

Ledbury Town Council

# Land North of Viaduct, Ledbury

Project Reference: 1908-022/TN/01

Technical Note 1 - Review of Planning Submission

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## 1 INTRODUCTION

- 1.1 This Technical Note (TN) has been prepared by Transport Planning Associates (TPA) on behalf of Ledbury Town Council to review the planning submission submitted by Bloor Homes for the development of 625 dwellings and employment use to Land North of the Viaduct, Ledbury (Ref: P171532/O), in respect of highway and transportation matters.
- 1.2 The site is located to the north of Ledbury and is bound to the north and east by Bromyard Road, to the south by the Worcester to Hereford railway line over Ledbury Viaduct, and the west and north west by agricultural land and the River Leadon.
- 1.3 The planning application was validated in June 2017 and accompanied by a Transport Assessment (TA) prepared by BWB Consulting. Herefordshire Council (HC) raised a number of issues with the original TA, resulting in an updated TA being submitted in July 2018, which was in turn recommended refusal on highway grounds. In September 2018 PJA was commissioned by Bloor Homes to prepare a new Transport Assessment which was submitted in December 2018.
- 1.4 WSP provided comments regarding the TA in February in its role as consultant to HC, requesting additional information regarding the development. WSP were also commissioned by PJA to conduct a Stage 1 Road Safety Audit on the 4<sup>th</sup> March 2019, and raised 21 problems with the proposed highway works. PJA responded to the Stage 1 Road Safety Audit on the 21<sup>st</sup> March 2019, and responded to comments regarding the TA on 3<sup>rd</sup> May 2019.
- 1.5 This TN has been prepared further to a detailed site visit carried out by TPA during the morning peak hour on Thursday 12<sup>th</sup> September 2019.

2.1.1

Summary

## 2 REVIEW OF TRANSPORT DOCUMENTS

## 2.1 Sustainability Walking and Cycling y

PJA identify five routes in the TA for pedestrians and cyclists from the development to local amenities, these are outlined below:

- Hereford Road;
- Ledbury Footpath ZB18 / Town Trail;
- The Homend;
- Bromyard Road; and
- New Mills Way.

Within the TA, an assessment of each route is provided in Table 3.1, with a detailed description provided in Appendix F.

The majority of facilities are located greater than 1000m from the development, PJA consider 2km is an acceptable commuting distance for journeys on foot based upon guidelines provided by CIHT. The TA also highlights access between the development and the identified routes will be improved to accommodate walking and cycling from the development to facilities outlined in Table 3.1.

WSP Ltd, as consultant to HC, provided comments requesting provision of additional information in regards to several aspects of the development. The comments are summarised in the Technical Note (TN) prepared by PJA in May 2019, which also includes PJA's responses to those comments. Walking distances to Bromyard Road trading estate from the northern, central and southern sectors via Bromyard Road or Hereford Road are shown in Table 2.1 within the TN.

PJA propose two measures to maximise sustainable access to the trading estate, summarised in paragraph 2.1.5 within the TN.

## **TPA Comments**

Pedestrian access from the site to Ballard Close was not shown on the original masterplan attached to the TA, but was included within the redline boundary in subsequent revisions. From TPA's site visit, it was not clear whether the extent of the proposed access falls within land under the control of the applicant. The pedestrian access forms an integral part of pedestrian and cyclist accessibility to and from the site, and it is therefore important that the ability of the applicant to provide this connection is confirmed through land ownership and/or adopted highway records.

Analysis of Highway Proposal Figure 15 shows narrowing of the footway connecting Hereford Road to the Town Trail around an existing tree. The tree is shown in the image below.



The proposed improvements to this footway are considered to provide a key part of the pedestrian and cycling accessibility for the site. However, no details are provided of how the footway would be delivered. Given the size of the tree and its roots, it is considered that further construction details should be provided to confirm that the footpath can be delivered within the available land and without adverse impact on the tree (unless that impact is otherwise confirmed as acceptable by an arboricultural specialist). It should also be noted that in order to provide suitable access by wheelchair and pushchair users, the width of the footpath past the tree should be a minimum of 1.2m.

It is noted that no footway is proposed along Bromyard Road to access the northern section of the industrial estate, and based on TPA's site visit, it is unlikely that a suitable footway could be achieved here. However, few pedestrians are predicted to require access to these units (circa. 13 per day) and the development has facilitated for future connections from within the site. TPA therefore considers the proposals in this respect acceptable.

## 2.1.2 Public Transport – Bus Services

## Summary

The TA identifies that bus stops on Hereford Road are the closest to the site, approximately 300m walking distance, and are served by routes 476, 600 and 672. PJA considers the 476 as the site's main route, offering hourly services throughout the day between Ledbury and Hereford.

The TA suggests additional services are available from the bus stop located along The Homend, approximately 500m from the boundary of the site. The TA highlights three services that pass the

site entrance along Bromyard Road. A summary of all services is provided in Table 3.3 within the TA.

## **TPA Comments**

CIHT recommends that new developments are planned with sufficient compactness in order to ensure the maximum walking distances to bus stops can be achieved with viable services. This ensures busses can complete effectively with private cars, and benefits members of society with differing levels of motivation and walking ability.<sup>1</sup>

The distances from all sectors of the site to bus stops located along Hereford Road are greater than that suggested by CIHT. However, it is important to consider the full journey time from door-to-door. Therefore, the southern sector (and to a lesser extent the central sector) of the site is considered acceptable in this respect, given the relatively short travel time by bus to Ledbury Town Centre. However, the northern sector of the site is more than double the distance from the bus stops as the southern sector, which would not encourage the use of sustainable transport.

TPA considers that, given the scale of the development and the distance to bus stops, a contribution should be provided to improve access to services near the site. This should include the provision of new bus stops on Bromyard Road close to the site access, that would facilitate access to the existing services operating along here, particularly the school bus service.

## 2.1.3 Public Transport - Rail Services

## Summary

The TA suggests Ledbury Railway Station is approximately 700m walking distance from the southern sector of the site and 1,350m from the northern sector of the site. A summary of the railway services from the station is provided in Table 3.4 within the TA.

## **TPA Comments**

Analysis of the railway services from Ledbury Station is considered acceptable and provides a realistic alternative to the private car for travel to a range of destinations beyond Ledbury. However, the distance to the northern sector of the site is such that it is likely that many future residents choosing to commute via train will access the station by cycling. At present Ledbury Station provides only 20 unsheltered Sheffield Stands. It is considered the development could contribute to improving cycle parking provision at Ledbury Railway Station, allowing the anticipated increase in patronage to be accommodated.

## 2.1.4 Highway Safety

## Summary

An analysis of PIC data is provided within the TA. Three areas were assessed, these are; Bromyard Road, Bromyard Road / Hereford Road / The Homend Priority junction, and The Homend. The TA highlights four collisions occurred along Bromyard Road, one collision within the vicinity of the Bromyard Road / Hereford Road / The Homend junction, and four collisions along The Homend.

<sup>&</sup>lt;sup>1</sup> CIHT (2018). Buses in Urban Developments. London: CIHT.

