

# **HS2**

## **Traffic Calming and Road Safety Provision Options – Woore Village**

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# 1 Executive Summary

- 1.1.1 HS2 has engaged with Woore Parish Council to address their concerns regarding the potential effects of HS2 construction traffic on Woore village. Woore Parish Council has suggested measures to mitigate the effects of HS2 construction traffic. This report examines the suggested mitigation proposals and proposes a package of measures which could practically be implemented to improve traffic behaviour (focussing on: traffic speed, pedestrian safety at road crossings, pedestrian safety on footways, safety of A51/A525 junction) in Woore village during the construction phase of HS2.
- 1.1.2 The concerns expressed by Woore Parish Council reflect existing underlying issues with speed management and lack of good provision for pedestrians, which the additions of HS2 construction traffic will have the potential to worsen. A number of options have been considered to improve pedestrian safety and enhance traffic calming in Woore Village. These options would form a package of measures to address concerns over traffic speed compliance and pedestrian safety in Woore.
- 1.1.3 Measures would complement provisions for the control of HS2 construction traffic set out in the HS2 Route-wide Traffic Management Plan for the Proposed Scheme.
- 1.1.4 The review of each measure considered the existing road and traffic conditions within Woore village, potential future improvements to provisions, their benefits to Woore village, dis-benefits and the associated costs.
- 1.1.5 The measures have been considered as a temporary design improvement, with the assumption that once HS2 Phase 2a construction has been completed, any mitigation works would be removed, and the highway returned to its original layout. Should the local highway authority wish to retain them after HS2 construction is complete, consideration could be given to retain some of the provisions permanently under their highways powers.
- 1.1.6 The recommended design package (Refer to Section 12 for further details) combines the following physical, non-physical and traffic management measures to improve road user and pedestrian safety in Woore village:
- Measure 1: A series of soft calming measures including road marking measures; upgrading of an existing controlled crossing; installation of a new zebra crossing and improved gateways in the north and south entrances to the village.
  - Measure 2: Vehicle Activated Signs (VAS)
  - Measure 4: Adjustments to the kerb-lines at the junction of the A51 / A525 junction.

- Measure 11: Improvements to pavement provision adjacent to the Falcon Inn.

- 1.1.7 Following feedback from Woore Parish Council on the design packages presented in this study, any packages requiring changes to the highway will need to be discussed and approved with the highway authority, Shropshire County Council, prior to being implemented.
- 1.1.8 This report has been produced on behalf of High Speed Two (HS2) Limited. The views expressed in this report do not necessarily reflect the views of HS2 Limited.

## 2 Introduction

### 2.1 Background

- 2.1.1 Woore Village is situated some 2.5km south west of the line of route of HS2. As a result of construction of the Proposed Scheme, the Environmental Statement, which accompanied the deposit of the HS2 Phase 2a High-Speed Rail (West Midlands - Crewe) Bill, “the Bill”, in Parliament assumes that some HS2 construction traffic will pass through the village via the A525 and A51 (both roads passing through the village). The use of the A51 London Road and the A525 is primarily to provide construction traffic access to the Madeley Cutting and Madeley Tunnel South satellite compounds, when the sites are being established, to service them during construction of the main works and, at the end of the construction phase (when the satellite compounds are to be removed). Once the satellite compounds are established, a main haul route is expected to be constructed along the alignment of the trace. This will minimise the amount of construction traffic using the local road network.
- 2.1.2 Woore Parish Council and Woore Primary and Nursery School petitioned the Bill, regarding their concerns with respect to heavy construction traffic passing through the village. These concerns were then raised during their appearance in Select Committee, in May 2018. The Select Committee’s Second Special Report of Sessions 2017-2018 (July 2018) requested that HS2 give further consideration (working with Shropshire County Council) to traffic calming and road safety provision for Woore village. Additional traffic surveys were undertaken in August 2018. A site visit was undertaken in early September 2018 in support of the options considered in this report.
- 2.1.3 The concerns expressed related to existing traffic speed within the village, pedestrian safety at both road crossings, pedestrian safety on the village footways (particularly for those accessing the school), the safety at the A51 and A525 junction in the centre of the village and local parking provision during construction.
- 2.1.4 The purpose of this report is to consider potential options with respect to traffic calming and road safety provision in Woore village. This takes into consideration the points made by Woore Parish Council and Woore Primary and Nursery School to the Select Committee and discussions between HS2 Ltd., Woore Parish Council and Shropshire County Council on the 31st July 2018. A list of community requests was prepared by Woore Parish Council following the consultation on 31<sup>st</sup> July and each of these have been considered with respect to potential options for traffic calming and improved road safety in Woore.

## 3 Existing Provisions and Conditions

### 3.1 Background supporting option assessment

- 3.1.1 The A51 and A525 are not part of the Highways England national routes for heavy or high abnormal loads<sup>1</sup>. These roads may be part of Shropshire County Council's internal routes for "high" or "heavy", vehicles but this is yet to be confirmed.
- 3.1.2 No detailed survey data is available for Woore to determine accurate road layout details for this stage of design. All design in this report is based on the standard Ordnance Survey data available in the public domain.
- 3.1.3 The A51 and A525 roads are part of the local bus route network. Neither is part of the national cycle network.

### 3.2 Current speed restrictions and accident data

- 3.2.1 The A525 is a national speed limit carriageway, with a short section of 40mph leading up to the 30mph speed limit at the entry to Woore village. The southbound approach to Woore, on the A51, is a national speed limit carriageway leading up to the 30mph speed limit at entry to Woore village. The northbound approach to Woore, on the A51, is a 40mph speed limit (from Ireland's Cross) leading up to the 30mph speed limit at the entry to Woore village.
- 3.2.2 Speed compliance signs have been erected through Woore village, in the form of speed indicator signs. These are located on the A51 on the approach to the A525 junction to encourage drivers to slow down. Recent speed and volume data collection surveys in August 2018 were carried out some time after the installation of these signs.

#### Speed limit

- 3.2.3 The latest survey undertaken by HS2 (subsequent to those for the Environmental Statement (2017)) was undertaken in August 2018. This provided additional speed and volume traffic surveys for Woore village along the A51 and the A525. Figure A15, in Appendix A shows the locations of where the speed and volume data were collected. A summary of key findings is presented in Appendix A, Table 4.
- 3.2.4 Table 4 indicates the 85<sup>th</sup> percentile speeds exceeded the speed limit (30mph) on the A51 at Woore (site 4). The surveyed values (30.6mph

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<sup>1</sup> Highways England defines that certain routes are suitable for use (subject to appropriate precautions) by vehicles which are abnormally high compared to the standard vehicles which use the road system. Highways England also defines that certain routes are suitable for use (subject to appropriate precautions) by vehicles which are abnormally heavy compared to the standard vehicles which use the road system.

northbound and 32.0mph southbound) indicate that the majority of vehicles passing through Woore on the A51 are not exceeding the applicable speed limits. Measured data shows that traffic on the A525 in Woore is generally travelling significantly slower than the 30mph limit.

### **Accident data**

- 3.2.5 A UK-wide accident data source 'Crashmap' shows that for the last 5 years there have been three recorded accidents along the A51 within Woore village. This includes two slight incidents at the junction with the A525 and one slight incident further north of the village centre.
- 3.2.6 The data indicates that there are no accident clusters (nine or more accidents in three years) on roads in Woore.

## 4 Management of Construction Traffic in the Proposed Scheme

### 4.1 Assessment of the Proposed Scheme at Woore

- 4.1.1 As part of the environmental impact assessment (EIA) of the Proposed Scheme a traffic assessment of existing traffic flows along the A51 and A525 through Woore village and evaluation of construction traffic has been undertaken. This is presented in the Environmental Statement deposited with the Proposed Scheme in July 2017.
- 4.1.2 The Environment Statement (2017)<sup>2</sup> reports that use of the local road network for HS2 construction traffic will increase traffic flows in the village of Woore during the peak month of construction, from the current traffic baseline: on the A51, south of the A525, by 10%; on the A525, by 14%; and on the A51, north of the A525, by 3%.
- 4.1.3 The Environment Statement (2017) reports slightly higher HGV flows on the A51, south of the A525 than on the A525. On the A51, north of the A525, HGV flows are substantially lower. Average daily HS2 HGV construction traffic (combined two-way flow) during the peak month of construction is reported as 548 total vehicle movements on the A51 in Woore, south of the A525 with a peak period (where HGV traffic exceeds 70% of the peak month) of two months and a busy period (where HGV traffic exceeds 50% of the peak month) of five months.
- 4.1.4 Appendix A includes the alphabet map for the Woore area which illustrates future baseline and AP1 revised scheme traffic flows. Appendix A also includes the AP1 revised scheme traffic histogram for the A51 south of the A525. The traffic figures reported in this Section 4.1 are consistent both for the Proposed Scheme and the AP1 revised scheme. Full details of the AP1 revised scheme are available in the Supplementary Environmental Statement and Additional Provision Environmental Statement<sup>3</sup>, published in March 2018.

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<sup>2</sup> HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Statement*, <https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement>

<sup>3</sup> HS2 Ltd (2018), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Supplementary Environmental Statement (SES1) and Additional Provision Environmental Statement (AP1 ES)*, <https://www.gov.uk/government/collections/hs2-phase-2a-supplementary-environmental-statement-and-additional-provision-environmental-statement>

## 4.2 Construction traffic control measures

### Route-wide Traffic Management Plan

- 4.2.1 The nominated undertaker has produced a Route-wide Traffic Management Plan (RTMP) which sets out how the project will be delivered. The RTMP has been consulted on with the highway authorities along the Phase 2a route. The RTMP covers matters such as plans to be produced by the Principal Contractor, consultation arrangements, vehicle flow management, driver and vehicle safety, travel to work, temporary traffic management and asset protection.

### Local Traffic Management Plan

- 4.2.2 Prior to the commencement of the works, the nominated undertaker will require that Local Traffic Management Plans (LTMP) are produced, in consultation with the local highway and traffic authorities, the emergency services and other relevant key stakeholders, such as bus companies. The LTMPs will typically include a list of roads which may be used by construction traffic near the site, including any restrictions to construction traffic on these routes.
- 4.2.3 The impact of road-based construction traffic would be managed in accordance with the Construction Code of Practice.
- 4.2.4 The LTMP would set-out a contractor's statement of intent regarding their key methods of working which will affect the road network and users. It will identify matters such as anticipated changes to the road network, including major road closures.
- 4.2.5 Contractors would be required to assess their traffic flow assumptions to ensure that, in accordance with Environmental Minimum Requirements, no new significant adverse effects would occur, beyond those reported in the Environmental Statement, due to construction traffic volumes.

### Quality plans and assurance / enforcement

- 4.2.6 In accordance with the Construction Code of Practice, HS2 Ltd will require the main civil works principal contractor to operate their fleet (vehicles over 3.5t) under a recognised quality management operation. This may be ISO39001 or the Fleet Operator Recognition Scheme. Other quality plans may be recognised by the nominated undertaker.
- 4.2.7 Vehicles regularly accessing any HS2 construction site will be required to adopt vehicle and driver safety standards which exceed the Construction Logistics and Community Safety (CLOCS) Standard, or equivalent.

- 4.2.8 The CLOCS standard includes improvements to vehicles beyond the legal minimum to seek to reduce the number of vulnerable road user crashes and injuries.
- 4.2.9 The HS2 requirements are that the project's contractors adopt most, if not all CLOCS standards but that the contractors are to adopt higher requirements, including:
- drivers working on the project for more than 6 months undertake rural driver training;
  - mass spoil vehicles are fitted with 4-way, or 360 degree digital recording equipment.

## 5 Measures Considered

- 5.1.1 Woore Parish Council and Woore Primary and Nursery School have raised concerns with respect to traffic speed compliance through the village and the potential risk this poses to safety, particularly for vulnerable road users. Analysis of the speed survey data indicates that some drivers are exceeding the speed limit in Woore on the A51 London Road, in the southbound direction, where the 85<sup>th</sup> percentile speed is 32 mph. Proposals to provide additional traffic calming in Woore may lead to a reduction in average vehicle speeds through Woore.
- 5.1.2 Although the Proposed Scheme construction traffic control measures (described in Section 4) will ensure that construction traffic would meet legal requirements and road safety standards, further options for complementary traffic calming measures have been considered to improve traffic speed compliance and potential safety concerns in Woore village.
- 5.1.3 When considering traffic calming measures to assist in speed management, there are soft (non-physical), which affect driver behaviour and hard (physical), which are self-enforcing measures that can be adopted. Combinations of hard and soft measures can also be effective.
- 5.1.4 The review of each potential measure considered the requirements, benefits, dis-benefits and the associated costs. The measures have been considered as a temporary design with the assumption that once HS2 construction is complete, that any mitigation works will be removed and returned to its original layout. If the highway authority were to desire the measures to remain as permanent installations, then HS2 would enter discussion with them at a later stage.
- 5.1.5 Specific requests for consideration have been identified by Woore Parish Council and have been considered in the assessment and the presentation of the options in this report.
- 5.1.6 The approach adopted in this assessment considers the effectiveness of non-physical, physical, combined (physical and non-physical), and traffic management measures, on traffic calming and road safety. Specific recommendations relating to each measure, or combination of measures incorporate these criteria in the decision process.
- 5.1.7 The following sections of the report present the assessment of the measures listed in Table 1 that were considered with a view to improving road and pedestrian safety in Woore village during the Phase 2a construction period.
- 5.1.8 A design package combining a number of measures from the listed options is considered to be the optimum solution. Two design packages were

appraised and the measures included in each design package are summarised in Table 1. Design Package 2 is the recommended solution. Full details on the recommended design package can be found in Section 10.3.

Table 1: List of measures assessed

| Measure Type                      | No. | Description  | Design Package 1 | Design Package 2 (Recommended) |
|-----------------------------------|-----|--|------------------|--------------------------------|
| Soft Calming                      | 1   | Road marking, upgrade of gateways and upgrade of crossings           | X                | X                              |
|                                   | 2   | Vehicle Activated Signs  |                  | X                              |
|                                   | 3   | Alternative soft traffic calming measures                            |                  |                                |
| Hard Calming                      | 4   | A51/A525 junction safety improvements                                | X                | X                              |
|                                   | 5   | Hard traffic calming measures on A51 north of the A51/A525 junction  |                  |                                |
|                                   | 6   | Hard traffic calming measures on A51 south of the A51/A525 junction  | X                |                                |
|                                   | 7   | Extension of hard traffic calming measures along A51, A525 and B5026 |                  |                                |
| Traffic Management                | 8   | Alternative hard traffic calming measures                            |                  |                                |
|                                   | 9   | School crossing patrols  |                  |                                |
| Improvements to Footway Provision | 10  | Enhanced pedestrian crossing points on A51                           |                  | X                              |
|                                   | 11  | Footway improvements close to the Falcon Inn                         |                  | X                              |
|                                   | 12  | Continuous pavement along the A51, A525 and B5026                    |                  |                                |
|                                   | 13  | Pedestrian access to Bridgemere Garden Centre                        |                  |                                |

## 6 Soft Traffic Calming Measures

### 6.1 Soft traffic calming options

6.1.1 Soft calming measures make use of features that require no physical change to the road layout or its vertical or horizontal alignment. The design aim of the soft calming measures described below is to increase road user's awareness of the speed limit through Woore and to enhance pedestrian facilities along the route to assist in key areas (e.g. outside the school and by the local shops). The design development took into account factors including the August 2018 speed survey data and an assessment of the existing road layout, provision and conditions. On this basis it was determined that soft measures would generally focus on roads on the southern side of the village, south of the A525.

