DRAWING NO. 16-021-012 REV A FOR JUNCTION LOCATION PLAN.

LEGEND

- PROPOSED KERB
- PROPOSED LADDER PAVING
- PROPOSED ROAD MARKINGS
- PROPOSED CONSTRUCTION

Rev	Amendments	Drn	Chk	App	Date
B	Drawing amended to suit comment from Stage 1 RSA	DF	TMS	GAC	03/04/17
A	Legend updated	PL	TMS	GAC	Mar 17

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Job Title
Land West of Hemel Hempstead

Drawing Title
Proposed J8 London Rd
Fishery Rd Improvements

Client
Taylor Wimpey
Barratt Homes

Scale	Date	Designed
1:200@A1	Feb 2017	DF
Drawn	Checked	Approved
DF/PL	TMS	GC
Job No	Drawing No	Rev
16-021	16-021-068	B