PJA concluded that existing safety issues are present at the location of the site access on Bromyard Road, and at the Bromyard Road / Hereford Road / The Homend junction. Collisions occurring along The Homend were not included as there were no common causation factors.

## **TPA Comments**

TPA considers that the assessment of Highway Safety is acceptable subject to the outcomes of the safety audit of the site access on Bromyard Road and the Bromyard Road / Hereford Road / The Homend junction, as outlined below.

## 2.2 **Trip Generation**

## 2.2.1 Vehicle Trip Generation, Distribution and Assignment

## Summary

The TA outlines forecast traffic generation was calculated based upon similar developments using TRICS, and applied the following floor areas and use classes:

Residential per dwelling;

Use Class B1(a) – Offices: 3,000m2 GFA;

Use Class B1(b) – Research and Development: 1,800m2 GFA; and

Use Class B1(c) – Light Industry: 7,200m2 GFA

Trip generation rates are shown in Table 5.1 and Table 5.2 within the TA.

PJA assigned vehicle trips to Rhea Lane, Beggars Ash, and Knapp Lane / Cut Throat Lane, and are summarised in Table 5.4 for residential trips and Table 5.5 for employment trips.

## **TPA Comments**

Traffic generation was calculated using similar sites on TRICS, the use classes chosen are considered acceptable.

Distribution was based upon 2011 census journey to work data for 'Herefordshire 019 MSOA', this is industry standard and considered acceptable given the location of the site.

Four rural routes were identified as potential diversions for traffic produced by the development. TPA considers the chosen routes and the percentage of trips assigned to them acceptable.

## 2.2.2 NMU Trip Generation, Distribution and Assignment

## Summary

The TA highlights forecast Non-Motorised User (NMU) trip generation was calculated based upon similar developments using TRICS.

Trip rate and subsequent trip generation for 625 dwellings are presented in Table 6.1 within the TA.

The TA divided residential NMU trips into trip purposes based upon the NTS Table 409 set out in Table 6.2. Destination and route assignment for each purpose are set out in Table 6.3 and residential NMU trips are summarised in Table 6.4.

The TA calculated employment NMU trips using TRICS outputs, set out in Table 6.5 and method of journey to work data was used to calculate modal split, summarised in Table 6.6. A summary of NMU employment trips is summarised in Table 6.7 and overall NMU are summarised in Table 6.8.

## **TPA Comments**

NMU trips were calculated using TRICS, for which the criteria used to calculate NMU trips is considered acceptable.

Trips were distributed based upon trip purpose, and the percentage of both pedestrian and cycling trips are considered acceptable.

NMU trips were separated into five categories based upon trip purpose, each category was separated by destination, with a percentage of trips divided between each. This is industry standard practice and is considered acceptable.

Trip generation results for employment uses on the development site was calculated using TRICS, and trips were then separated dependent upon mode. This is industry standard practice and is considered acceptable.

NMU employment trip distribution was calculated using the population of LSOA areas within 2km walking distance of the site. Employment and residential trips were combined to calculate the number of trips on each route. This is considered acceptable.

## 2.3 Travel Plan

## Summary

PJA produced a Travel Plan (TP) accompanying the separate TA. The aims and objectives of the TP are to encourage sustainable travel and reduce single occupancy car travel to and from the proposed residential and employment aspects of the site.

## 2.3.1 Section 2 – Policy Context and Guidance

## Summary

A review and summary of relevant National Policy, Planning Practice and Guidance, and Local Policy is provided within sections 2.1, 2.2 and 2.3.

## **TPA Comments**

TPA consider the relevant policy context and guidance is appropriately addressed.

## 2.3.2 Section 3 - Baseline Transport Conditions

## Summary

Section 3 provides an analysis of the local highway network, including a review of local amenities. Walking distances are provided within Table 3.2, a summary of areas within 2km are provided in paragraph 3.8.4.

A review of public transport services is included, with a summary of bus services included within Table 3.3. PJA identify the 476 as the main service, operating at an hourly frequency.

The TA identifies that rail offers the most attractive opportunity for sustainable travel, highlighting in comparison to peak hour car travel, rail journey times are comparable or quicker to several commuting destinations. A summary of railway services is included in Table 3.4.

## **TPA Comments**

TPA considers existing bus services, as a whole, enhance the accessibility of the site and should be promoted within the Travel Plan.

TPA considers the commuting destinations set out are logical, however, it is noted that they are not supported by journey to work data. It is suggested that the dataset should be reviewed to confirm existing commuting destinations among residents of Ledbury. Dataset analysis could also influence measures implemented in the TP by promoting means of transport used most by existing local residents.

Successful implementation of the proposed measures are dependent upon the provision of pedestrian and cycling improvements, along with contributions toward public transport improvements, outlined above.

## 2.3.3 Section 4 - Development Proposals and Integrated Transport Strategy

## Summary

Access to the site using a vehicle, walking or cycling is described in sections 4.2 and 4.3. A review of the integrated transport strategy is provided in section 4.4, amenities throughout Ledbury and the routes available to reach them are shown in Figure 4.1.

A summary of the existing pedestrian and cycling infrastructure, along with the proposed improvements are shown in Table 4.1, with an overall summary provided in paragraphs 4.7.1 and 4.7.2.

## **TPA Comments**

TPA considers that the development should contribute to improving cycle parking provision at Ledbury Railway Station.

The distance to Ledbury Railway station is 1,350 metres from the northern sector of the site. It is considered that many future residents choosing to commute via train will access the station by cycling. At present Ledbury Station provides only 20 unsheltered Sheffield Stands. It is considered

the development could contribute to improving cycle parking provision at Ledbury Railway Station, allowing the anticipated increase in patronage to be accommodated.

Proposed measures are dependent upon the implementation of the proposed shared footway cycleway along Hereford Road and access from the site via Ballard Close, the suitability of which is considered above.

## 2.3.4 Section 5 – Travel Plan Management

## Summary

The TP sets out the requirement for a Site Travel Plan Coordinator (STPC) responsible for the delivery of the Travel Plan for the residential element, and also responsible for liaising with occupiers of the employment elements to ensure they appoint individual Company Travel Plan Coordinators (CTPC).

Roles and responsibilities of the STPC and CTPC are outlined in section 5.3 with a summary of responsibilities provided in paragraphs 5.3.3 and 5.3.4.

## **TPA Comments**

TPA considers that the annual STPC budget should be confirmed to ensure that it is adequate to implement the measures identified in the Travel Plan.

## 2.3.5 Section 6 – Residential Travel Plan Measures

## Summary

Proposed measures are divided into four categories and are summarised in paragraph 6.1.2. The TP states the measures are considered relevant, proportionate and practical given the development proposals.

The measures proposed to promote travelling using sustainable modes and to reduce single car use are summarised between sections 6.2 and 6.6.

## **TPA Comments**

## Hard Measures

Sustainable travel vouchers - It is widely accepted significant mode shift at residential developments is most likely to be achieved at point of occupation. TPA considers that, given the scale of the development, provision of a travel voucher to each dwelling should be provided, allowing residents to sample other modes of transport at no personal expense.