6.1.2 The following measures were taken forward to a more detailed appraisal, where engineering and construction feasibility, cost and environmental impacts were considered:

- Measure 1 – Road marking, upgrade of gateways and upgrade of crossing
- Measure 2 – Vehicle Activated Signs

6.1.3 Alternative soft calming measures that were not taken forward to a detailed appraisal are outlined in the description of Measure 3.

### 6.2 Measure 1 – Road marking, upgrade of gateways and upgrade of crossing

6.2.1 This measure uses a combination of road markings, gateway upgrades and crossing upgrades. The aim is to create an environment within the village where drivers feel constrained to reduce their speeds and their awareness is reinforced that there are pedestrians present by regular reminders and visual cues. The aim would be to bring the 85<sup>th</sup> percentile speed to lower than the 30mph speed limit (it is currently above this speed limit on the A51, based upon recently measured data).

6.2.2 Soft calming in the village would be enhanced by additional road markings. This may include:

- School roundel markings being installed in the carriageway to supplement and enhance the existing signage.
- Anti-skid coloured surfacing and "Slow" text road marking being installed on the A51 southbound approach to the A51/A525 junction.

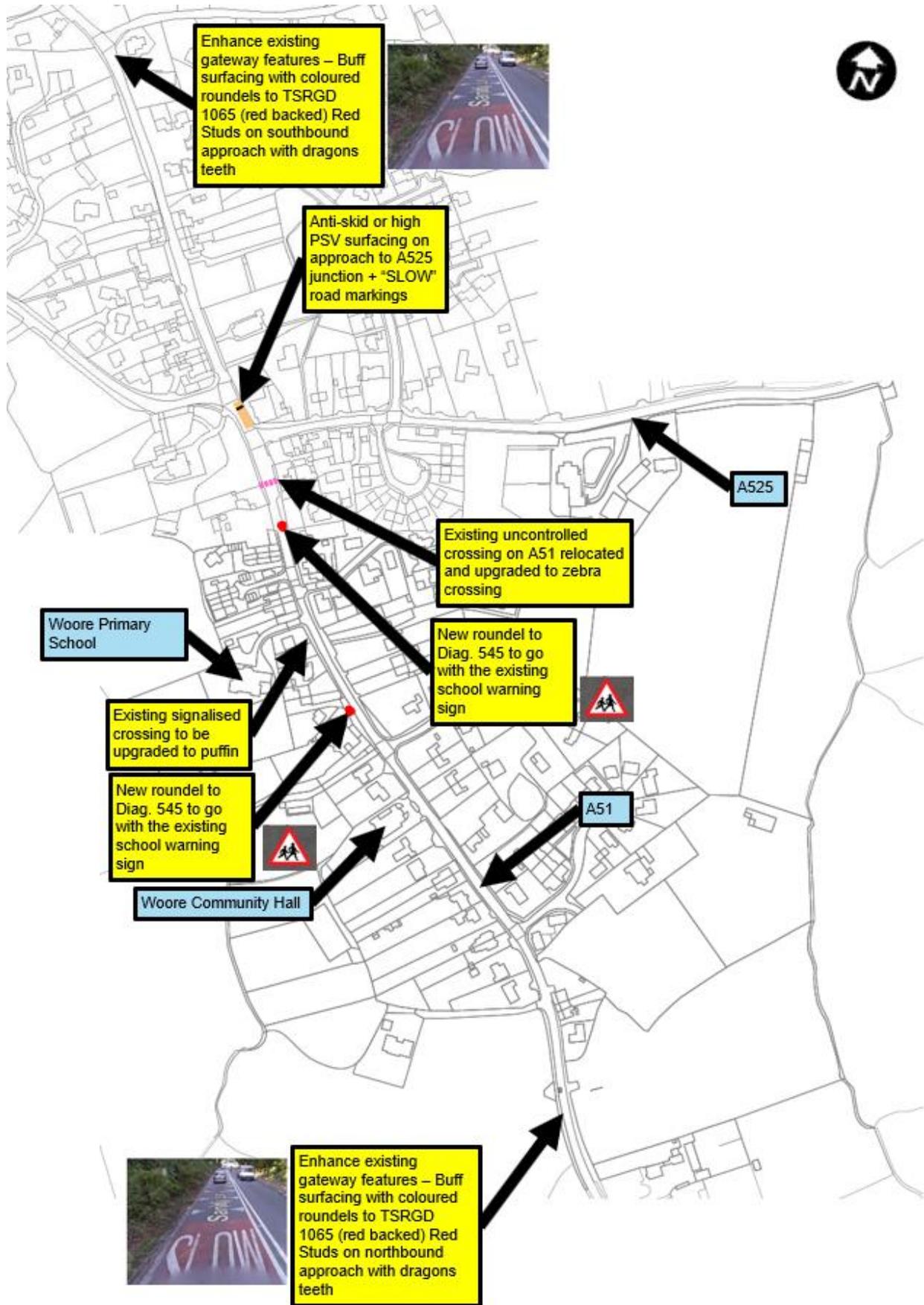
- Red coloured surfacing with speed limit roundels and additional dragon's teeth markings being utilised to enhance the gateway features on the A51 at both entrances to the village. This would further highlight change to the 30mph speed limit.

- 6.2.3 The existing signalised crossing outside the school in Woore would benefit from an upgrade to the latest puffin crossing<sup>4</sup> design. The change would benefit pedestrian experience and safety, particularly for school children, since on-crossing detection would extend green times for the pedestrian phase, when necessary. In addition, drivers would generally benefit from reduced wait times (because requests to stop would be cancelled if the pedestrian is detected to be no longer waiting at the crossing point). The request button and red/green man signals would also be upgraded leading to improved visualisation and usability, particularly for school children.
- 6.2.4 The existing uncontrolled crossing point on A51, just south of the A51/A525 junction would benefit from an upgrade to a zebra crossing. This would improve pedestrian safety at the crossing point. The crossing point would likely be relocated slightly further south as part of the changes associated with 'Measure 4 - A51/A525 junction safety improvements', which is also a recommended measure in all design packages.
- 6.2.5 Identification of key hazard targets together with a summary and indicative layout of potential combined soft calming measures options for Woore (as discussed above) is illustrated in Figure 1.

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<sup>4</sup> Puffin crossing - this term is used in the UK to describe a smart signalised crossing for pedestrians to differentiate from the old timed duration 'pelican' crossing. The puffin crossing uses sensors to sense people waiting and crossing to keep the red phase active for the required duration

Figure 1: Measure 1 - Combined soft traffic calming measures and identification of main hazard targets



## Advantages

6.2.6 The following advantages are identified for Measure 1:

- Improved pedestrian safety at crossing points on A51;
- Low disruption to local residents and businesses as a result of the installation process;
- Soft calming has no impact on journey comfort or impact on emergency services and their response time travelling through an area; and
- Soft calming can reduce the urbanising feel to any calming.

## Disadvantages

6.2.7 Disadvantages identified for Measure 1:

- May require additional soft or hard traffic calming measures to achieve reduction in 85<sup>th</sup> percentile speed on A51 below the speed limit. (E.g. Measure 2 – Vehicle Activated Signs); and
- Existing issues related to HGV turning movements at the A51/A525 junction (Refer to Section 7.2 for further details) can't be resolved through soft calming measures only.

## Recommendation

6.2.8 The soft traffic calming measures outlined above would likely contribute to a slight reduction in the 85<sup>th</sup> percentile speed through Woore village in addition to broader road safety improvements. However, soft measures alone would not resolve certain existing road safety issues such as the HGV movement issues at the A51/A525 junction.

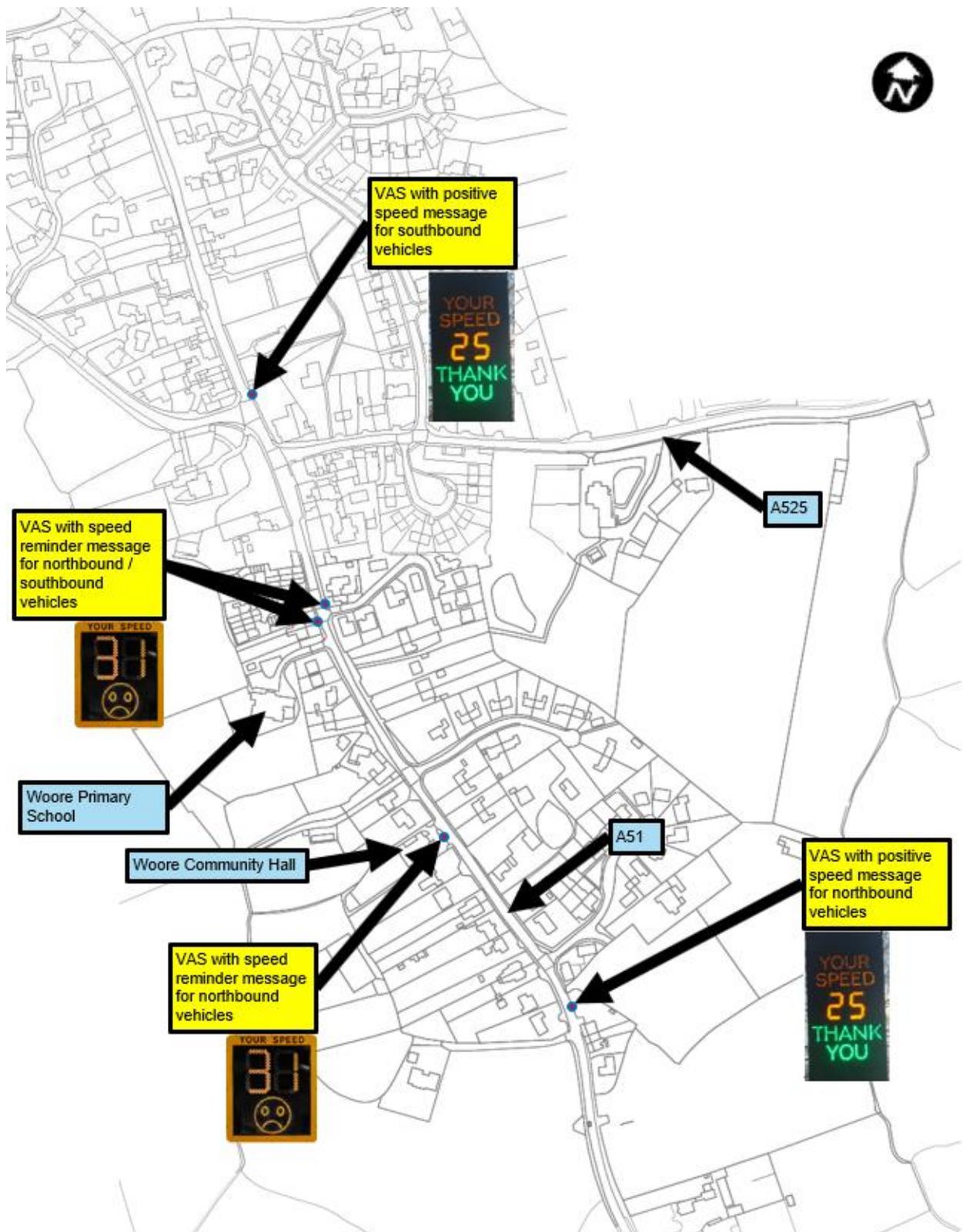
6.2.9 It is recommended that these soft traffic calming measures should be incorporated into a broader final package of works that also includes some hard traffic calming measures.

## 6.3 Measure 2 – Vehicle Activated Signs

6.3.1 Measure 2 includes five VAS signs along the A51, with two of these being larger and showing more information (located on the northern side of the A525 junction and the southern end of Woore). The indicative VAS signs layout is shown in Figure 2.

6.3.2 The aim would be to bring the 85<sup>th</sup> percentile speed to lower than the 30mph speed limit (it is currently above this speed limit on the A51, based upon recently measured data). VAS signs convey an illuminated message to drivers in response to vehicle speeds exceeding a pre-defined threshold. Thus, VAS signs target the message specifically at those drivers that need it.

Figure 2: Measure 2 - Indicative VAS sign layout



### Advantages

6.3.3 The following advantages are identified for Measure 2:

- VAS signs are blank when not activated. This limits visual intrusion, which is particularly relevant in rural areas;
- VAS signs can be powered by renewable methods (wind, and solar) in the absence of local mains electricity which can limit the disruption of installation (although the solar panels can have an urbanisation effect);
- VAS signs are relatively quick and easy to install, particularly lamp column mounted signs. VAS signs mounted on lamp columns can be relocated to new positions with minimal effort;
- Low disruption to local residents and businesses as a result of the installation process;
- Soft calming has no impact on journey comfort or impact on emergency services and their response time travelling through an area; and
- Soft calming can reduce the urbanising feel to any calming.

### **Disadvantages**

6.3.4 The following disadvantages are identified for Measure 2:

- VAS signs rely on voluntary reductions in speed. Not all drivers will respond correctly;
- Larger signs can be visually intrusive in rural areas, especially if powered by renewable means (due to the additional solar array);
- The signs need regular maintenance;
- The signs may need a power supply which would require a utility connection and associated disturbance to the footpath (renewable energy options rely on the correct conditions to power the sign and these are not always present); and
- Existing issues related to HGV turning movements at the A525/A51 junction (See Section 7.2 for further details) can't be resolved through soft calming measures only.

### **Recommendation**

6.3.5 The installation of VAS along the A51 would likely contribute to a reduction in the 85<sup>th</sup> percentile speed through Woore village. However, this measure alone would not resolve certain existing road safety issues such as the HGV movement issues at the A51/A525 junction.

6.3.6 It is recommended that VAS signs be incorporated into a broader combined package of measures that also includes some hard traffic calming measures.