Provision of a car club - Whilst the Travel Plan aims to reduce single occupancy vehicle mode share, there will be times when residents require access to a car. A car club can help to minimise the number of multiple car ownership households, therefore reducing the development's overall reliance on the private car. It is considered that the Travel Plan should include a commitment for Bloor Homes to enter into a short term car club contract (i.e. 36 months), after which the financial viability of the scheme would be reviewed, allowing the operator to either continue the car club's operation, or indeed allow another operator to utilise the space.

## Additional Measures

Utilise gamification apps - BetterPoints app incentivises users to travel sustainably by allowing them to record their sustainable travel and accrue BetterPoints that can be redeemed against vouchers for high street retailers or donated to charity. These should be advertised within the Travel Information Packs.

## 2.3.6 Section 7 – Employment Travel Plan Measures

## Summary

Several measures are outlined in the TP, these are split into five categories and are outlined in paragraph 7.1.1.

The TP states the measures are aimed at promoting existing and proposed travel facilities and are summarised between sections 7.2 and 7.8.

## **TPA Comments**

The Travel Plan confirms that a 'Travel Information Pack' will be included within employee induction packs. TPA consider it important this procedure is adhered to throughout the life of the Travel Plan to ensure its successful implementation across the employment aspect of the development, given that staff turnover can be relatively high.

It is unclear whether 'welfare facilities' proposed include showering, changing and drying facilities, which are fundamental for encouraging employees to commute by active modes.

TPA consider additional measures outlined below should be implemented to further encourage mode shift:

- Emergency cycle repair kits;
- Permit flexible working hours so employees can fit their workday around public transport timetables; and
- Car park permit system, to limit the number of employees that can park.

## 2.3.7 Section 8 – Targets

## Summary

Targets set by PJA are summarised in Table 8.1. The TP indicates targets were calculated based on a 10% reduction in predicted vehicle trip generation for the site.

## **TPA Comments**

TPA consider the 10% reduction in vehicle trip generation proposed is widely accepted to be a realistic and sufficiently ambitious target.

The TP fails to state the timescales for achieving this target, it is suggested that this is confirmed to ensure the target is achieved in a timely manner.

The TP should confirm who will be responsible for continuing to enforce the TP after the monitoring period and STPC involvement has ceased. Typically, the Travel Plan will be handed over to a

resident/employee group, with input from officers at the Council and/or external stakeholders as appropriate.

## 2.3.8 Section 9 – Consultation and Monitoring

## Summary

The TP specifies how travel plan monitoring and consultation with residents, employees and parents will be undertaken. The TP separates the section into three parts; stakeholder consultation, additional monitoring and monitoring reporting. A summary is provided within each section on how they will be achieved.

Stakeholder consultation refers to key stakeholders who will be formally consulted by face to face meetings, public exhibitions or telephone discussions. The six target groups are specified in paragraph 9.2.1. A summary of stakeholder consultation is provided in paragraph 9.2.15.

Additional monitoring refers to targets calculated based upon a reduction in predicted vehicle trip generation for the site. A summary of the methods which will be applied are provided in section 9.3.

The TP states a monitoring report will be submitted to HC within two months of the baseline survey completion, followed by subsequent annual monitoring reports, submitted within two months of the annual monitoring survey.

## **TPA Comments**

The proposed approach is considered to be satisfactory, with annual surveys and subsequent monitoring reports submitted to Herefordshire Council.

TPA considers that in order to achieve a sufficient number of responses, a 'door-knocking' approach should be adopted, as opposed to a simple questionnaire distribution. Similarly, it is important that the Travel Plan states a survey response rate that will be adhered to; at least 40% of dwellings is considered to be realistically achievable if a door knocking approach is taken, and allows conclusions drawn to be representative of the entire residential development.

## 2.3.9 Section 10 – Action Plan

## Summary

A summary of the action plan created by PJA is outlined in Table 10.1 and Table 10.2.

## **TPA Comments**

TPA consider the action plan is acceptable subject to the changes set out above.

## 2.4 **Development Proposals**

## 2.4.1 Site Access Arrangements

## Summary

The proposed site access is shown in Drawing 016 Rev P4. The vehicular access, as stated previously, takes the form of a four arm roundabout, with the southern two arms accessing the development site. This has been shown by PJA to effectively form two separate points of access.

This has been accepted by the LHA. This junction has also been subject to a Stage 1 Road Safety Audit, with a designer's response provided by PJA.

## **TPA Comments**

The proposed site access roundabout fails to conform to DMRB standards, however problems associated with the roundabout have generally been appropriately addressed by WSP in their road safety audit.

However, one issue raised in the RSA required the widening of the exits of the roundabout. PJA suggested that this could be resolved at the detailed design stage, however TPA considers that changes made to the exit widths of the roundabout have the potential to significantly influence the overall form of the junction, which in turn could lead to issues with land ownership. This should therefore be addressed within the preliminary design stage, to ensure potential issues can be addressed prior to the detailed design stage.

## 2.4.2 Hereford Road

## Summary

Highway proposals on Hereford Road are shown in Drawing 015 Rev P1. The proposals include improvements to Hereford Road to provide improved footways and cycleways, along with crossing points, including the removal of the existing ghost island right turn lanes along the road.

## **TPA Comments**

During TPA's site visit, there were few right turning movements observed along Hereford Road, and it is therefore considered acceptable for the ghost island right turn lanes to be removed.

The highway boundary along the A438 Hereford Road needs to be confirmed. Several proposed measures of the design along the road are shown outside of the boundary. It is considered a serious problem if proposed improvements to pedestrian and cyclist accessibility along the link are not implemented. This is due to the site's reliance upon Hereford Road to provide access to and from the site for cyclists and pedestrians. It is considered likely that the highway boundary as shown is incorrect as it does not appear to match up to the OS mapping boundaries in many locations, but this should be confirmed.

## 2.4.3 Hereford Road / The Homend Junction

## Summary

The proposals at the Hereford Road junction with The Homend are shown in Drawing 010 Rev P5. The proposals include improvements to the Hereford Road / The Homend junction to provide a signalised junction with an additional approach lane on Hereford Road.

## **TPA Comments**

Inter-visibility is not available between the Hereford Road and Bromyard Road stop lines. However, this would only be considered necessary at times when the traffic signals are not working. At those times, it is anticipated that the junction would in fact operate similarly to the existing junction, such that vehicles would be much further forward than the stop line before giving way. As such, it is

considered that the proposed arrangements, whilst not ideal, are acceptable and would result in an overall betterment to the existing situation.

## 2.4.4 Emergency Access

## Summary

Despite the site access roundabout being accepted as operating as two separate access points, a separate emergency access is to be provided to the east of the vehicular access roundabout. This effectively provides three emergency access points to the development.

## **TPA Comments**

Whilst it is accepted that a second point of access onto Bromyard Road is appropriate for emergency purposes, due to the internal layout of the site, there would remain a single point of access to the central and southern sectors of the site. An obstruction occurring within the carriageway between the northern and central sectors inside the development could prevent emergency services accessing the central and southern sectors of the site. TPA suggests either:

- Providing an extra route between the northern and central sectors in order to allow emergency vehicle access if the main carriageway becomes blocked;
- Limit the number of residential units and employment floor space proposed within the central and southern sectors to a number which can be served by a single access in accordance with planning policy (to be secured by planning condition); or
- Confirm with the local emergency services that the emergency access provision is acceptable for the quantum of development proposed in each sector.

## 2.5 Transport Modelling

This section summarises TPA's review of the Transport Modelling work undertaken. The full review of all modelling inputs is included at **Appendix A**.

## 2.5.1 Committed Developments and Traffic Growth

## Summary

Baseline traffic flows have been obtained from traffic surveys carried out at the assessed junctions on 15<sup>th</sup> September 2017 and 25<sup>th</sup> October 2018.

The assessments carried out include for the following committed developments:

Barratt Homes at Land South of Leadon Way – 321 Dwellings

Land Rear of Full Pitcher Inn, New Street – 100 Dwellings

Assessments have been carried out for a future design year of 2031, with traffic growth determined using TEMPRO growth factors.

## **TPA Comments**

Alternative assumptions have been applied within TEMPRO to deduct the committed developments already accounted for above. However, these committed developments are not allocated within the local plan, and it is therefore possible that local plan allocations may be delivered *in addition* to the committed developments. It is therefore not considered appropriate in this instance for the committed developments to be deducted. Notwithstanding this, the proposed development site, which is an allocated development site, has not been excluded. As such, this

offsets the committed developments to the extent that the applied traffic growth can be considered acceptable.

## 2.5.2 Bromyard Road / Hereford Road / Homend Junction

## Summary

The TA states that a baseline model of the junctions was prepared using Junctions 9, but did not validate against observed queue lengths. The TA states that *"The likely reason for this is that Junctions 9 software cannot properly consider the various interactions at the junction, delay caused by large vehicles or general hesitancy due to the non-typical layout."* 

Notwithstanding this, the TA acknowledges that the development will likely have a significant adverse impact on the operation of the existing junction, and therefore a scheme is proposed to provide signalisation at the junction. The signalised junction is assessed using Linsig. This has been modelled with a pedestrian phase operating every, every other and every third sequence.

PJA have demonstrated that a pedestrian phase will typically be called every third sequence, based on surveys. A memo dated 10 May 2019 from Mr C Brace of Planning Services, Herefordshire Council, states that "*the operation of the proposed traffic signal scheme is considered acceptable*". The scheme was also subject to a Stage One Road Safety Audit, undertaken by WSP. The RSA concludes the issues raised "*can be addressed as part of the s.278 detailed design, and a suitably worded condition will be applied*".

## **TPA Comments**

The explanation for the lack of validation is considered reasonable, although it is not clear whether any attempt has been made to apply capacity or intercept adjustments in order to manually validate the model. In any case, during TPA's site visit, it was noted that the operational issues at the junction are principally caused by large vehicles trying to turn left into Bromyard Road, with vehicles having to wait under the bridge to allow them to do so. This would be resolved by the proposed junction layout.

In the absence of a validated base model, it is not possible to compare the future operation of the proposed junction to the future operation of the existing junction. A comparison must therefore be made against the existing observed operation. It is noted the maximum recorded queue in the 2018 traffic survey was 19 vehicles. The modelling work undertaken indicates that the proposed junction would offer a benefit in comparison to this.

However, a number of minor issues have been raised within the modelling inputs which require rectification, following which it will be necessary to review whether the proposed junction remains appropriate. In particular, this relates to the pedestrian phase minimums and the entered traffic flows. The full details are provided at **Appendix A**.

## 2.5.3 Bromyard Road Site Access Roundabout

## Summary

The junction has been assessed within the TA using Junctions 9. There is a significant amount of reserve capacity available within the junction as modelled.

## **TPA Comments**

As set out in **Appendix A**, there are a number of issues highlighted within the model inputs, particularly in relation to the geometries applied and therefore requires reassessment. The comments raised previously in relation to the Road Safety Audit may also impact on this. Given the amount of reserve capacity within the junction as currently modelled, it is unlikely that these changes would result in an unsatisfactory junction arrangement, but this should be confirmed through further modelling.

## 2.5.4 Beggars Ash / Bromyard Road Priority Junction

## Summary

The junction has been assessed within the TA using Junctions 9. There is a significant amount of reserve capacity available within the junction as modelled and the proposed development is not shown to have any significant impact on the operation of the junction.

## **TPA Comments**

It is considered that the junction has been modelled appropriately and no further work is required on this junction.

## 2.5.5 Hereford Road / New Mills Way / Leadon Way Roundabout

## Summary

The junction has been assessed within the TA using Junctions 9. There is a significant amount of reserve capacity available within the junction as modelled and the proposed development is not shown to have any significant impact on the operation of the junction.

## **TPA Comments**

As set out in **Appendix A**, there are a number of issues highlighted within the model inputs, particularly in relation to the presence of a nearby crossing that has not been accounted for and therefore requires reassessment.

## 2.5.6 Worcester Road / High Street / New Street / The Southend signalised junction.

## Summary

The junction has been assessed within the TA using Linsig. The junction has been modelled using a cycle time of 120s, although it was noted that on-site observations indicated a cycle time of up to 180s was used. The junction results show that the junction operates within Practical Reserve Capacity (PRC) in all scenarios.

## **TPA Comments**

There is a signalised pedestrian crossing to the north of the junction which has not been included within the modelling. This could impact on the operation of the junction and should be considered further. There are also issues with the traffic flows entered to the model, as set out in **Appendix A**.

The results of the modelling as currently shown indicate that whilst the junction is forecast to operate within capacity, the addition of the proposed development will have a significant impact on the operation during the PM peak in particular, with all arms being close to the PRC. At present this

is considered acceptable, but should be confirmed to remain appropriate following any necessary changes to the modelling as outlined above.

## 2.5.7 Impact of Trip Diversion to Rural Routes

## Summary

The TA indicates that as all junctions assessed are forecast to operate within capacity in 2031, this would not encourage traffic to divert to less appropriate rural routes. Notwithstanding this, a proportion of traffic has been assigned to these routes in any case, with up to 9 vehicles in the peak hours on Rhea Lane, 20 vehicles on Beggars Ash and 12 vehicles on Knapp Lane. PJA considered that this level of trips was not significant and did not require further assessment.

## **TPA Comments**

Based on TPA's site visit, the number of trips assigned to each route is considered reasonable.

Rhea Lane is likely to be an unattractive route as it is a single track road with few passing places, and there would also likely be difficulties for vehicles seeking to turn right from Rhea Lane onto Hereford Road. The route via Rhea Lane is a similar distance to the route via the main road, and is not anticipated to result in any significant time saving that would encourage rat-running.

Beggars Ash is considered to be the main route to rural areas such as Colwall, Cradely and Wellington Heath, and has been assigned as such by PJA. It does not offer any attractive alternative route to main roads such as the A449 or A4103, and is therefore not considered to encourage rat-running.