## **6.4 Measure 3 – Alternative soft traffic calming measures**

6.4.1 A number of alternative soft traffic options were considered at the village of Woore but were discounted as part of the preliminary appraisal of options that was undertaken. This preliminary appraisal considered options in terms of whether they are reasonable against environmental, technical and design criteria, these are as follows:

- Measure 3a – Provision of soft traffic calming measures outside Woore village
- Measure 3b - Provision of speed cameras
- Measure 3c – Provision of prominent speed gate on A525
- Measure 3d – Provision of a temporary pedestrianised crossing at the Falcon Inn
- Measure 3e - Provision of a temporary pedestrianised crossing at the A525

6.4.2 A consideration of each of the above options is provided in Appendix B of this report.

## 7 Hard Traffic Calming Measures

### 7.1 Discussion of Hard Calming Options

- 7.1.1 Hard calming makes use of features that require physical changes to the road layout or its vertical profile.
- 7.1.2 This method of traffic calming is largely self-enforcing and would slow down most road users to the desired speed.
- 7.1.3 The distance between features directly relates to the average speed along the route. The closer the feature, the lower the speeds. However, there is a balance between speeds and smooth traffic flow to control noise and emissions. Another consideration is the overall functionality of the road and the desire to maintain suitable speeds for through traffic, including commercial traffic, which can often conflict with the desires of local residents.
- 7.1.4 Many vehicle cross-overs occur on the A51 through Woore. (A cross-over is a location where a vehicle travelling in one lane must cross through the opposite lane into a junction, domestic access or service road (or vice versa)). These would limit the type of physical engineering that could be installed because hard traffic calming features could create potential access difficulties for residents living close to the road.
- 7.1.5 The following option was taken forward to a detailed appraisal where engineering and construction feasibility, cost and environmental impacts were considered:
- Measure 4 – A51/A525 junction safety improvements
  - Measure 5 - Hard traffic calming measures on A51 north of the A51/A525 junction
  - Measure 6 - Hard traffic calming measures on A51 south of the A51/A525 junction
- 7.1.6 Alternative hard calming measures that were not taken forward to a detailed appraisal are outlined in the descriptions of Measure 7 and Measure 8.

### 7.2 Measure 4 - A51/A525 junction safety improvements

- 7.2.1 Currently HGVs that are westbound on the A525 making a left turn out of the A525 onto the A51 (southbound) overrun into the opposing lane to ensure that they clear the adjacent footway buildout that is located on the southern side of the junction, see Figure 3.
- 7.2.2 To improve the safety of turning movements for the increased frequency of HGVs arising from HS2, the existing kerb line would require to be

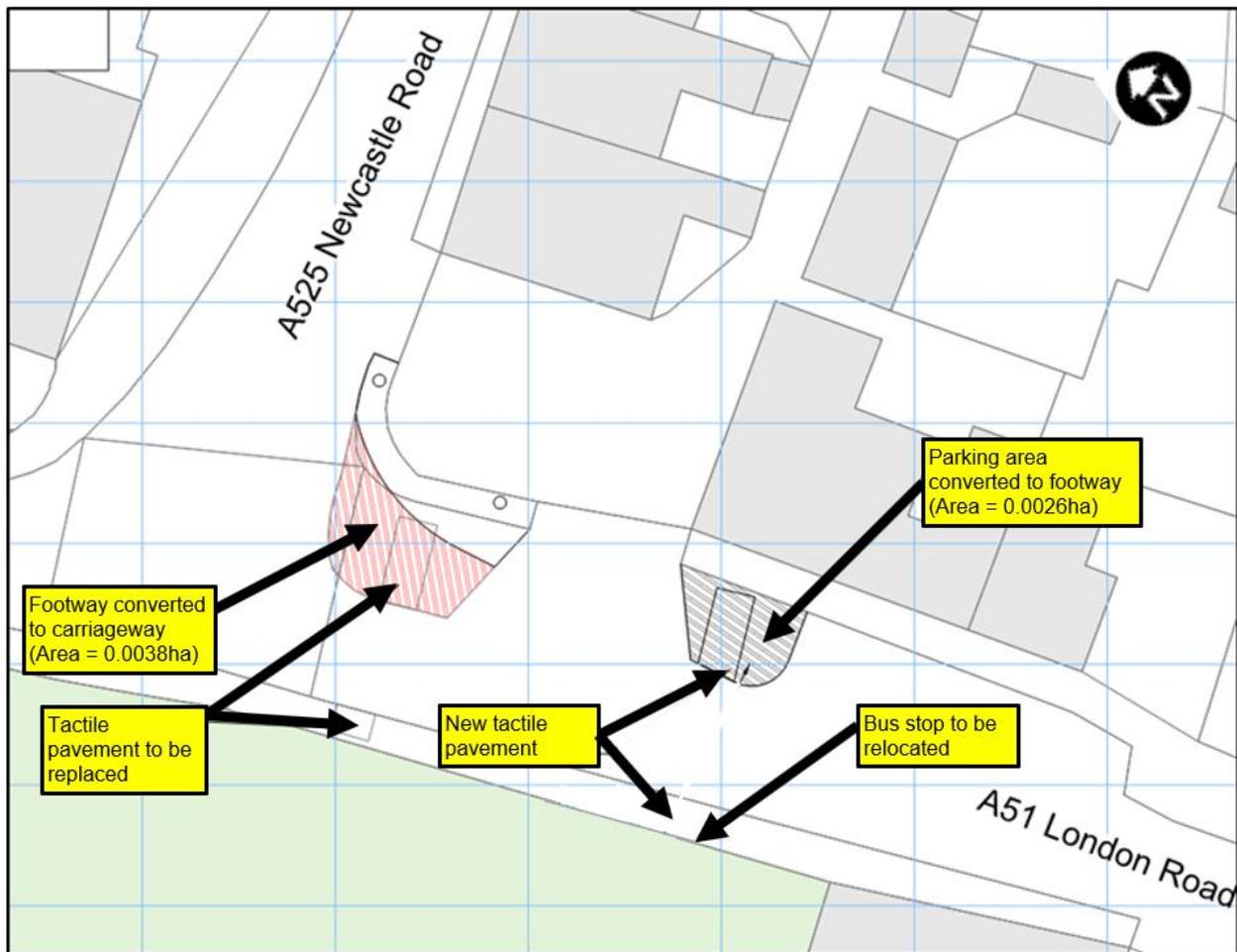
temporarily set back during the duration of construction traffic movements as shown in the sketch in Figure 4.

7.2.3 This measure is included in both design packages.

Figure 3: View looking north on A51 at the A51/A525 junction

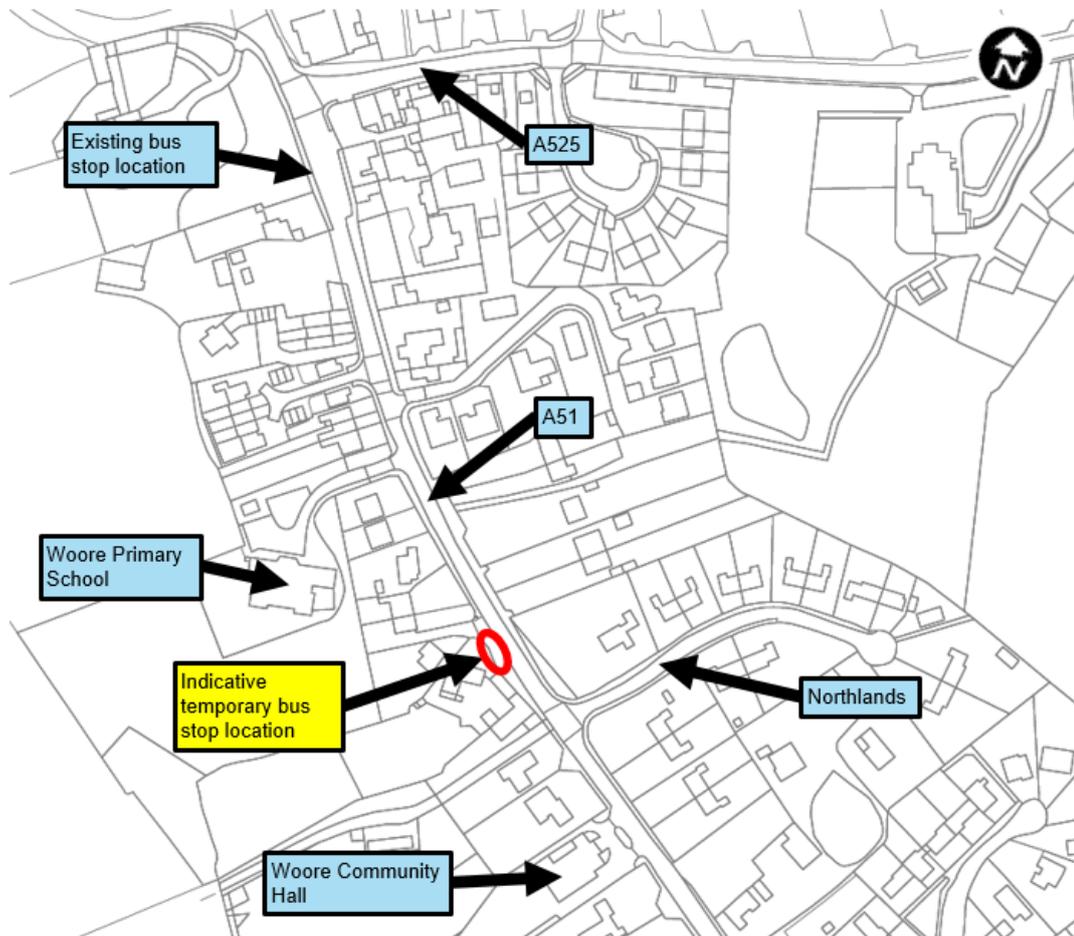


Figure 4: Indicative layout of revised junction



- 7.2.4 The kerb radius would be reduced to achieve the left turn out of the junction whilst keeping a 2m wide footway at the rear of the carriageway to maintain safe provision for pedestrians.
- 7.2.5 The existing uncontrolled pedestrian crossing located on the southern side of the A51/A525 junction on the A51 would need to be relocated away from the junction. This would allow for the kerb line to be adjusted but maintain the crossing provision. This uncontrolled crossing could be in the form of a new build out further south outside the antiques shop (Refer to Figure 4)
- 7.2.6 The new, uncontrolled crossing would conflict with the bus stop on the north bound side of the A51. This could be temporarily relocated to the south of the existing location. Figure 5 illustrates the indicative temporary bus stop location. The existing footway at this location is sufficiently wide to enable footway users to pass each other safely when people are waiting at the bus stop. Discussions with the bus companies and traffic authority would need to take place in order to confirm the exact temporary bus stop location.

Figure 5: Indicative temporary bus stop location



- 7.2.7 The existing footway width on the western side of the A51 at the existing uncontrolled crossing point just south of the A51/A525 junction is narrow. The existing footway width at the proposed temporary location of the crossing is similarly narrow. In both design packages it is recommended that this crossing be upgraded to a zebra crossing. It may be necessary to widen the footway into the existing raised verge in order to accommodate the signage and tactile paving associated with the temporary zebra crossing. This would need to be discussed with the Local Highway Authority at a later design stage if this temporary measure is to be implemented.
- 7.2.8 Based on information at this stage of design development it is not clear if utilities may be affected by the option for temporary junction improvement proposals. Indications on site show that there are communication services within this area. Requirements for diversions / lowering of utility services cannot be ruled out and may cause disruption as well as adding to the cost of the junction improvement.

**Temporary loss of parking**

- 7.2.9 An area currently designated for parking would need to be temporarily converted to a footway build-out as part of the junction improvement works

(Refer to Figure 4). This will assist pedestrians in crossing the A51 safely. The provision of a replacement parking space in Woore village is challenging. In general, the existing carriageway and footway width through the village is insufficient to enable the provision of additional parking spaces within the available cross section width.

- 7.2.10 One of the locations examined as a possible temporary parking replacement was the footway outside the Swan Court apartments. There is an existing footway build-out outside the building entrance (Refer to Figure 6) that could be replaced with a temporary parking space. However, it is assumed that this location is currently used as an informal crossing point for the northern end of the village. There are few alternative safe crossing locations on the A51 north of the A51/A525 junction. The provision of an alternative replacement crossing point would necessitate the removal of parking spaces and make the design changes redundant. On this basis it is not recommended that this location be utilised for alternative parking.
- 7.2.11 Any additional on-street parking provision in other locations on the A51 will reduce the width of the highway for moving traffic and therefore has the potential to cause disruption to the flow of traffic on this A road. The A51 is currently used by large HGVs and agricultural vehicles in this location and anything which unduly negatively affects the flow of the A road would not be desirable.
- 7.2.12 No other safe location for the provision of temporary replacement parking in the village was identified and as a result it is assumed that parking available in the village would be slightly reduced for the duration of construction works while the design changes to the A51/A525 junction remain in place. Whilst there is the potential loss of one space there are limited on street parking restrictions in the vicinity of the shops and therefore the loss of one parking space will not result in any adverse effect.

Figure 6: Existing footway build-out outside entrance to Swan Court apartments



## Advantages

7.2.13 The following advantages are identified for Measure 2:

- Design changes could be made in advance of HS2 construction phase to provide a safer access onto the A51 southbound for HGVs approaching from the A525; and
- Disruption from these proposals would be relatively low and reinstatement to the original conditions after HS2 construction is complete would be relatively simple, if required.

## Disadvantages

7.2.14 The following disadvantages are identified for Measure 2:

- The relocation of the uncontrolled crossing may result in some temporary loss of current parking on the A51 to the south of the junction, due to the need for a build-out to assist pedestrians crossing the road; and
- An existing bus stop and shelter / public notice board is located close to this proposed crossing. The bus stop would need to be relocated temporarily and space to provide this is limited. The shelter / public notice board could be retained in its current position.

## Recommendation

7.2.15 This option is considered to be a practicable way to improve the safe turning movements of HGVs through the A51/A525 junction during the HS2 construction period. It is recommended that this option is included in any combined package of design works to reduce the impact of HGV movements through the village.

7.2.16 Pedestrian safety at the relocated crossing point on the A51 could be further enhanced by incorporating additional soft calming measures (E.g. Zebra Crossing). See the description of the recommended design package in Section 10.3 for further details.