Knapp Lane offers an alternative route from the site to the A449. PJA indicates that the distance via this route is similar to that via the main road, but in fact the distance between the junction of Knapp Lane with The Homend to the junction of Cut Throat Lane with the A449 is in fact double via the main road as via Knapp Lane. Knapp Lane may therefore serve as a credible rat-running route. However, similarly to Rhea Lane, the road is single track with few passing places and also includes traffic calming features. The junction of Knapp Lane with The Homend is also narrow with restricted visibility. These features are likely to discourage the use of this route, and the number of trips assigned to this route by PJA is therefore considered appropriate.

Overall, TPA agrees with PJA's assertion that the level of trips on the rural routes identified would not be considered significant and does not warrant further assessment.

## 3 SITE ACCESS APPRAISAL

- 3.1 It is noted that particular concerns have been raised by local residents and by Ledbury Town Council in relation to the vehicular access proposals for the site. This section therefore focuses on the suitability of the proposed vehicular access arrangements.
- 3.2 In summary, the vehicular access proposals for the site include:
  - (i) A new four-arm roundabout junction with Bromyard Road, providing two access roads into the development site; and
  - (ii) A separate emergency access onto Bromyard Road.

## **Emergency Access Arrangements**

- 3.3 The purpose of emergency access is to ensure that access is maintained in the event that the road becomes blocked. This is addressed as follows:
  - (i) If the main access road into the site from the proposed roundabout becomes blocked, there is a second access road leading from the same roundabout;
  - (ii) In the unlikely event that the roundabout becomes blocked entirely, there is a separate emergency access onto Bromyard Road.
- 3.4 As set out in **Chapter 2**, it is considered that a second point of access onto Bromyard Road could be considered acceptable for emergency purposes. However, the illustrative masterplan for the development only shows one vehicle connection between the northern and southern parts of the development site.
- 3.5 It is noted that Herefordshire Council guidance suggests that an emergency link would be required for developments serving more than 200 dwellings, and this is likely to be exceeded by the southern section of the site shown in the current illustrative masterplan, which also serves all of the employment areas of the scheme.
- 3.6 PJA references Manual for Streets guidance within its TA, which suggests that higher numbers of units could be served by a single access, subject to a risk assessment carried out by the fire service. It goes on to state that the emergency planning officer at Herefordshire Council was consulted twice but did not respond. It should be noted that the lack of a response does not correspond to approval of the arrangements as presented. There is also no evidence that the applicant has sought the views of the fire service itself.

3.7 Whilst it is acknowledged that the application is made in outline, and the internal layout of the site is therefore subject to change, it is considered that the emergency access provision to all areas of the site is a significant issue that should be resolved at this stage. It is therefore suggested that any planning permission granted should include a suitably worded planning condition that limits the number of units served off a single link to 200 dwellings, unless otherwise confirmed in writing as acceptable by the emergency services.

## Potential Access onto Hereford Road / Leadon Way Roundabout

- 3.8 No vehicular access is proposed from the site under the viaduct onto the Hereford Road / Leadon Way Roundabout, which would appear to be a clear option for access to the site given the existing spur off the roundabout and therefore the direct connection onto the Ledbury bypass. It would also address the issue of emergency access outlined above.
- 3.9 Bloor Homes issued a letter dated 22<sup>nd</sup> June 2018 outlining the reasons why a vehicular access under the viaduct did not form part of the proposals. In summary, the key reasons set out by Bloor Homes are set out below, along with TPA's comments on these reasons.
  - (i) **Reason**: There is no absolute policy requirement for a vehicular access to be provided under the viaduct.

**TPA Comments**: This is accepted, although all benefits and dis-benefits of any connection should be weighed up in the development of the access strategy.

(ii) Reason: The requirement to achieve technical approval for the works from Network Rail would be expected to take a minimum of 3 years and would likely be longer than this.

**TPA Comments**: Given the provision of an access onto Bromyard Road, and the size of the development, it is considered reasonable that the development could be delivered in phases, with access under the viaduct provided as part of a later phase if necessary due to discussions with Network Rail.

(iii) **Reason**: The risks of any potential collisions with the pillars of the viaduct, both during construction and operation of any new access road, or any potential to undermine the foundations of the viaduct as a result of the construction activities.

**TPA Comments**: It is expected that appropriate provisions could be put in place to minimise the risk of any damage to the viaduct during construction. It is also likely that construction close to a listed structure is a situation that has been satisfactorily managed by a number of contractors elsewhere across the UK. It is also worth noting that construction under the viaduct will be necessary in any case in order to provide the proposed canal and pedestrian / cycle connection to the site.

During operation, it is accepted that there could be a risk of vehicles striking the pillars of the viaduct. However, this risk could be significantly reduced through the provision of appropriate vehicle restraint systems. There are many different types of vehicle restraint systems that could be applied in order to minimise the visual impact and thereby ensure that the link can be considered suitable in the context of the listed viaduct. For example, this could include Trief kerbs, speed reduction measures on approach to the viaduct, and wooden clad crash barriers. It could also include a weight restriction such that any HGVs requiring access to the site would be required to route via Bromyard Road.

(iv) **Reason**: The potential for any access road to be closed due to necessary maintenance works to the viaduct.

**TPA Comments**: Should any temporary maintenance works be necessary, an alternative access would be available onto Bromyard Road.

(v) **Reason**: The impact of providing a vehicle route on the landscape and character of the viaduct.

**TPA Comments**: The impact of providing a vehicle route on the landscape and character would ultimately need to be assessed by consultants specialising in those areas. However, TPA has experience of working on a number of highway schemes that have been specifically designed and delivered in order to be sympathetic to the local environs, such that the impact on the landscape and character of the area is minimised as far as possible.

(vi) **Reason**: The Herefordshire Green Infrastructure Strategy did not envisage any vehicular access under the Viaduct.

**TPA Comments**: The Green Infrastructure Strategy highlights the need to "*Support the restoration of the canal to develop a continuous linear aquatic habitat, accompanied by pedestrian and non-motorised vehicular access.*" However, this simply highlights the need to provide access for non-motorised users and does not suggest that there should be no access provided for motor vehicles.

(vii) **Reason**: The impact of any highway proposal on the proposed route of the Hereford and Gloucester Canal.

**TPA Comments**: The structure of the viaduct is such that there are a number of arches side by side. The use of one of these arches to provide the Hereford and Gloucester Canal does not therefore preclude the use of a separate arch to facilitate vehicular access.

3.10 As set out above, all of the reasons set out by Bloor Homes could be reasonably addressed to the extent that the issues are either mitigated sufficiently or removed entirely. The Bloor

Homes letter also fails to recognise any of the benefits of providing vehicular access under the viaduct. For clarity, TPA's view of the potential benefits are as follows:

- (i) Vehicle trips to/from the west (incl. Hereford) would not be required to travel through the constrained Hereford Road / Bromyard Road / The Homend junction.
- (ii) A more direct route to/from the west would be provided such that the potential for rat-running via Rhea Lane would be significantly reduced.
- (iii) Vehicle trips to / from the south (incl. Gloucester and the M50) would be directed along the Ledbury by-pass rather than through the constrained Hereford Road / Bromyard Road / The Homend junction and Ledbury Town Centre.
- (iv) Subject to demand, it would allow for a future bus service to loop through the development site onto Bromyard Road, enhancing sustainability.
- (v) The setting of the viaduct could be utilised to provide an attractive gateway to the development site.
- 3.11 It is not clear to what extent the decision made by Bloor Homes has been based upon the cost of delivering a vehicle route under the viaduct. The letter states, *"in financial cost terms alone it would be considerably more affordable for Bloor Homes to provide an access road into the site via the existing roundabout on the Hereford Road. However, the decision is not predicated by the cost saving."* However, it later goes on to state, *"the land acquisition cost would also be substantial and in my opinion coupled with what would be a difficult and expensive road solution, would undoubtedly have an affect on the viability of the project."*
- 3.12 There has been no evidence provided to suggest that a balanced view of all benefits have been weighed against the dis-benefits in order to arrive at the decision not to provide access under the viaduct. It is suggested that this evidence is provided in order to properly determine the suitability of the site access proposals.

## 4 SUMMARY AND CONCLUSIONS

- 4.1 In summary, it is considered that the proposals are likely to be acceptable in highways terms, subject to confirmation of a number of matters which are summarised as follows:
  - Confirmation of deliverability of proposed pedestrian access onto Ballard Close within available land ownership (Ref. Section 2.1.1);
  - Confirmation of deliverability of proposed footpath connection to town trail around existing tree (Ref. Section 2.1.1);
  - Provision of a contribution towards public transport improvements, including new bus stops on Bromyard Road close to the site access (Ref. Section 2.1.2);
  - Provision of a contribution towards improved cycle parking provision at Ledbury Railway Station (Ref. Sections 2.1.3 and 2.3.3);
  - Review of commuting destinations applied within Travel Plan (Ref. Section 2.3.2);
  - Confirmation of the annual STPC budget (Ref. Section 2.3.4);
  - Provision of additional Travel Plan measures, including sustainable travel vouchers and provision of a car club among others (Ref. Sections 2.3.5 and 2.3.6);
  - Confirmation of timescales to achieve Travel Plan targets (Ref. Section 2.3.7);
  - Confirmation of who will be responsible for the Travel Plan after the monitoring period (Ref. Section 2.3.7);
  - Provision of a 'door-knocking' approach to monitoring (Ref. Section 2.3.8);
  - Amendment of site access proposal to accommodate RSA issue in relation to exit widths (Ref. Section 2.4.1);
  - Confirmation of adopted highway boundary and proposed highway scheme on Hereford Road (Ref. Section 2.4.2);
  - Provision of appropriate emergency access arrangements to the central and southern sectors of the site (Ref. Section 2.4.4);
  - Reassessment of junctions following rectification of issues identified within this report (Ref. Section 2.5); and
  - Evidence of an assessment of benefits vs dis-benefits of providing a vehicle access under the viaduct (Ref. Section 3.12).

# Appendix A

## **Review of Modelling Inputs**

## Table 1 Review of Bromyard Road / Hereford Road / Homend Linsig Model

Checks Made	Comments	
Junc	tions	
All necessary junctions included in network with logical arm structure	Accepted	
La	nes	
Lane setup reflects junction drawings	Accepted	
Signal controlled lanes matched to controller and phase	Accepted	
Lane length appropriate	Accepted	
Saturation Flows		
Justified method to derive saturation flows	Accepted. Linsig geometrical saturation flow tool (based on RR67) used.	
Saturation flow calculations acceptable	Accepted	
Advanced L	ane Settings	
Start / end green displacements	Accepted. Default values used.	
Queue limits	Information not provided, although assumed no queue limits set given the nature of the junction.	
Use of weightings for optimiser constraints	Information not provided, although assumed no optimiser constraints set given the nature of the junction.	
Use of random delay or queue de-sliver	Information not provided, although assumed no random delay or queue de-sliver set given the nature of the junction.	
Give Way	Parameters	
Priority controlled lanes correctly assigned	Accepted.	
Measurement of max/min flow when giving way	Accepted. Default values applied.	
Flow when opposing traffic stopped reasonable	Accepted.	
Measurement of give-way co-efficient	Accepted. Default values applied.	
Measurement of clear conflict time of opposing traffic	Accepted	
Check all opposing movements identified	Accepted.	
Measurement of storage in front of stop-line	Accepted.	
Max turns in inter-green reasonable	Accepted.	
Measurement of non-blocking storage	Accepted.	
Lane Co	nnectors	
Lane connectors provided reasonable	Accepted.	
Cruise time	Information not provided and cannot be checked, although is unlikely to significantly alter results.	
Platoon Dispersion	Information not provided and cannot be checked, although is unlikely to significantly alter results.	
Zo	nes	
Zones logical with appropriate entry and exit lanes	Accepted.	
Pedes	strians	
Pedestrian crossings suitably represented	Not Accepted. Pedestrian crossing included in signal staging. However, the Technical Note titled 'Response to HC Comments' states "The pedestrian crossing adds 20 seconds to the cycle time, based upon a 7-second crossing 'green time' plus additional intergreen time for the extra stage", whereas the modelling only includes a green time of 5s for the crossing. This should be rectified and the junction reassessed.	

General Controller Set-up		
Controllers setup correctly	Accepted.	
Stage streams setup correctly	Accepted.	
Non-standard filters setup correctly	Accepted.	
Signal	Settings	
Phases setup correctly for each controller	Accepted.	
Phase minimums/type reasonable	Not Accepted. The Technical Note titled 'Response to HC Comments' states " <i>The pedestrian crossing adds 20 seconds</i> <i>to the cycle time, based upon a 7-second crossing 'green time'</i> <i>plus additional intergreen time for the extra stage</i> ", whereas the modelling only includes a green time of 5s for the crossing. This should be rectified and the junction reassessed.	
Inter-greens reasonable	Accepted.	
Stages reasonable	Accepted.	
Phase delays reasonable	Accepted.	
Stage Se	equences	
Stage sequences reasonable	Accepted.	
Stage timings reasonable / optimised	Not Accepted. The Technical Note titled 'Response to HC Comments' states " <i>The pedestrian crossing adds 20 seconds</i> <i>to the cycle time, based upon a 7-second crossing 'green time'</i> <i>plus additional intergreen time for the extra stage</i> ", whereas the modelling only includes a green time of 5s for the crossing. This should be rectified and the junction reassessed.	
Traffic	Flows	
O-D matrices match traffic flow data	Not accepted. The AM 2031 + CD + Dev flows shown in the modelling outputs do not match those shown in the 2031 + CD + Dev flow TA stick diagrams in Appendix I.	
Lane / route assignment acceptable	Accepted	
Actual flows match desired flows	Information not provided and cannot be checked, although is unlikely to significantly alter results.	
Inappropriate routes closed	Accepted	
Mod	elling	
Scenarios set up with correct options	Accepted	
Cycle time appropriate / optimised	Accepted	
Res	sults	
Are all values as expected (Demand Flows, Green Times etc)	Not Accepted. The Technical Note titled 'Response to HC Comments' states " <i>The pedestrian crossing adds 20 seconds</i> <i>to the cycle time, based upon a 7-second crossing 'green time'</i> <i>plus additional intergreen time for the extra stage</i> ", whereas the modelling only includes a green time of 5s for the crossing. This should be rectified and the junction reassessed.	
Deg Sat >100% for existing situation with no modelled suppressed demand?	Accepted	
Deg Sat appropriate? Validated?	Accepted	
Capacity conclusions	Accepted	
If suppressed demand has been modelled, do queues validate?	N/A	
Queues appropriate?	Accepted	
Queue limits exceeded?	Not accepted. The queue on The Homend is forecast to block the Ledbury Railway junction. The impact of this blocking has not been accounted for within the modelling.	