## 7.3 Measure 5 – Hard traffic calming measures on A51 north of the A51/A525 junction

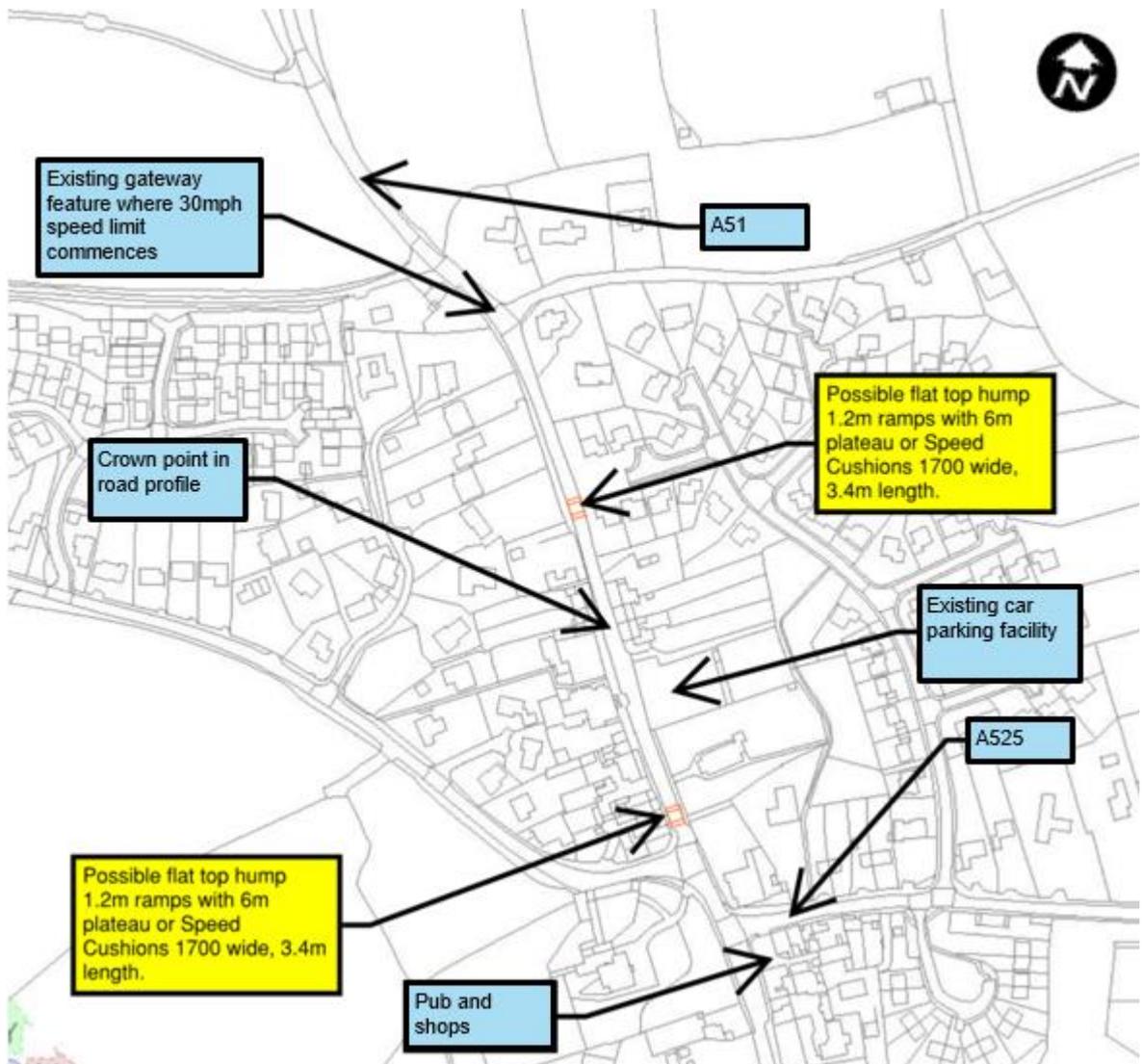
7.3.1 Measure 5 provides an indicative layout of potential effective hard calming options for Woore north of the A525 junction on the A51. These are designed to self-enforce a 30mph speed limit and enhance pedestrian facilities along the route (Refer to Figure 7).

7.3.2 Flat top humps or cushions are considered possible (but may not be desirable) for Woore village to control speed within the current 30mph

speed limit taking into consideration existing conditions of the highways in the village. These are described in more detail in Appendix B.

- 7.3.3 Speeds of vehicles between humps are influenced by ‘before’ speed, hump dimensions and the longitudinal hump spacing. Lower heights and shallower ramp gradients can be used on bus routes to reduce discomfort for bus drivers and passengers and reduce delays to emergency services. This is considered important for Woore village because the road network is on a bus route. However, it is noted that this type of hump design is likely to increase the ability for cars to travel at higher speed, though less than on an unrestricted carriageway.
- 7.3.4 Cushions are also considered an alternative option to humps for Woore village. Speed of vehicles over cushions is mainly determined by cushion width. Cushion dimensions and spacing can be varied depending upon the road type and ‘target’ speed required. Narrower cushions can be used to reduce discomfort to passengers in mini-buses and ambulances. Cushion layouts can be varied to suit changes of road width.
- 7.3.5 It is also important that the incidence of commercial vehicles straddling cushions is minimised (TAL 06/96). This can be reduced by the introduction of parking restrictions to maintain clear space around the cushions. This may be particularly relevant to the effectiveness of traffic calming in combination with the use of the A525 and A51 for construction traffic and may be a requirement if cushions were adopted as a hard traffic calming solution in Woore. The associated reduction of roadside parking is likely to be seen as a disadvantage by some people who visit or use the village amenities.

Figure 7: Measure 5 - Hard traffic calming north of A51/A525 junction



### Advantages/Disadvantages

7.3.6 The following advantages are identified for the adoption of road hump hard traffic calming options for Woore village:

- Road humps are a proven speed control device used in 20mph zones and on 30mph roads and have been shown in some locations to result in a reduction of over-speeding with consequent reductions in injury accidents of up to 60 per cent;
- The hump design to maintain speeds within limits (which is influenced by vehicle type and hump dimensions) of typical vehicles on the A51 can be accommodated within Woore village road characteristics;
- Vehicles can park over humps which reduces (but may not eliminate) the impact on parking space;

- Flat-top humps (kerb-to-kerb) can also provide good crossing places for pedestrians and may enhance pedestrian travelling experience when crossing the roads in the village, providing wider desired benefits;
- Humps and raised junctions can improve the appearance of a road (if designed and built to a high standard and in materials sensitive to the location) and would not necessarily significantly change the heritage characteristics of the village; and
- Flat top humps are proven to be an effective speed control device without supervision by the authorities. i.e. They are largely self-enforcing.

7.3.7 Disadvantages for Woore village with respect to the adoption of road hump hard calming options can be summarised as follows:

- Delays to emergency service vehicles and buses;
- Potential poor quality of ride for all vehicles, including bicycles;
- Additional ‘wear and tear’ of vehicles (including emergency vehicles and buses). Local Woore residents being frequent road users in the area would be affected. In addition, the possibility of grounding for vehicles with a long wheelbase and/or for scraping of the underside of vehicles would be a possibility;
- Increased vehicle noise and exhaust emissions to Woore village caused by vehicles negotiating features and from gear changes and speed reduction. This would be limited, where possible, by careful design but may not be fully eliminated;
- Potential temporary disruption to Woore village and road users during installation and removal, including requirements for the provision additional drainage to accommodate for kerb-to-kerb road humps;
- Some hump schemes may not be visually attractive and may be considered ‘urbanising’ in rural areas – this may be a disadvantage to Woore village due to the local perception of the heritage characteristics of the village;
- Ongoing maintenance cost; and
- Road humps need marking, signing and lighting except in 20 mph zones. This may affect the heritage characteristics of the village.

7.3.8 The following advantages are identified for cushion hard calming options for Woore village:

- Cushion solutions provide less discomfort than road humps to occupants of buses and commercial vehicles;
- Cushions cause fewer delays to emergency vehicles;

- Cushions are an effective speed control device (although not as effective as round or fat-top road humps);
- Drainage issues are reduced; and
- Cyclists and motorcyclists may be able to avoid the cushions which may be attractive to some road users in Woore village.

7.3.9 The following disadvantages of cushion hard calming options for Woore village are considered:

- Different colours and materials may need to be adopted to increase the visibility of these measures. This may be a disadvantage to residents of Woore village with respect to heritage preservation;
- Cushions are not suitable for reducing speeds of two-wheeled motor vehicles;
- Discomfort is experienced by drivers and passengers in smaller vehicles (cars, light commercial vehicles, minibuses and some ambulances);
- These are not always effective for controlling speed of wider axle width vehicles, which may be a concern of Woore's HGV traffic use. To ensure effectiveness parking restrictions or additional build-outs may also be required;
- There is a noise and vibration impact from provision of cushions.
- There is a potential for poor driving style as drivers attempt to lessen the impact of the cushions depending on road constraints). This is likely to be an unattractive potential issue for Woore due to carriageway constraints;
- Potential for grounding of vehicles;
- They are not suitable at pedestrian crossing places as they are potentially a tripping hazard;
- There is an increased risk of damage to vehicles parked adjacent to the cushions;
- Temporary disruption to road users during installation and removal;
- Ongoing maintenance cost;
- Potential for temporary loss of parking spaces in the vicinity of the cushions as it must be ensured that emergency vehicles and buses etc. have sufficient space to straddle the cushions; and
- Speed cushions need road marking, signing and lighting (except in 20 mph zones where this need is reduced). This may affect the heritage characteristics of the village. Speed cushions may not fit in with the character of the street and may be considered 'urbanising' in rural areas.

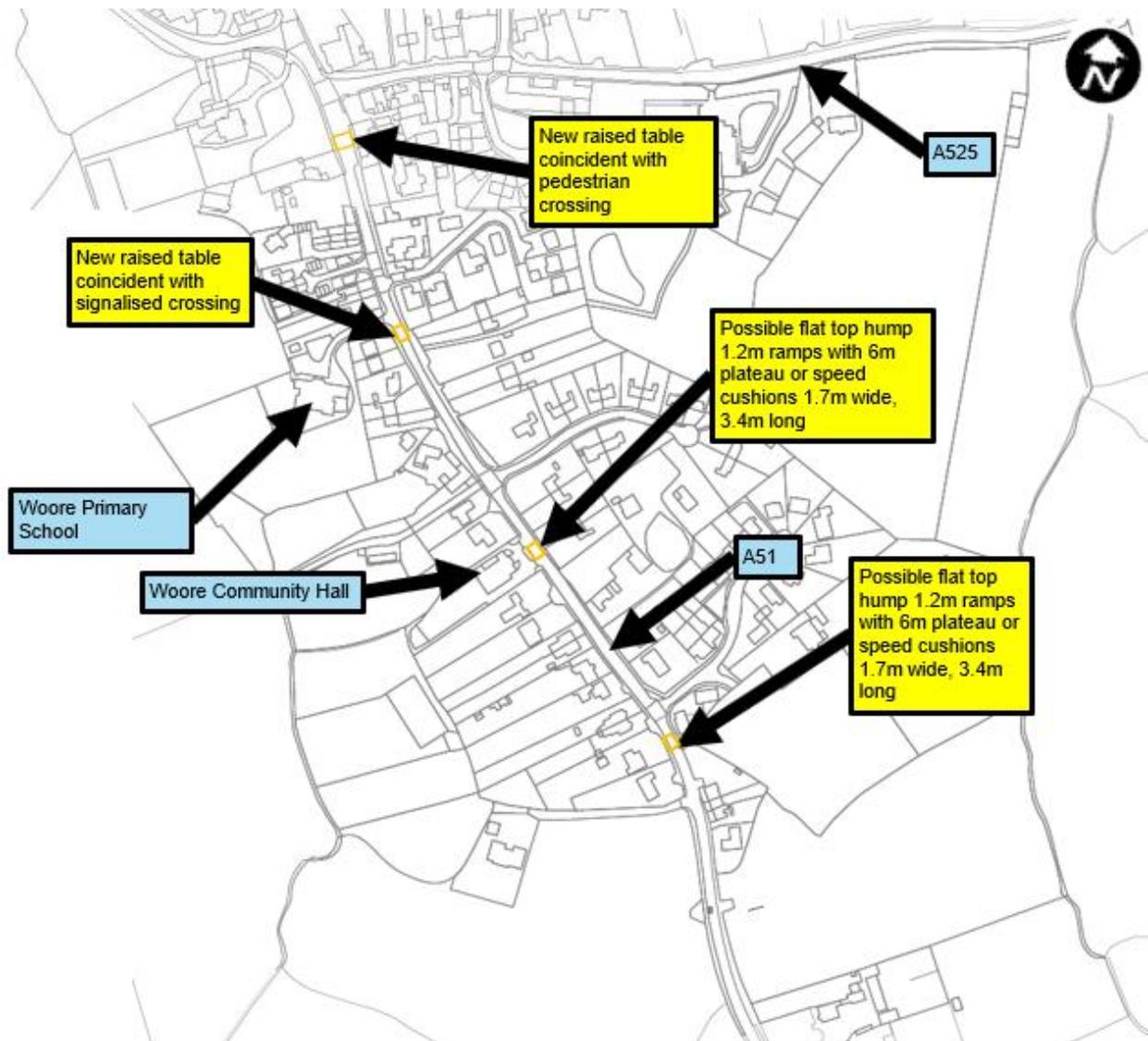
### **Recommendation**

- 7.3.10 Though hard traffic calming can be an effective means of achieving speed reductions and improving road safety, they also have a number of disadvantages. Taking account of these disadvantages, it is not recommended that these hard traffic calming measures should be adopted for Woore village.

## **7.4 Measure 6 – Hard traffic calming measures on A51 south of the A51/A525 junction**

- 7.4.1 Measure 6 provides an indicative layout of potential effective hard calming options for Woore south of the A51/A525 junction. These are designed to self-enforce a 30mph speed limit and enhance pedestrian facilities along the route (Refer to Figure 8).
- 7.4.2 At the two locations where the road humps are to be coincident with existing pedestrian crossing points (The uncontrolled crossing just south of the A51/A525 junction and the signalised crossing adjacent to Woore Primary School), flat top humps coincident with the crossings would be utilised to enhance pedestrian safety at these locations.
- 7.4.3 Further details on the design considerations related to road humps and cushions can be found in Section 7.3.

Figure 8: Measure 6 - Hard traffic calming south of A51/A525 junction



### Advantages

7.4.4 The following advantages are identified for Measure 6:

- Enhanced pedestrian safety at two existing pedestrian crossing points; and
- Refer to Section 7.3 for a list of advantages associated with road humps and cushions.

### Disadvantages

7.4.5 The following disadvantages are identified for Measure 6:

- Refer to Section 7.3 for a list of disadvantages associated with road humps and cushions.

## **Recommendation**

7.4.6 Whilst the hard traffic calming measures may improve pedestrian safety at the crossing points south of the A51/A525 junction and may also contribute to a reduction in the 85<sup>th</sup> percentile speed on the A51, this measure is not recommended for adoption in Woore village on the basis of the disadvantages listed above. Alternative traffic calming measures were deemed to be more appropriate.

## **7.5 Measure 7 – Extension of hard traffic calming measures along A51, A525 and B5026**

7.5.1 The extension of hard traffic calming along the A51, A525 and B5026 outside the main village of Woore is challenging. There is insufficient carriageway width or highway land available in Woore Parish for the majority of the lengths of these roads to consider the installation of central reserves, chicanes or traffic islands features. Hard measures along these roads within the Parish, as a means of traffic calming, would therefore not be feasible.

7.5.2 The B5026 does not have gateway feature entering into Irelands Cross. It would be possible to install a gateway feature here to highlight the entrance to the existing 40mph speed limit. However, in view of the fact that HS2 construction traffic will not be using the B5026 it would be difficult to justify the disruption caused by the construction of this sort of feature at this location.

7.5.3 Any new infrastructure with respect to traffic calming in Woore would need to be agreed and approved by the local highway authority, Shropshire County Council.

## **7.6 Measure 8 – Alternative hard traffic calming measures**

7.6.1 A number of alternative hard traffic options were considered at the village of Woore but were discounted as part of a preliminary appraisal of options. Measures were considered in terms of whether they were reasonable against environmental, technical and design criteria, taking into account the scale of the problem that is currently considered to exist compared to the scale of the disruption that would occur to implement the change. These are as follows:

- Measure 8a - Provision of Chicanes
- Measure 8b - Pinch Points
- Measure 8c - Traffic Islands and Refuges
- Measure 8d - Round and Flat Top Humps
- Measure 8e - Cushions

- Measure 8f - Rumble Strips
- Measure 8g - Mini Roundabouts

7.6.2 A description of each of the above options is provided in Appendix B of this report.

## 8 Traffic Management Measures

### 8.1 Other Traffic Management Measures Available

8.1.1 Measures available include: the provision of a traffic control officer during school opening or closure periods or improvements to the existing signalised crossing.