Queuing conclusions (will exit blocking modify these?)	Not accepted. The queue on The Homend is forecast to block the Ledbury Railway junction. The impact of this blocking has not been accounted for within the modelling.	
If suppressed demand has been modelled do journey times validate?	N/A	
Journey time conclusions?	Accepted	
Conclusions and Recommendations		
It is our opinion the junction is to be remodelled based on pedestrian phase timings as stated within the TA of 7 seconds. Additionally, comment is requested on the blocking of Station access due to queueing vehicles on The Homend.		

## Table 2 Review of Site Access Roundabout Junctions 9 Model

Ch	ecks Made	Comments
Jun		ctions
All necessary junctions included in network with logical arm structure		Accepted
	U	nits
All units utilised in the mo	delling software are as expected	Accepted
	Junction Ne	etwork Options
Driving side and lighting o	options as standard	Accepted
	Geo	ometry
	Approach road half-width	Not accepted. Drawing 03468-A-016-P2 states approach half width of 3.3m whilst 3.5m has been modelled. Verification required.
	Entry Width	Accepted
Bromyard Road North	Effective flare length	Not accepted. The effective flare length is over 30m for a 1.2m flare width. This is excessively long, and skews the modelling results. It is recommended the junction is redesigned with an appropriate flare length.
	Entry radius	Accepted
	Inscribed circle diameter	Accepted
	Conflict angle	Accepted
	Approach road half-width	Not accepted. Drawing 03468-A-016-P2 states approach half width of 3.3m whilst 3.8m has been modeleld. Verification required.
	Entry Width	Not accepted. Drawing 03468-A-016-P2 states entry width of 4.5m whilst 4.74m has been modelled. Verification required.
Bromyard Road South	Effective flare length	Not accepted The effective flare length is over 30m for a 1.2m flare width. This is excessively long, and skews the modelling results. It is recommended the junction is redesigned with an appropriate flare length.
	Entry radius	Not accepted. Drawing 03468-A-016-P2 states entry radius of 20m whilst 32.2m has been modelled. Verification required.
	Inscribed circle diameter	Accepted
	Conflict angle	Accepted
	Approach road half-width	2.75m Accepted
	Entry Width	Not accepted. Drawing 03468-A-016-P2 states entry width of 4.5m whilst 3.47m has been modelled. Verification required.
Site Access South	Effective flare length	Not accepted The effective flare length is over 30m for a 1.5m flare width. This is excessively long, and skews the modelling results. It is recommended the junction is redesigned with an appropriate flare length.
	Entry radius	Not accepted. Drawing 03468-A-016-P2 states entry radius of 20m. 18m has been modelled. Verification required.
	Inscribed circle diameter	Accepted
	Conflict angle	Accepted
	Approach road half-width	2.75m Accepted
Site Access North	Entry Width	Not accepted. Drawing 03468-A-016-P2 states entry width of 4.5m whilst 3.7m has been modelled. Verification required.
	Effective flare length	Not accepted. The effective flare length is over 30m for a 1.5m flare width. This is excessively long, and skews the modelling

		results. It is recommended the junction is redesigned with an appropriate flare length.	
	Entry radius	Not accepted. Drawing 03468-A-016-P2 states entry radius of 32.5m whilst 20m has been modelled. Verification required.	
	Inscribed circle diameter	Accepted	
	Conflict angle	Accepted	
	De	mand Set	
Scenarios		2031 + Dev is modelled. This is accepted.	
Time Periods		Both AM and PM peak hours are modelled. This is accepted.	
Traffic Profile Type		One Hour flow profiles are used. Given the expected traffic flows, this is robust and accepted.	
Start/end time		The start/end times are as stated in the TA. This is accepted.	
Time segment length		The time segment length is 15 minutes. This is standard practice, and accepted.	
Network flow scaling facto	r	The network flow scaling factor is 100%. This is accepted.	
	Tra	ffic Flows	
PCU factor for HV		This is accepted.	
Origin Destination Flows		The OD flows match those shown in the 2031 + CD + Dev flow TA stick diagrams in Appendix I.	
HV %		It is not possible to check the HV% as the traffic survey is not provided in the TA.	
	F	Results	
RFC		Given the information used in the modelling, this is accepted.	
Delay Queue		However, the modelling needs to be rerun to ensure the results	
		are correct.	
	Conclusions and Recommendations		
The junction should be re- traffic flows and scenarios	designed with appropriate flare le s to ensure the junction continues	ngths. This revised junction should be remodelled with the same to operate within capacity.	

## Table 3 Review of Beggars Ash / Bromyard Road Junctions 9 Model

Checks	Made	Comments
		Junctions
All necessary junctions inclue	ded in network with logical	Accepted
arm structure		
		Units
All units utilised in the model expected	ling software are as	Accepted
	Junctio	on Network Options
Driving side and lighting options as standard Accepted		
Geometry		
	Width of carriageway	Accepted
	Has kerbed central reserve	Accepted
Major arm geometry	Has right turn bay	Accepted
	Visibility for right turn	Accepted
	Blocks?	Accepted
	Blocking queue	Accepted
	Minor arm type	Accepted
Miner arm geometry	Lane width	Accepted
Minor arm geometry	Visibility to left	Accepted
	Visibility to right	Accepted
		Demand Set
Scenarios		2017, 2031 + CD, and 2031 + Dev is modelled. This is accepted.
Time Periods		Both AM and PM peak hours are modelled. This is accepted.
Traffic Profile Type		One Hour flow profiles are used. Given the expected traffic flows, this is robust and accepted.
Start/end time		The start/end times are as stated in the TA. This is accepted.
Time segment length		The time segment length is 15 minutes. This is standard practice, and accepted.
Network flow scaling factor		The network flow scaling factor is 100%. This is accepted.
		Traffic Flows
PCU factor for HV		Accepted.
Origin Destination Flows		The OD flows match those shown in the TA stick diagrams in Appendix I.
HV %		It is not possible to check the HV% as the traffic survey is not provided in the TA.
Results		
RFC		Accepted
Delay		Accepted
Queue		Accepted
Conclusions and Recommendations		
It is considered this junction has been modelled appropriately, and no further work is required on this junction.		