### 8.2 Measure 9 – School crossing patrols

8.2.1 School crossing patrols are not common in Shropshire<sup>5</sup>. It is a common policy of many highway authorities not to provide school crossing patrols at such locations due to the presence of an existing, very visual and safe crossing point for pedestrians to cross the road.

8.2.2 The existing signalised crossing at Woore is directly outside the entrance to Woore Primary and Nursery School, as shown in Figure 9.

Figure 9: Existing crossing facility outside Woore Primary School



8.2.3 As discussed in Section 6.2 of this report, there would be some benefit from upgrading this crossing to a Puffin crossing to improve pedestrian safety provision and traffic flows.

8.2.4 The opportunity for provision of a school crossing patrol officer, even as a temporary measure, would require further discussion with Shropshire County Council. The discussions would need to consider:

<sup>5</sup> Refer to <https://www.shropshire.gov.uk/roads-and-highways/road-safety/school-crossing-patrols/>

- In what ways it would be considered to be useful over and above the existing provision;
- Any specific issues relating to the location;
- How to reliably staff the crossing;
- Cost of staffing;
- School staff views; and
- Local highway authority views.

8.2.5 The provision of a school control crossing officer would more typically be found at uncontrolled crossing points and zebra crossings.

## 9 Measures to Improve Footway Provision

### 9.1 Existing provision

- 9.1.1 Within Woore village, the A51 has footways on both sides of the highway for most of its length. Where it is omitted, there is lack of available highway land to provide it (at the north end of village) or, alternatively, infrequent housing (for example; at the southern end of Woore there are only 5 houses present on the east side of the A51). At some locations, the effective width of the footway is reduced by obstructions.
- 9.1.2 The B5026 (at Ireland’s Cross) has footway facilities at its northern end which links up to the A51 pedestrian facilities without the need to cross over the A51. Again, existing highway boundaries determine what side of the highway that the provision for the footway can be located.
- 9.1.3 The A525 has footways on both sides of the road in the centre of Woore. The provision reduces to one side of the highway when leaving the village centre. Housing is mainly located on this existing footway side.
- 9.1.4 Between Ireland’s Cross and Woore the footway provision is non-continuous due to the highway layout, residential dwelling locations and highway boundary features. The highway boundary determines which side of the carriageway a footway can be located. Therefore, between Ireland’s Cross and Woore there are two locations where pedestrians are required to cross over the A51 to continue their journey using the footway. The first point is at the northern extent of Ireland’s Cross and the second point being at the southern edge of Woore village as shown in and Figure 10 and Figure 11.

Figure 10: Existing uncontrolled crossing facility on outskirts of Ireland’s Cross



Figure 11: Existing crossing facility on outskirts of Woore (southern side)



9.1.5 There are no existing footways provided outside of Woore to the north of the village.

## 9.2 Measure 10 – Enhanced pedestrian crossing points on A51

9.2.1 The two existing uncontrolled pedestrian crossing points between Ireland’s Cross and Woore (Refer to Figure 10 and Figure 11) could be enhanced with temporary soft calming measures.

9.2.2 With the likely relatively low use of the uncontrolled crossings between Woore and Ireland’s Cross, it would not be appropriate or cost-effective to install controlled crossings (such as zebra crossings) at these locations. There could also be some safety concerns with such a proposal due to low pedestrian usage and related driver behaviours. The locations of these uncontrolled crossing points are within a 40mph speed limit. Current design standards do not allow the installation of zebra crossing on roads with 85<sup>th</sup> percentile speeds over 35mph. If speeds are anticipated to be above this level, any crossings would need to be of a signalised pedestrian crossing type.

9.2.3 A more appropriate solution would be the utilisation of additional signage, road markings, reflective bollards and coloured surfacing. These measures would highlight to oncoming road users both the presence of a crossing point and the need to be aware of pedestrians wanting to cross at these locations. This would improve driver awareness of the hazard and general pedestrian safety along the road. The detailed design of this measure would need to be developed in consultation with the local highway authority.

### **Advantages**

9.2.4 The following advantages are identified for Measure 10:

- Increased driver awareness of the two crossing points leading to improved pedestrian safety;
- Low disruption to local residents and businesses as a result of the installation process; and
- No impact on journey comfort or impact on emergency services and their response time travelling through an area.

### **Disadvantages**

9.2.5 The following disadvantages are identified for Measure 10:

- Additional street furniture (E.g. reflective bollards) would introduce obstructions for footway users and it may not be possible to accommodate them at all crossings within the footway width available.

### **Recommendation**

The soft traffic calming measures outlined above would likely contribute to improved safety for pedestrians during the construction period. It is recommended that these soft traffic calming measures should be incorporated into a broader final package of works that also include additional soft and hard traffic calming measures along the route.

## **9.3 Measure 11 – Footway improvements close to the Falcon Inn**

9.3.1 A section of existing footway is narrowed by a private hedge along the boundary between the school and the Falcon Inn on the western side of the carriageway, as shown in Figure 12

Figure 12: Existing hedge narrows the footpath on the southern side of the Falcon Inn entrance



9.3.2 The hedge encroaches onto the footway restricting the usable width of the footway for pedestrians over this short section. This is an important length of footway taking into consideration the proximity to the school access and the understanding of the use of the Falcon car park for school drop-off and pick-ups.

9.3.3 The works would entail significant cutting back and removal of the hedge to the highway boundary, erection of a temporary fence removal of the temporary fence and re-planting/cultivation of the hedge (on the assumption that the cut-back to the hedge would be so severe that it would not survive) after HS2 construction works are complete.

### **Advantages**

- The particular short section of footway would be significantly more accessible for pedestrians, prams and mobility scooters.

### **Disadvantages**

- The section of footway would still be relatively narrow and other obstructions (such as wooden service poles) would still, locally, obstruct the footway width.

### **Recommendation**

9.3.4 This option will improve accessibility for pedestrians and is therefore recommended.

## **9.4 Measure 12 - Continuous footway along the A51, A525 and B5026**

9.4.1 A continuous pavement along the A51, A525 and B5026 through the village was suggested by Woore Parish Council to limit the need to cross the main roads. As presented in the review of current provision and constraints, this option is not considered feasible (within the scope of the Phase 2A hybrid Bill) due to the lack of available highway land.

9.4.2 The fitting of pedestrian guardrail barriers at crossing points is also not recommended. They are mainly used in urban environments where options for adequate design of crossing locations may be restricted. There should be no requirement for such measures in Woore village for well-designed crossing points. Installation of such provision in Woore village would create more street furniture clutter and potentially adversely affect the existing heritage characteristics of the village. The footways in Woore are not wide and any street furniture installed would need to be set back from the kerb edge which would further restrict the available width. This would potentially create a hazard / annoyance for people using the footways, especially those using pushchairs and mobility scooters.

### **Advantages**

- A continuous pavement would clearly improve pedestrian safety.

### **Disadvantages**

- It would be very disruptive to properties alongside the route due to the need to obtain land from private properties to provide the continuous route that is desired; and
- There would be a loss of roadside parking.

### **Recommendation**

9.4.3 It is considered to be too disruptive to the village to provide a continuous footway route.

9.4.4 As outlined in Section 9.2 of this report, at two uncontrolled crossing points on the A51 (where one footway ends and pedestrians are forced to cross the road) it is recommended that improved signage and road markings be installed to warn traffic that pedestrians may be crossing ahead.

## **9.5 Measure 13 - Pedestrian access to Bridgemere Garden Centre**

9.5.1 Provision of pedestrian access to the Bridgemere Garden Centre was considered. It is noted that the HS2 construction works has no impact on the

existing access to the garden centre other than the additional construction related traffic, which as reported in the Environment Statement (2017) during the peak month of construction equates to 66 HGVs in each direction. The garden centre is located out of the village of Woore, further north along the A51. There is no footway access to this location along the A51. The distance between the Garden Centre and the point in Woore Village where the current footway ends is approx. 1350m.

- 9.5.2 The provision of a footway along the A51 would require numerous areas of land take from private residential and agricultural land. In addition, the proposal would have significant environmental impacts, with extensive lengths of hedges and many trees being affected. It is highly likely that utility services would require some diversion and possible earthworks would be required which could potentially increase land take beyond the width of the footway itself.

### **Recommendation**

- 9.5.3 Considering these significant challenges, the associated environmental impacts and land take required to construct pedestrian access from Woore to the Bridgemere Garden Centre along the A51, the provision is not recommended.

# 10 Design Package Options

## 10.1 Benefits of combined packages of measures

- 10.1.1 Combined hard and soft traffic calming measures offer the opportunity to establish an environment within a locality in which drivers are continually influenced and reminded to drive below posted speed limits and to maintain full consideration of non-motorised users.
- 10.1.2 A number of alternative combined traffic calming options were considered at the village of Woore. The following design packages were taken forward to an outline appraisal where engineering and construction feasibility, cost and environmental impacts were considered.
  - Design Package 1 – Combined hard and soft traffic calming measures on A51 including road humps south of the A51/A525 junction
  - Design Package 2 – Combined hard and soft traffic calming measures on A51 excluding road humps
- 10.1.3 Refer to Table 2 for a summary table outlining the measures that have been included in each design package.

Table 2: Design Packages Summary

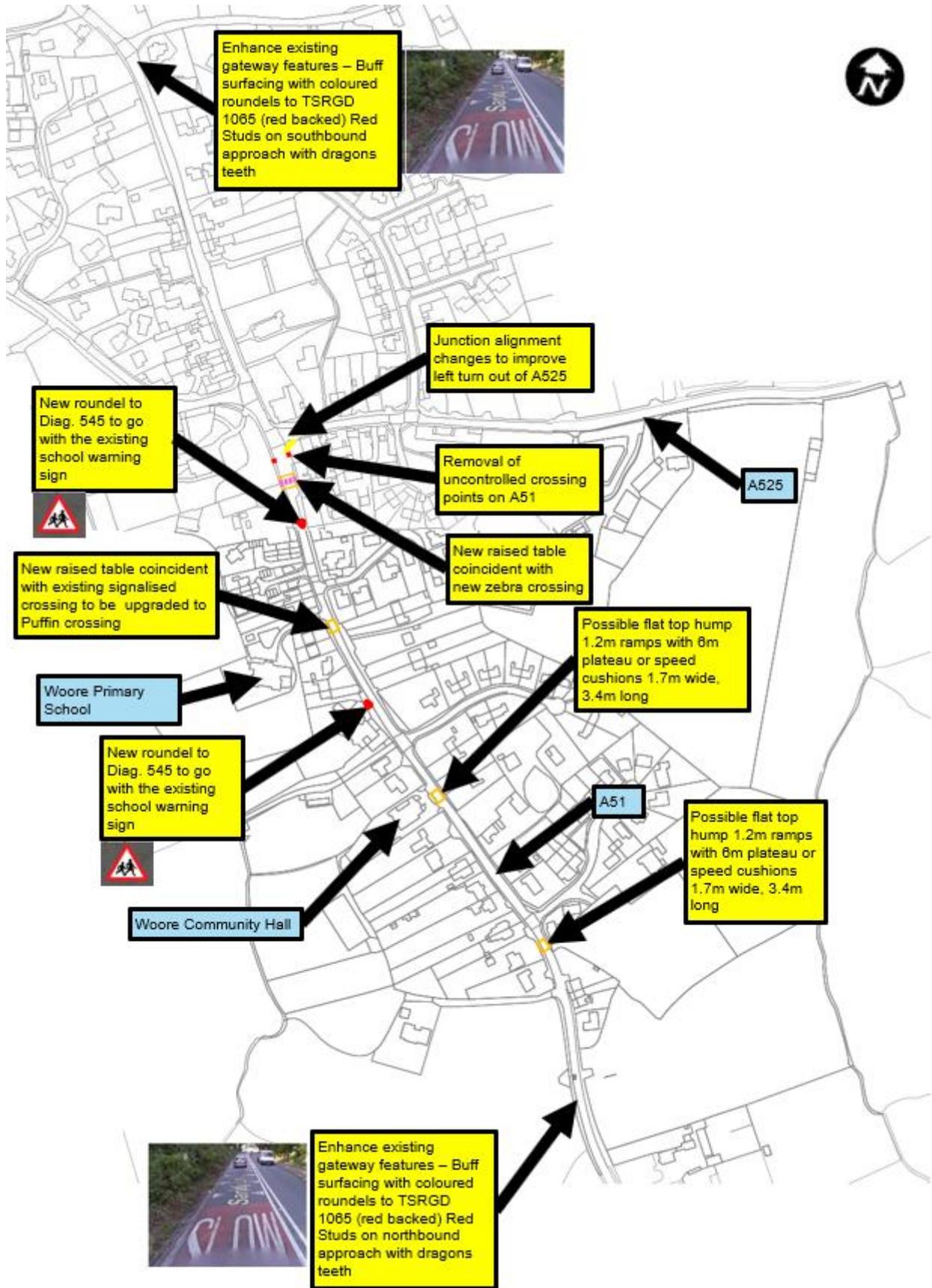
| Measure Type                      | No. | Description  | Design Package 1 | Design Package 2 (Recommended) |
|-----------------------------------|-----|--|------------------|--------------------------------|
| Soft Calming                      | 1   | Road marking, upgrade of gateways and upgrade of crossings           | X                | X                              |
|                                   | 2   | Vehicle Activated Signs  |                  | X                              |
|                                   | 3   | Alternative soft traffic calming measures                            |                  |                                |
| Hard Calming                      | 4   | A51/A525 junction safety improvements                                | X                | X                              |
|                                   | 5   | Hard traffic calming measures on A51 north of the A51/A525 junction  |                  |                                |
|                                   | 6   | Hard traffic calming measures on A51 south of the A51/A525 junction  | X                |                                |
|                                   | 7   | Extension of hard traffic calming measures along A51, A525 and B5026 |                  |                                |
| Traffic Management                | 8   | Alternative hard traffic calming measures                            |                  |                                |
|                                   | 9   | School crossing patrols  |                  |                                |
| Improvements to Footway Provision | 10  | Enhanced pedestrian crossing points on A51                           |                  | X                              |
|                                   | 11  | Footway improvements close to the Falcon Inn                         |                  | X                              |
|                                   | 12  | Continuous pavement along the A51, A525 and B5026                    |                  |                                |
|                                   | 13  | Pedestrian access to Bridgemere Garden Centre                        |                  |                                |

## 10.2 Design Package 1 – Combined hard and soft traffic calming measures on A51 including road humps south of the A51/A525 junction

- 10.2.1 Design Package 1 presents a combination of hard and soft traffic calming measures on the A51 including road humps south of the A51/A525 junction (Refer to Figure 13). Measures 1, 4 and 6 have been included in this package and are summarised below.

- 10.2.2 This option includes the installation of flat top road humps (or cushions) through the Woore village on the A51. The road humps are in targeted locations where they would provide the greatest benefit, while considering the spatial requirements between the calming features.
- 10.2.3 A new raised zebra crossing is proposed between the Falcon Inn and the A51/A525 junction (as part of the relocation of the existing build out at the A51/A525 junction). The existing signalised crossing outside the school access would be converted to a flat top road hump and the signals would be upgraded to a puffin crossing standard.
- 10.2.4 The safety improvements to the A51/A525 junction outlined in the description of Measure 4 are included as part of this combined package of works.
- 10.2.5 The soft calming measures include the following additional road marking treatments:
- School roundel markings being installed in the carriageway to supplement and enhance the existing signage.
  - Red coloured surfacing with speed limit roundels and additional dragon's teeth markings being utilised to enhance the existing gateway features on the A51 at the southern and northern entrances to the village. This would further highlight change to the 30mph speed limit.

Figure 13: Design Package 1 - Hard Calming solution combined with complementary soft calming provision



## Advantages

- 10.2.6 The key advantages of Design Package 1 can be summarised as follows:
- Improved pedestrian safety at crossing points on the A51;
  - Road humps are a proven speed control device used in 20mph zones and on 30mph roads and have been shown in some locations to result in a reduction of over-speeding with consequent reductions in injury accidents of up to 60 per cent; and
  - Design changes to A51/A525 junction could be made in advance of HS2 construction phase to provide a safer access onto the A51 southbound for HGVs approaching from the A525.
- 10.2.7 Refer to Sections 6.2, 7.2 and 7.4 for additional details regarding the advantages of Measures 1, 4 and 6 respectively.

## Disadvantages

- 10.2.8 The key disadvantages of Design Package 1 can be summarised as follows:
- Road humps and cushions would lead to delays to emergency service vehicles and buses; potential poor quality of ride for all vehicles; additional 'wear and tear' of vehicles; increased vehicle noise and exhaust emissions; potential disruption to Woore village during installation and removal; and potential negative impact on the heritage characteristics of Woore village.
  - The safety improvements to the A51/A525 junction and the upgrade of the adjacent uncontrolled crossing may result in some temporary loss of current parking on the A51 and will require temporary relocation of the existing bus stop on the A51.
- 10.2.9 Refer to Sections 6.2, 7.2 and 7.4 for additional details regarding the disadvantages of Measures 1, 4 and 6 respectively.

## Recommendation

- 10.2.10 This design package is not recommended. This is primarily because of the numerous disadvantages associated with the utilisation of road humps and/or cushions in Woore village. The package of measures recommended in Design package 2 is deemed more appropriate to achieve the speed reduction and road safety goals of these design changes, whilst minimising the negative impacts through Woore village.

### **10.3 Design Package 2 – Combined hard and soft traffic calming measures on A51 excluding road humps (Recommended)**

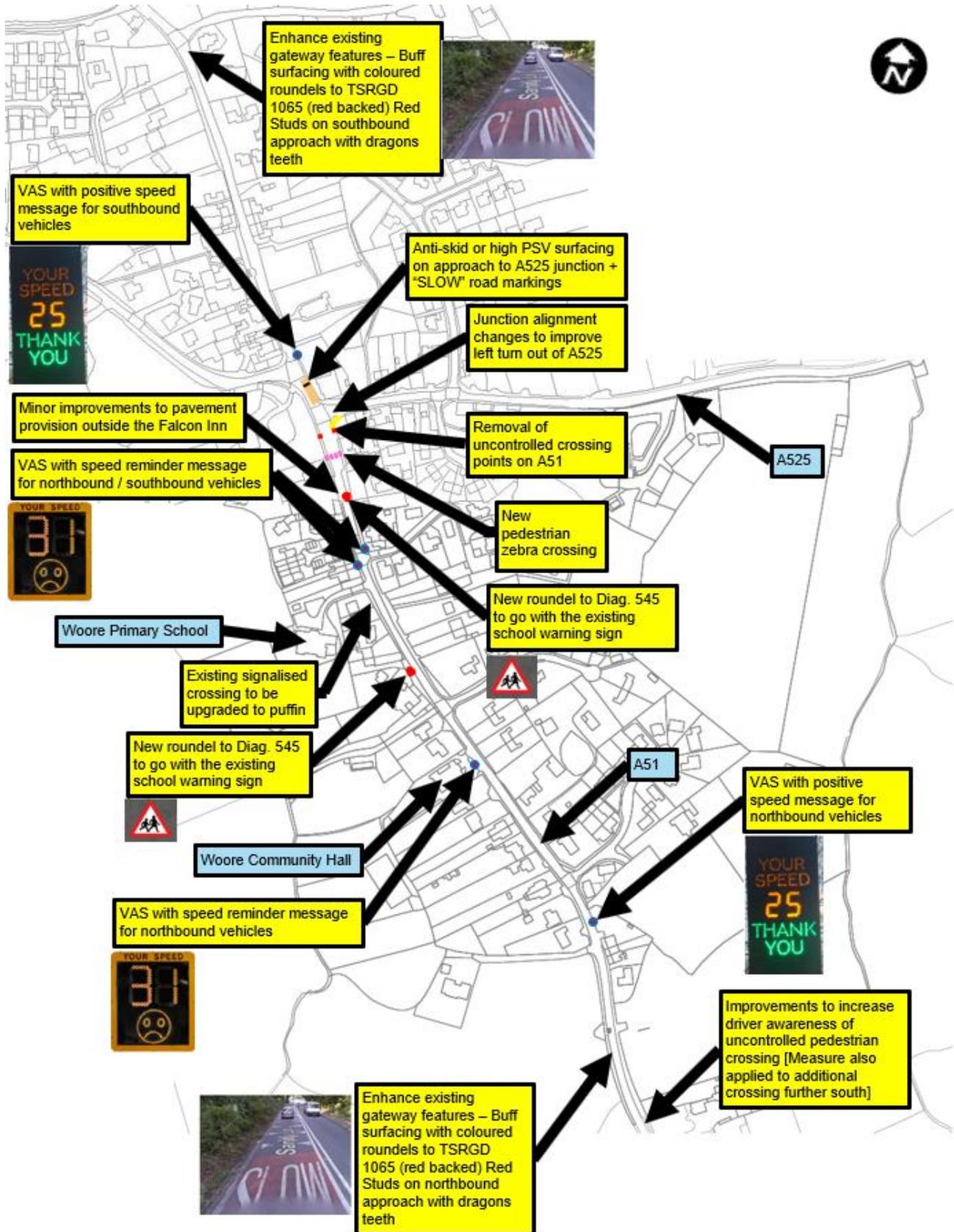
10.3.1 Design Package 2 presents a combination of hard and soft traffic calming measures on the A51 excluding road humps and cushions. (Refer to Figure 14) Measures 1, 2, 4, 10 and 11 have been included in this package and are summarised below.

10.3.2 The soft calming measures include:

- A series of VAS signs through the village on A51 to encourage speed reduction;
- Road marking and signage measures to improve driver awareness of uncontrolled crossings between Woore and Ireland’s cross;
- School roundel markings being installed in the carriageway to supplement and enhance the existing signage;
- Anti-skid coloured surfacing and “Slow” text road marking being installed on the A51 southbound approach to the A51/A525 junction;
- Red coloured surfacing with speed limit roundels and additional dragon’s teeth markings being utilised to enhance the existing gateway features on the A51 at the southern and northern entrances to the village. This would further highlight change to the 30mph speed limit;
- A new zebra crossing is proposed between the Falcon Inn and the A51/A525 junction (as part of the relocation of the existing build out at the A51/A525 junction); and
- The existing signalised crossing outside the school access would be upgraded to a puffin crossing.

10.3.3 The safety improvements to the A51/A525 junction outlined in the description of Measure 4 and the improvements to the footway provision outside the Falcon Inn outlined in Measure 10 are also included as part of this combined package of works.

Figure 14: Design Package 2 - Use of VAS, enhanced road marking and signage plus selected hard traffic calming measures.



### **Advantages**

- 10.3.4 The key advantages of Design Package 2 can be summarised as follows:
- Improved pedestrian safety at crossing points and along footways on the A51;
  - Low disruption to local residents and businesses as a result of the installation process compared to hard calming measures;
  - Measures would have no impact on journey comfort or impact on emergency services and their response time travelling through an area;
  - Measures would not lead to any increases in vehicle emissions, noise or vibrations.
  - Soft calming can reduce the urbanising feel to any calming; and
  - Design changes to A51/A525 junction could be made in advance of HS2 construction phase to provide a safer access onto the A51 southbound for HGVs approaching from the A525.
- 10.3.5 Refer to Sections 6.2, 6.3, 7.2, 9.2 and 9.3 for additional details regarding the advantages of Measures 1, 2, 4, 10 and 11 respectively.

### **Disadvantages**

- 10.3.6 The key disadvantages of Design Package 2 can be summarised as follows:
- VAS signs rely on voluntary reductions in speed. Not all drivers will respond correctly;
  - The safety improvements to the A51/A525 junction and the upgrade of the adjacent uncontrolled crossing may result in some temporary loss of current parking on the A51 and will require temporary relocation of the existing bus stop on the A51.
- 10.3.7 Refer to Sections 6.2, 6.3, 7.2, 9.2 and 9.3 for additional details regarding the disadvantages of Measures 1, 2, 4, 10 and 11 respectively.

### **Recommendation**

- 10.3.8 This combined package of hard and soft traffic calming measures is the recommended solution. This design solution would aim to:
- Maintain sub 30mph vehicle speeds through the village;
  - Minimise impact on the heritage characteristics of Woore village;
  - Minimise noise and emissions resulting from traffic calming measures;
  - Enhance pedestrian safety in the village; and
  - Improve the safe and efficient passage of vehicles including both HGVs and agricultural vehicles.

## 10.4 Design Package Comparison Table

10.4.1 As part of the appraisal of each design package, each design package was assigned a rating relative to the Proposed Scheme design against the following design criteria:

- Impact on traffic speeds;
- Impact on pedestrian safety at crossings;
- Impact on pedestrian safety on village footways (Particularly for school access);
- Impact on safety at the A51/A525 junction;
- Disruption to village during construction of calming measures;
- Impact on local parking provision;
- Delays to emergency services and buses caused by calming measures;
- Impact of calming measures on vehicle emissions, noise and vibrations; and
- Impact of calming measures on heritage characteristics of Woore village.

Each design package was assigned a rating from one to three stars against each of these criteria. A summary of these ratings along with a description of the performance metric for each criteria and additional commentary is provided below in

10.4.2 Table 3.

Table 3: Design Package Comparison

| Criteria   | Relative performance metric (From * to ***) | Baseline        | Relative Performance |                                | Comments  |   |  |
|--|---|-----------------|----------------------|--------------------------------|---|---|--|
|  |   | Proposed Scheme | Design Package 1     | Design Package 2 (Recommended) | Baseline – Proposed Scheme  | Design Package 1  | Design Package 2 (Recommended)   |
| Impact on traffic speeds   | *** = large reduction                       | Baseline        | ***                  | **                             | The Proposed Scheme construction traffic control measures (described in Section 4) will ensure that construction traffic would meet legal requirements and road safety standards. The Proposed Scheme does not include calming measures that would aim to reduce speeds through Woore village. The surveyed existing 85 <sup>th</sup> percentile speed on the A51 was above the 30mph speed limit in Woore village. The Proposed Scheme does not include changes to the existing pedestrian crossings or footways in Woore village. | Road humps would have the greatest impact on speed reduction and should reduce the 85 <sup>th</sup> percentile speed on the A51 below 30mph.                              | It is expected that the measures included in Design Package 2 would also lead to a reduction in the 85 <sup>th</sup> percentile speed on the A51 to below 30mph.   |
| Impact on pedestrian safety at crossings   | *** = large improvement                     |                 | ***                  | **                             |   | Flat top humps coincident with crossings would have the greatest impact on pedestrian safety at crossings.  | Upgrades to the signalised crossing at the school and a number of uncontrolled crossings would also improve pedestrian safety through the village.   |
| Impact on pedestrian safety on village footways (Particularly for school access) | *** = large improvement                     |                 | *                    | **                             |   | Package does not include improvements to footway provision.   | A moderate improvement to pedestrian safety on footways would be achieved through the removal of overgrown vegetation obstructing the footway adjacent to the primary school and by increasing driver awareness of pedestrians along A51 with signage and road marking measures. |
| Impact on safety at the A51/A525 junction  | *** = large improvement                     |                 | **                   | **                             | The Proposed Scheme includes provision to temporarily remove existing street furniture to allow HGVs to pass through the junction safely.   | Both packages include similar measures that will lead to additional safety improvements at the junction, further improving the safety of HGV movements.                   |  |
| Disruption to village during construction of calming measures                    | *** = low disruption                        |                 | **                   | ***                            | Low disruption would result from the removal of street furniture at the A51/A525 junction.  | The installation and removal of the road humps in the carriageway would lead to greater disruption to the village compared to Design Package 2.                           | Relatively low disruption would result from the A51/A525 junction upgrade and other works, primarily on the footways.  |
| Impact on local parking provision  | *** = low reduction in parking              |                 | ***                  | ***                            | The Proposed Scheme does not include calming measures that would lead to a reduction in parking provision through the village.  | The A51/A525 junction upgrade present in both options will likely lead to minor reduction in parking provision in the village for the duration of the construction phase. |  |

Table 3: Design Package Comparison (Continued)

| Criteria  | Relative performance metric (From * to ***) | Baseline        | Relative Performance |                                | Comments   |  |  |
|---|---|-----------------|----------------------|--------------------------------|--|--|--|
|   |   | Proposed Scheme | Design Package 1     | Design Package 2 (Recommended) | Baseline – Proposed Scheme   | Design Package 1   | Design Package 2 (Recommended)   |
| Delays to emergency services and buses caused by calming measures       | *** = shortest delay                        | Baseline        | *                    | ***                            | The Proposed Scheme does not include calming measures that would lead to delays to emergency services and buses through the village. | Road humps would lead to delays for emergency services and buses.  | Package does not include any hard calming measures that would delay emergency services and buses.  |
| Impact of calming measures on vehicle emissions, noise and vibrations   | *** = smallest increase                     |                 | **                   | ***                            | The Proposed Scheme does not include calming measures that would lead to increased vehicle emissions, noise and vibrations.          | Road humps would lead to increased vehicle emissions (CO, NOx and PM), noise and vibrations through the village.         | Package does not include any hard calming measures that would increase vehicle emissions, noise or vibrations.   |
| Impact of calming measures on heritage characteristics of Woore village | *** = small impact                          |                 | *                    | **                             | The Proposed Scheme does not include calming measures that would impact on the heritage characteristics of Woore village.            | Road humps may be considered 'urbanising' in nature, negatively impacting the heritage characteristics of Woore village. | Additional signage and road marking may be considered to have a moderate impact to heritage characteristics of the village. One advantage of VAS signs is that they are blank when not displaying a message. |

# 11 Summary and Recommendations

- 11.1.1 A range of measures have been considered with respect to improving road safety and traffic calming in Woore village. It is recommended that a package of complementary measures (Design Package 2) is considered to address concerns over traffic speed compliance and pedestrian safety in Woore.
- 11.1.2 The recommended measures would also complement provision for the control of construction traffic set out in the HS2 construction management plan (using current industry standards and guidance) for the Proposed Scheme.
- 11.1.3 The recommended package of measures includes:
- Adjustments to the A51/A525 junction;
  - A series of soft calming measures including VAS, road signage and markings and improved gateways in the north and south entrances to the village;
  - Upgrading of the existing signalised pedestrian crossing and the possible introduction of a new zebra crossing to replace the existing uncontrolled crossing just south of the A5/A525 junction; and
  - Improvements to pavement provision outside the Falcon Inn.
- 11.1.4 Generally, road humps or cushions are not recommended in the package of measures as a result of the disadvantages outlined in Section 7.3.
- 11.1.5 Wider upgrading and enhancing pavement provision throughout the village is not recommended due to lack of highway land available to accommodate the provision and lack of potential demand in some locations.
- 11.1.6 The provision of a school patrol officer lacks clear additional benefit over other options (such as improving the existing, signal-controlled crossing to a Puffin crossing). However, the option is not discounted at this point and should be discussed further with Shropshire County Council.
- 11.1.7 Hard traffic calming features remain an option for Woore village but are less favoured and not recommended due to several disadvantages to the village. These disadvantages include: noise impact, increased emissions, installation disruption, heritage impacts and cause increased wear and tear on vehicles passing through Woore.
- 11.1.8 Following feedback from Woore Parish Council on the design packages presented in this study, any measures requiring changes to the highway will need to be discussed and agreed with the highway authority, Shropshire County Council prior to being taken forward.