<u>I able 4</u> Review of Hereford Road/Leadon Way Roundabout Junctions 9 Mode
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Chec	ks Made	Comments
	Junctions	3
All necessary junctions included	l in network with logical arm structure	Not accepted. The proposals show a Toucan crossing point located some 20m to the east of the roundabout on Hereford Road. This signalised junction needs to be modelled in conjunction with the roundabout to ensure queuing vehicles from the Toucan crossing do not adversely impact the operation of the roundabout.
	Units	
All units utilised in the modelling	software are as expected	Accepted
	Junction Network	Options
Driving side and lighting options	as standard	Accepted
	Geometry	/
	Approach road half-width	
	Entry Width	
4438 W	Effective flare length	The geometry of this arm has not been verified
	Entry radius	
	Inscribed circle diameter	
	Conflict angle	
	Approach road half-width	
	Entry Width	Not accepted. This arm has been modelled based on
Northern Arm	Effective flare length	the existing highway layout, rather than the proposed
	Entry radius Inscribed circle diameter	highway layout, as shown in drawing 03468-A-015-P0. This includes the entry width and approach half width.
	Conflict angle	-
	Approach road half-width	
	Entry Width	Not accord. This arm has been modelled based on
A 400 E	Effective flare length	the existing highway layout, rather than the proposed
A438 E	Entry radius	highway layout, as shown in drawing 03468-A-015-P0.
	Inscribed circle diameter	This includes the entry width and approach half width.
	Conflict angle	-
	Approach road half-width	
	Entry Width	
Now Mille Way	Effective flare length	Not accepted. This arm has been modelled based on
New Willis Way	Entry radius	highway layout, as shown in drawing 03468-A-015-P0.
	Inscribed circle diameter	
	Conflict angle	]
	Approach road half-width	
	Entry Width	
Loadon Way	Effective flare length	The geometry of this arm has been unable to be verified
Leauon way	Entry radius	based on the data provided.
	Inscribed circle diameter	
	Conflict angle	

Demand Set		
Scenarios	2017, 2031 + CD, and 2031 + Dev is modelled. This is accepted.	
Time Periods	Both AM and PM peak hours are modelled. This is accepted.	
Traffic Profile Type	One Hour flow profiles are used. Given the expected traffic flows, this is accepted.	
Start/end time	The start/end times are as stated in the TA. This is accepted.	
Time segment length	The time segment length is 15 minutes. This is standard practice, and accepted.	
Network flow scaling factor	The network flow scaling factor is 100%. This is accepted.	
Traffic Flo	ws	
PCU factor for HV	This is accepted.	
Origin Destination Flows	The OD flows match those shown in the $2031 + CD + Dev$ flow TA stick diagrams in Appendix I apart from the A438 E PM flows are ±1 to arms one and 4 respectively. This is not expected to have an impact on the results	
HV %	It is not possible to check the HV% as the traffic survey is not provided in the TA.	
Results	,	
RFC	Given the information used in the modelling, this is	
Delay	accepted. However, the modelling needs to be rerun to	
Queue	ensure the results are correct.	
Conclusions and Reco	mmendations	
The mitigated junction including toucan crossing on A438 E arm sho scenarios to ensure the junction continues to operate within capacity	uld be remodelled with the same traffic flows and /.	

## Table 5 Review of High Street / Worcester Road / New Road Linsig Model

Checks Made	Comments
Junc	tions
All necessary junctions included in network with logical arm structure	Not accepted. A pedestrian signalised crossing is located some 45m to the north of the High Street which is not included in the modelling of the junction.
La	nes
Lane setup reflects junction drawings	Accepted
Signal controlled lanes matched to controller and phase	Accepted
Lane length appropriate	Accepted
Saturati	on Flows
Justified method to derive saturation flows	Accepted. Linsig geometrical saturation flow tool (based on RR67) used.
Saturation flow calculations acceptable	Accepted
Advanced L	ane Settings
Start / end green displacements	Accepted. Default values used.
Queue limits	Information not provided, although assumed no queue limits set given the nature of the junction.
Use of weightings for optimiser constraints	Information not provided, although assumed no optimiser constraints set given the nature of the junction.
Use of random delay or queue de-sliver	Information not provided, although assumed no random delay or queue de-sliver set given the nature of the junction.
Give Way	Parameters
Priority controlled lanes correctly assigned	Accepted.
Measurement of max/min flow when giving way	Accepted. Default values applied.
Flow when opposing traffic stopped reasonable	Accepted.
Measurement of give-way co-efficient	Accepted. Default values applied.
Measurement of clear conflict time of opposing traffic	Accepted
Check all opposing movements identified	Accepted.
Measurement of storage in front of stop-line	Accepted.
Max turns in inter-green reasonable	Accepted.
Measurement of non-blocking storage	Accepted.
Lane Co	nnectors
Lane connectors provided reasonable	Accepted.
Cruise time	Information not provided and cannot be checked, although is unlikely to significantly alter results.
Platoon Dispersion	Information not provided and cannot be checked, although is unlikely to significantly alter results.
Zo	nes
Zones logical with appropriate entry and exit lanes	Accepted.
Pedes	strians
Pedestrian crossings suitably represented	Not Accepted. Whilst a pedestrian phase is shown in the stage diagram, it is not included in any of the stage sequences for the scenarios modelled. It is recommended this junction is remodelled with the inclusion of a separate pedestrian crossing junction, at an appropriate frequency based on a pedestrian survey.

General Controller Set-up		
Controllers setup correctly	Accepted.	
Stage streams setup correctly	Accepted.	
Non-standard filters setup correctly	Accepted.	
Signal	Settings	
Phases setup correctly for each controller	Accepted.	
Phase minimums/type reasonable	Accepted	
Inter-greens reasonable	Accepted.	
Stages reasonable	Accepted.	
Phase delays reasonable	Accepted.	
Stage Se	equences	
Stage sequences reasonable	Accepted.	
Stage timings reasonable / optimised	Accepted	
Traffic	Flows	
O-D matrices match traffic flow data	Not accepted. The AM and PM 2031 + CD + Dev flows shown in the modelling outputs do not match those shown in the 2031 + CD + Dev flow TA stick diagrams in Appendix I. The figures recorded in the TA and those modelled in the AM are 1425 and 1430 respectively. This is unlikely to significantly alter the results.	
Lane / route assignment acceptable	Accepted	
Actual flows match desired flows	Information not provided and cannot be checked, although is unlikely to significantly alter results.	
Inappropriate routes closed	Accepted	
Mod	elling	
Scenarios set up with correct options	Accepted	
Cycle time appropriate / optimised	Accepted	
Res	sults	
Are all values as expected (Demand Flows, Green Times etc)	Accepted	
Deg Sat >100% for existing situation with no modelled suppressed demand?	Accepted	
Deg Sat appropriate? Validated?	Accepted	
Capacity conclusions	Accepted	
If suppressed demand has been modelled, do queues validate?	N/A	
Queues appropriate?	Accepted	
Queue limits exceeded?	Not accepted. Given the location of the unmodelled pedestrian crossing, it is possible that queuing from the pedestrian crossing will impact the operation of the signalised junction, and vice versa.	
Queuing conclusions (will exit blocking modify these?)	Not accepted. Given the location of the unmodelled pedestrian crossing, it is possible that queuing from the pedestrian crossing will impact the operation of the signalised junction, and vice versa.	
If suppressed demand has been modelled do journey times validate?	N/A	
Journey time conclusions?	Accepted	

#### **Conclusions and Recommendations**

It is our opinion the junction has not been modelled to represent the highway layout, and the operation of two signalised junctions in close proximity. As such, it is recommended the junction is remodelled to properly show the operation of the junction.