11.1.9 The recommended measures are shown diagrammatically in Figure 14. The solution would aim to achieve:

- Maintaining sub 30mph vehicle speeds through village;
- Minimise impact on the heritage characteristics of Woore village;
- Minimise noise and emissions resulting from traffic calming measures;
- Enhance pedestrian safety in the village; and
- Improve the safe and efficient passage of vehicles including both HGVs and agricultural vehicles.

## References

1. Local Transport Note 1/07 March 2007 – Traffic Calming  
<https://www.gov.uk/government/publications/traffic-calming-ltn-107>
2. HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Statement*, <https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement>
3. HS2 Ltd (2018), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Supplementary Environmental Statement (SES1) and Additional Provision Environmental Statement (AP1 ES)*,  
<https://www.gov.uk/government/collections/hs2-phase-2a-supplementary-environmental-statement-and-additional-provision-environmental-statement>
4. Environmental Statement Volume 5: Technical appendices. Draft Code of Construction Practice (CT-003-000)
5. High Speed 2 Phase 1 and 2a: Route-Wide Traffic Management Plan. Document no.: HS2-HS2-CL-PLN-000-000002

## Appendix A – Traffic Survey Locations and results

Figure A15: Extract from Ordnance survey map showing two speed and volume data points (Sites 3 and 4)

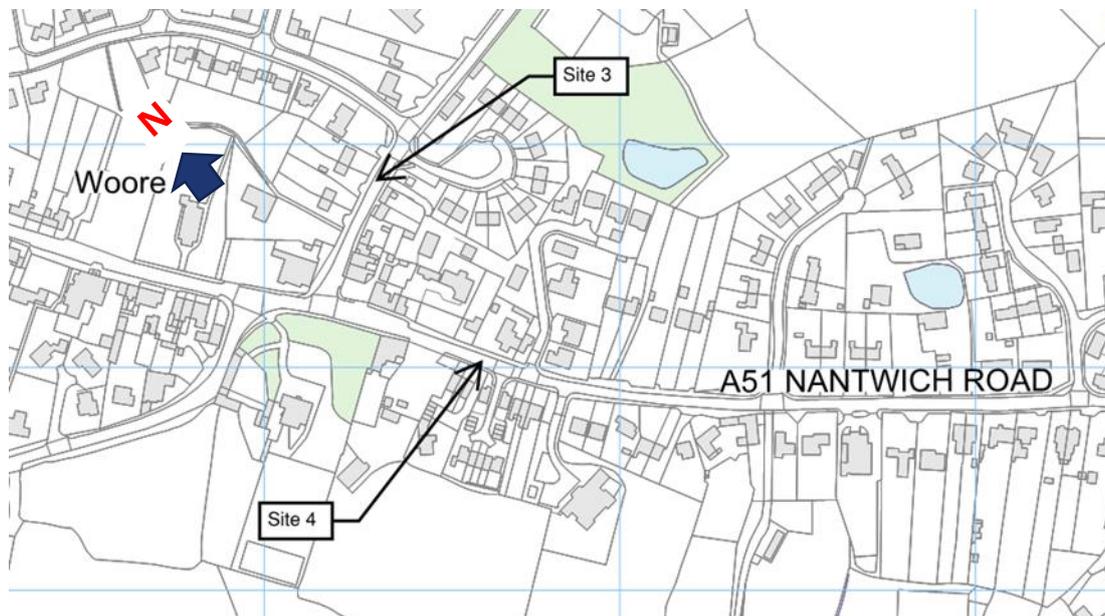


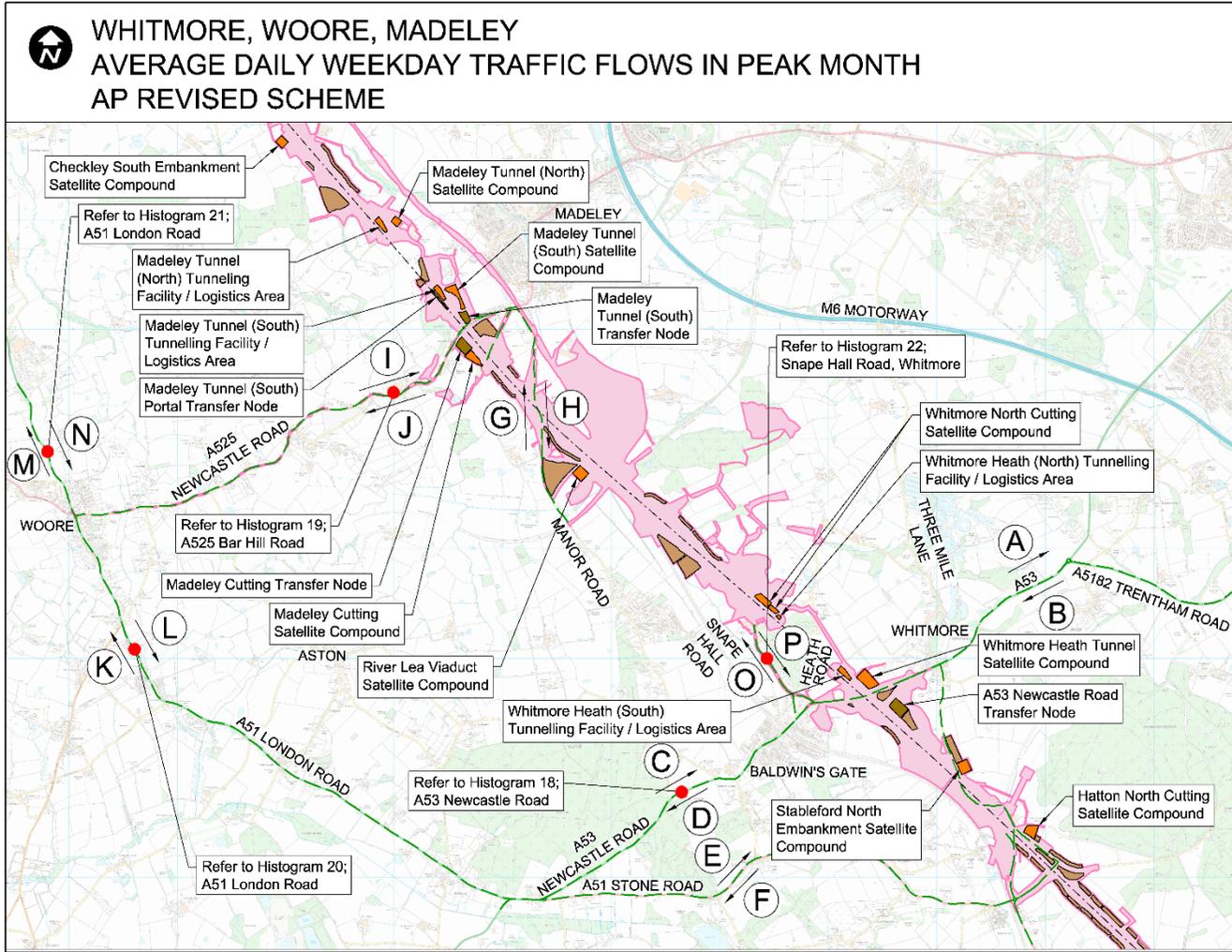
Table 4: Traffic survey results – Sites 3 and 4

| Location      | Direction | AADT | % HGV | 85 <sup>th</sup> Percentile Speed (MPH) |
|---------------|-----------|------|-------|---|
| Site 4 – A51  | NB        | 3246 | 2.0   | 30.6                                    |
| Site 4 – A51  | SB        | 3228 | 2.0   | 32.0                                    |
| Site 3 – A525 | EB        | 1857 | 1.7   | 25.9                                    |
| Site 3 – A525 | WB        | 1822 | 3.0   | 25.1                                    |

Notes: AADT - Annual average daily traffic (number)

% HGV - % of AADT which is recorded as HGV traffic

85<sup>th</sup> Percentile speed – Measured speed of which 85% of traffic is below at the location



|   |                      | A53 - Eastbound  |      |             |      |      |                               |      |      |
|---|----------------------|--|------|-------------|------|------|-------------------------------|------|------|
| A | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 7252                 | 380  | 5%   | 638         | 353  | 55%  | 9%                            |      |      |
|   |                      | A53 - Westbound  |      |             |      |      |                               |      |      |
| B | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 6782                 | 425  | 6%   | 638         | 353  | 55%  | 9%                            |      |      |
|   |                      | A53 Newcastle Road (between Madeley Road and Holly Bush Lane) - Eastbound      |      |             |      |      |                               |      |      |
| C | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 4088                 | 318  | 8%   | 309         | 254  | 82%  | 13%                           |      |      |
|   |                      | A53 Newcastle Road (between Madeley Road and Holly Bush Lane) - Westbound      |      |             |      |      |                               |      |      |
| D | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 5817                 | 475  | 8%   | 309         | 254  | 82%  | 5%                            |      |      |
|   |                      | A51 Stone Road (east of A53) - Eastbound                                       |      |             |      |      |                               |      |      |
| E | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 1488                 | 48   | 3%   | 50          | 16   | 32%  | 4%                            |      |      |
|   |                      | A51 Stone Road (east of A53) - Westbound                                       |      |             |      |      |                               |      |      |
| F | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 2294                 | 82   | 4%   | 50          | 16   | 32%  | 4%                            |      |      |
|   |                      | Manor Road (between Bar Hill and HS2 Route) - Northbound                       |      |             |      |      |                               |      |      |
| G | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 580                  | 16   | 3%   | 190         | 85   | 45%  | 13%                           |      |      |
|   |                      | Manor Road (between Bar Hill and HS2 Route) - Southbound                       |      |             |      |      |                               |      |      |
| H | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 590                  | 21   | 4%   | 190         | 85   | 45%  | 14%                           |      |      |
|   |                      | A525 Bar Hill Road (between Gravenhunger Moss and HS2 Route) - Eastbound       |      |             |      |      |                               |      |      |
| I | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 2201                 | 70   | 3%   | 297         | 261  | 88%  | 13%                           |      |      |
|   |                      | A525 Bar Hill Road (between Gravenhunger Moss and HS2 Route) - Westbound       |      |             |      |      |                               |      |      |
| J | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 2144                 | 92   | 4%   | 297         | 261  | 88%  | 14%                           |      |      |
|   |                      | A51 London Road (between Gravenhunger Lane and Newcastle Road) - Northbound    |      |             |      |      |                               |      |      |
| K | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 3093                 | 148  | 5%   | 350         | 274  | 78%  | 10%                           |      |      |
|   |                      | A51 London Road (between Gravenhunger Lane and Newcastle Road) - Southbound    |      |             |      |      |                               |      |      |
| L | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 3384                 | 45   | 1%   | 350         | 274  | 78%  | 9%                            |      |      |
|   |                      | A51 London Road (between Newcastle Road and Yew Tree Lane) - Northbound        |      |             |      |      |                               |      |      |
| M | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 3020                 | 52   | 2%   | 97          | 66   | 68%  | 4%                            |      |      |
|   |                      | A51 London Road (between Newcastle Road and Yew Tree Lane) - Southbound        |      |             |      |      |                               |      |      |
| N | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 2817                 | 93   | 3%   | 97          | 66   | 68%  | 5%                            |      |      |
|   |                      | Snape Hall Road, Whitmore (between HS2 Route and Birch Tree Lane) - Northbound |      |             |      |      |                               |      |      |
| O | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 13                   | 1  | 8%   | 135         | 52   | 38%  | 36%                           |      |      |
|   |                      | Snape Hall Road, Whitmore (between HS2 Route and Birch Tree Lane) - Southbound |      |             |      |      |                               |      |      |
| P | 2023 future baseline |  |      | HS2 Traffic |      |      | 2023 future baseline plus HS2 |      |      |
|   | All Vehs             | HGVs   | %HGV | All Vehs    | HGVs | %HGV | All Vehs                      | HGVs | %HGV |
|   | 13                   | 0  | 0%   | 135         | 52   | 38%  | 35%                           |      |      |

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**LEGEND**

- Location of Construction Traffic Histogram
- Rail Alignment
- Land Potentially Required During Construction
- Construction Main Compound
- Construction Satellite Compound
- Transfer Node
- Borrow Pit
- Construction Traffic Route
- Highway Realignment or Closure
- Temporary Material Stockpile

Registered in England  
Registration No. 06791688  
Registered office:  
2 Snow Hill,  
Queensway,  
Birmingham, B4 6GA

Zone: CA3 & CA4

Project/Contract: P2A Civils Design & Environmental Services

Design Stage: DESIGN FOR PETITIONS

Discipline/Function: Traffic and Transport

Drawing Title: Whitmore, Woore, Madeley

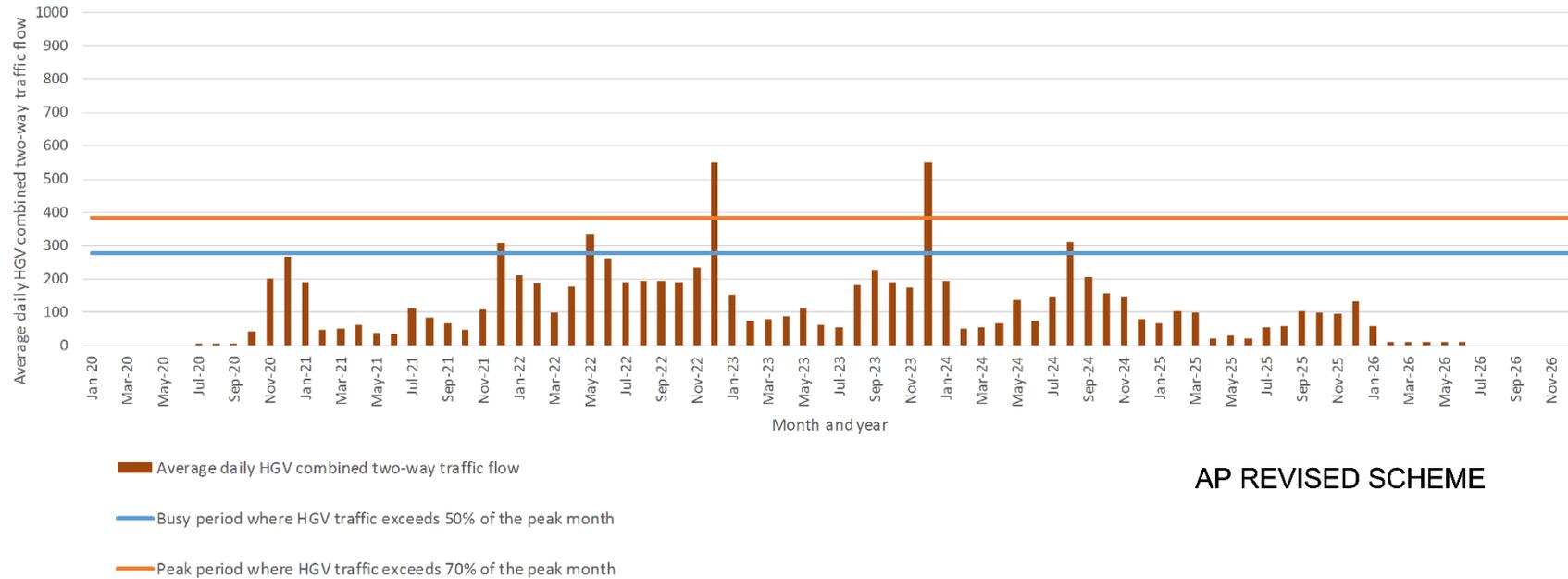
Daily Weekday Traffic Flows

Construction Phase - Peak Monthly Average Daily HGV Traffic

|   |             |              |
|---|-------------|--------------|
| Drawn: DAS                              | Checked: PK | Approved: AG |
| Date: 12/03/18                          | Scale: NTS  | Size: A3     |
| Drawing No: 2PT01-ARF-TM-DSK-000-100601 | Rev: P02    |              |

Rev Description Drawn Checked Con App HS2 App Revs with caution as alterations can occur.

Whitmore  
 AP Revised Scheme - Histogram 20  
 A51 London Road (between London Road and Newcastle Road)  
 Reference K+L on Whitmore construction traffic flow map



AP REVISED SCHEME

|       |             |       |         |         |   |   |
|-------|-------------|-------|---------|---------|---|---|
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| Rev   | Description | Drawn | Checked | Con App | HSE App   | Scale with caution as distortion can occur. |

|                       |
|-----------------------|
| <p>Legends/Notes:</p> |
|-----------------------|

Registered in England  
 Registration No. 96791686  
 Registered office:  
 2 Snow Hill,  
 Queensway,  
 Birmingham, B4 6GA

Creator/Originator  
 Ove Arup & Partners International Ltd

|               |   |
|---------------|---|
| Zone          | CA5   |
| Design Stage  | DESIGN FOR PETITIONS  |
| Drawing Title | A51 London Road<br>(between London Road and Newcastle Road) |

|                             |  |          |  |
|-----------------------------|--|----------|--|
| Project/Contract            | P2A Civils Design & Environmental Services |          |  |
| Drawn                       | Checked                                    | Approved |  |
| DAS                         | BF   | TE       |  |
| Date                        | Scale                                      | Sun      |  |
| 09/03/2018                  | As Shown                                   | A3       |  |
| Drawing No.                 | Rev  |          |  |
| 2PT01-ARP-TM-DSK-000-101031 | P00.1                                      |          |  |

## Appendix B - Traffic calming measures (Hard and Soft)

### Hard traffic calming measures

The hard traffic calming measures considered in Woore are discussed below:

- **Measure 8a – Chicanes**

Chicane designs vary considerably but most fall into two broad categories:

- Single lane, consisting of staggered build outs, narrowing the road so that the traffic from one direction must give way to opposing traffic.
- Two lane, using build outs to provide deflection, but with lanes separated by road markings or a central island.

A single lane chicane allows traffic flow in both directions, but there is only room for one vehicle to pass at a time. Generally, priority is given to one direction, minimising the possibility of vehicle conflicts. Priority should be given to vehicles leaving a traffic-calmed area to reduce the speed of vehicles entering the area.

Two lane chicanes require more carriageway width than single lane chicanes, as they allow two vehicles to pass in opposite directions at the same time. Where chicanes do not have a central divider, vehicles can encroach into the opposing traffic lane, and this may result in less speed reduction being achieved, and / or safety being compromised.

- **Measure 8b - Pinch Points**

A pinch point is where the road is narrowed from both sides at the same position along the road for 5 to 10m. By implementing this measure, the carriageway width can be restricted so that only one vehicle at a time may pass, or so that two vehicles can pass slowly. Roads with a high frequency of buses and / or heavy goods vehicles need a wider carriageway width between the pinch points.

- **Measure 8c - Traffic Islands and Refuges**

Central islands and refuges can be installed in the middle of the carriageway to narrow the width of the traffic lanes and assist in reducing vehicle speeds. Such facilities must be accompanied by the relevant road markings.

- **Measure 8d - Round and Flat Top Humps**

Round top and flat top humps have been used extensively across the UK. Flat top humps having the added benefit that they can also be used as raised crossing points in appropriate locations.

- **Measure 8e – Cushions**

Cushions are favoured more commonly over rounded top and flat top humps, especially on bus routes. A speed cushion is a form of road hump, occupying part of the traffic lane in which it is installed. Speed cushions are generally located in pairs, arranged transversely across the carriageway, but single cushions centrally positioned between build outs, "three abreast" versions, and double pair arrangements have also been used.

- **Measure 8g - Rumble Strips**

Rumble devices are designed to provide a vibratory and/or audible effect. They are intended to alert drivers to take greater care in advance of a hazard such as a bend or junction, and to help to reduce vehicle speeds. Reliance should not be placed on such traffic calming surfaces alone when seeking speed reduction.

- **Measure 8h - Mini Roundabouts**

Mini roundabouts assist in giving easier access from side roads. A mini roundabout should not be considered as a traffic calming measure in isolation and should only be considered as a package of traffic calming measures.

A summary of published comparison of various Hard Measures with respect to traffic calming performance (from reference 1: Local Transport Note 1/07 March 2007 – Traffic Calming) as shown below:

Table 1.1 Summary of measures and their relative performance

| Type of measure                            | Chapter or Section in LTN | Impact on traffic speeds<br>*** = largest reduction | Impact on traffic flows<br>*** = largest reduction | Impact on injury accidents<br>*** = largest reduction | Delays to emergency services<br>*** = shortest delay | Relative public acceptability<br>*** = most acceptable | Impact on vehicle emissions<br>*** = smallest increase |     |     |
|--|---------------------------|---|--|---|--|--|--|-----|-----|
|  |                           |   |  |   |  |  | CO   | NOx | PM  |
| Road hump                                  |                           |   |  |   |  |  |  |     |     |
| Round-top                                  | 4.2                       | ***   | ***  | ***   | *  | ***  | **   | **  | **  |
| Flat-top                                   | 4.2                       | ***   | ***  | ***   | *  | ***  | *  | *   | *   |
| Raised junction                            | 4.2                       | ***   | ***  | ***   | *  | ***  | *  | *   | **  |
| Sinusoidal                                 | 4.2                       | ***   | ***  | ***   | *  | ***  | -  | -   | -   |
| 'H' hump                                   | 4.2                       | **  | ***  | ***   | **   | ***  | -  | -   | -   |
| 'S' hump                                   | 4.2                       | **  | ***  | ***   | **   | ***  | -  | -   | -   |
| Thump                                      | 4.2                       | **  | ***  | **  | *  | **   | -  | -   | -   |
| Cushion                                    | 4.2                       | **  | ***  | ***   | **   | **   | **   | **  | **  |
| Rumble device                              |                           |   |  |   |  |  |  |     |     |
| Area                                       | 5.1                       | *   | *  | **  | ***  | **   | -  | -   | -   |
| Strip                                      | 5.1                       | *   | *  | **  | ***  | *  | -  | -   | -   |
| Narrowing                                  |                           |   |  |   |  |  |  |     |     |
| Island                                     | 6.3                       | *   | *  | *   | ***  | -  | -  | -   | -   |
| Pinch point/build-out                      | 6.3                       | * to ***  | * to **  | * to **   | ***  | *  | **   | *** | *** |
| Chicane                                    |                           |   |  |   |  |  |  |     |     |
| Single lane                                | 6.4                       | ***   | **   | **  | **   | *  | *  | *** | *   |
| Two-way                                    | 6.4                       | **  | *  | **  | **   | **   | -  | -   | -   |
| Gateway                                    | 7                         | **  | *  | **  | ***  | **   | -  | -   | -   |
| Mini-roundabout                            | 8                         | **  | *  | **  | ***  | *  | ***  | **  | **  |
| Vehicle activated device                   |                           |   |  |   |  |  |  |     |     |
| Vehicle activated signs                    | 9.1                       | **  | *  | **  | ***  | -  | -  | -   | -   |
| Speed cameras                              | 9.2                       | **  | *  | **  | ***  | ***  | -  | -   | -   |
| Road markings, traffic signs and furniture |                           |   |  |   |  |  |  |     |     |
| Roundels                                   | 10.2                      | *   | *  | *   | ***  | ***  | -  | -   | -   |
| Coloured surfacing                         | 10.2                      | *   | *  | *   | ***  | -  | -  | -   | -   |

Features like traffic / pedestrian islands, pinch points and mini roundabouts, of the hard-calming features, are not considered suitable for use in Woore village due to the geometrical constraints of the highways in the village. Generally, there is a lack of carriageway width / highway land to provide these features. These traffic calming features are normally installed on roads with a wider footprint (a characteristic that can encourage an increase in vehicle speeds due to driver perception).

Chicanes are often combined with vertical measures to be effective and potentially adding noise impact to the village. Chicane designs would also need to accommodate moderate to high amounts of HGV vehicles usage which would require wider spacing of the chicanes. The accommodation of HGV movements may be less effective in calming car speed (requiring shorter stagger of the chicanes). As a result, the use of chicanes on the A51, which is used by large HGVs and agricultural vehicles, is not considered to be appropriate. Chicanes are unlikely to control traffic speed more effectively than other available options.

## **Traffic Calming Option Selection – Other Technical Considerations**

### **Noise and Vibration**

Research has been carried out on how road humps and tables would affect noise and vibration levels. Test track research has measured maximum noise levels from a range of heavy vehicles passing over a selection of road humps and cushions (Abbott et al., 1995c). The results showed that, at sites located alongside the measure with typical vehicle speeds, installing speed cushions or humps would lead to substantial reductions in light vehicle noise levels, smaller changes in noise levels for buses, and generally an increase in maximum noise levels for unladen commercial vehicles with steel leaf suspensions, despite reductions in vehicle speeds.

Based on an assumed reduction in vehicle speed and where the traffic flow consists of all cars, a lowering of traffic noise levels would be expected following the installation of cushions or humps. With the introduction of just 10% commercial vehicles and 1% of buses, these reductions in traffic noise would deteriorate dramatically. For wide cushions and flat-top humps this traffic noise would further increase.

When considering the potential noise impacts of traffic calming involving road humps or cushions, consideration needs to be given to the number of commercial vehicles, particularly those in the heavier category and that are unladen. In Woore, along the A51, there is expected to be a mixture of laden and unladen vehicles for both the current traffic and for the construction vehicles associated with HS2.

Generally, the introduction of temporary humps and tables as an option for traffic calming in Woore is considered to introduce further noise impacts that would be undesirable for the village residents based on comments made in the Woore Parish Council petition to the Phase 2a Bill.

### **Requirement to Provide Signs and Lighting for Hard Features**

There is no requirement to sign individual vertical deflections of hard features providing these deflections are less than 150m apart. Signing is required (Traffic Signs Regulations and General Directions 2016 (TSRGD 2016)) and should be erected at the start of the traffic calmed area, together with supplementary signs as appropriate including any signs for ramped pedestrian crossings.

The requirement for signage will have an impact on the historic setting of Woore village and this needs to be considered when selecting traffic calming options to address Woore Parish Council's desire to protect and maintain the village setting.

The requirements for road lighting of road hump schemes, other than in 20mph zones, are that lighting should extend over the length of the road containing the humps. This must consist of at least three street lamps placed not more than 38 metres apart from each other, or the lighting should comply with the British Standard (BS 5489, 1992). The potential need for additional lighting through the village would need to be assessed as part of the detailed design of any design packages that included road humps.

### **Governance Requirements to Adopt Hard Calming measures**

Any traffic calming works proposed for Woore would need to meet the Highways (Road Hump) Regulations 1999 and a statutory duty consultation process. Any calming measures would need to be accepted and agreed by Shropshire County Council (SCC). A safety audit process would also need to be completed.

### **Alternative soft traffic calming measures**

The following alternative soft calming measures were discounted for the reasons described below:

- **Measure 3a - Soft traffic calming measures outside Woore village**

It may be possible to introduce additional soft measures along the A51, A525 and B5026 outside Woore village but with no specific target or hazard it is unclear what risk these measures would be addressing and whether they would be effective in reducing speed or road safety provision.

- **Measure 3b - Speed Cameras**

Local highway authorities have strict restrictions and policies as to where and when speed cameras can be used. There is normally a requirement for a certain amount of serious or fatal collisions within a certain distance of the site. According to road accident data Woore does not have any significant collision history and there is no current speeding problem as demonstrated by the speed survey data. Therefore, this measure is not recommended.

- **Measure 3c - Prominent Speed Gate on A525**

There is no apparent evidence that traffic is travelling over the 30mph speed limit on the A525 within Woore village. On this basis, the disruption to traffic during the installation of such a facility is not considered to be warranted.

- **Measure 3d - Pedestrian Crossing at Falcon Inn**

There is no apparent evidence of difficulty for pedestrians crossing at the Falcon Inn. On this basis, the construction of such a facility is not considered to be warranted.

- **Measure 3e - Pedestrian Crossing on A525**

There is no apparent evidence of difficulty for pedestrians crossing the A525. On this basis, the construction of such a facility is not considered to be warranted.

### **Signal-controlled staggered crossroad at the A51/A525 junctions**

The upgrade of the A51 London Road/A255 Newcastle Road and A51 Nantwich Road/A525 Audlem Road junctions to a signal controlled staggered crossroad was considered as a further alternative design measure. It would cause increased delays in the village and would introduce design and road safety challenges associated with the short stagger distance between the existing junctions. Alternative traffic calming measures would be more suitable treatments for achieving the desired speed reduction and road safety goals. It was also deemed unlikely that this measure would be supported by the local highway authority. For these reasons, this measure is not recommended.