



## **Sharpness Vale – Highway Capacity Assessment**

Analysis of the possible effects on the local highway network of the proposed Local Plan allocation for 2,400 homes at Sharpness Vale

Report Date

Prepared for:

Sharpness Development LLP

Prepared by:

Stantec UK Ltd



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## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

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Prepared by

[Redacted Signature]

(signature)

[Redacted Name]

Reviewed by

[Redacted Signature]

(signature)

[Redacted Name]

Approved by

[Redacted Signature]

(signature)

[Redacted Name]



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## 1.0 INTRODUCTION

### 1.1 BACKGROUND

Sharpness Development LLP are the promoters of the proposed Sharpness Vale settlement, a sustainable and resilient growth point proposal, at Land south and east of Newtown and Sharpness, in the district of Stroud, Gloucestershire.

The site, referenced in this appraisal report as ‘Sharpness Vale’ is identified in the draft Stroud District Local Plan Review Draft Plan for Consultation (November 2019) as a proposed allocation under site reference ‘PS36’ for a new garden community comprising:

1. 10ha mixed employment uses, to complement what already exists at and around Sharpness Docks;
2. 2,400 dwellings in the Local Plan period, by 2040, and a total of 5,000 by 2050;
3. Local centre including shops and community uses, primary school(s) and secondary school, associated community and open space uses;
4. Strategic green infrastructure and landscaping;
5. Priority for walking, cycling, “micro-mobility” modes and public transport over the use of the private car including high quality pedestrian, cycle and micro-mobility routes throughout the development, bus only routes and displaced car parking;
6. The reopening of the Sharpness Branch line to passenger services, in addition to the current freight operations, including provision of a new rail station, providing direct enabling rail services to Cam and Gloucester, and onwards journeys to Bristol and the rest of the UK; and
7. Flexible and targeted bus services, utilising “Demand Responsive” services, traditional local bus routes, bespoke coach services and other emerging technologies to provide for a wide range of different journey purposes.

The scheme is intended to follow a sustainable philosophy across all aspects – and for transport this means adopting an approach to minimise the need for travel and to provide alternative modes to those that have greater environmental and social impact, such as the private car.

More details, and a full technical appraisal of the way that trips might be expected to take place in a fully realised resilient and sustainable solution is set out in two documents produced in support of the allocation:

- Transport Approach – How we developed the transport philosophy for the new settlement (April 2020)
- Transport Technical Appraisal (June 2020)

This report should be considered in the context of those earlier documents.



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

## Introduction

### 1.1.1 A holistic approach

The overall approach to transport and movement at Sharpness Vale is developed around recognition of the link between journey purpose and treating the transport network as a systemic whole.

#### 1.1.1.1 Journey purpose

Journey purpose dictates where people need to travel and when, and there are a series of societal norms regarding travel that we have come to accept – people travel routinely to work, to education and to shop. They make other trips to support their quality of life – to medical facilities, or to leisure pursuits or to visit friends and family, but these are more occasional journeys that don't follow such a defined pattern.

The majority of people would have a propensity to minimize the time that they have to spend travelling, and so would prefer to work or go to school closer to home. This propensity is offset by the affordability of housing and the overall location of employment. Many people have been either unable to afford to live close to where they work, or have worked for businesses that followed the zonal planning approach that has been the model in the UK for the last few decades. Hence, employment places have been focused on city centres or business parks and similar spaces, where it is inevitable that commuting is required.

However – the “local living” agenda has been increasingly evident – and this has been accelerated by the current Covid-19 response, which has seen many people working successfully from home. It is likely that this will lead to permanent changes in travel patterns – although these are not yet possible to discern or quantify accurately.

#### 1.1.1.2 The travel system

The approval process in the UK has tended to pitch the use of the car against the use of other modes when assessing the effects of development proposals. This has resulted in an approach where, however good the proposals may be in terms of providing more sustainable modes, there is a requirement to also mitigate the effects of increasing car use, if this is the mode that is chosen by more of the residents or users of the development.

This has created a self-fulfilling prophecy approach – where the mitigation measures provided in case of greater car use create a weighting towards even easier reliance on car use. It seems likely that, going forward into a future that recognizes the impacts of environmental and social damage from car use, we will have to wean ourselves off this approach.

Instead, we should view the transport network holistically, as an entire system, where all modes create opportunities and varying levels of convenience in travel for some particular journeys. The test should be around whether we can accommodate the movement demand for a development on the network as a whole, and then apply interventions to realise that solution and encourage people to use it.

#### 1.1.1.3 The holistic approach at Sharpness

At Sharpness Vale, this has been defined in a transport case that focuses on the periods when the network is under greatest stress (generally the weekday morning and afternoons) and then considers



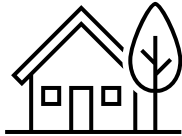


## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Introduction

how to provide for the journeys that people will need to make through a hierarchy of sustainable responses.

The hierarchy works out as follows:



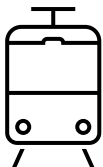
1. Reduce the need to travel at all – support home working with house types that facilitate and accommodate workspaces



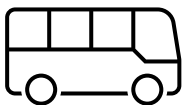
2. Provide links to land uses that reflect routine and regular travel patterns that are close enough to each to be easily and most reliably walked between



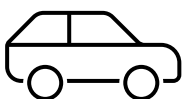
3. Provide high-quality, safe and direct infrastructure to encourage and support cycling (and the use of other personal modes) for slightly longer journeys, or for trips to stations or other public transport hubs



4. Reintroduce rail passenger services to Sharpness, as a new mode of travel to Gloucester, and beyond, and as a first-step catalyser to the recovery of wider rail services in the area



5. Provide bespoke, tailored and demand responsive services via high-quality coaches and buses that take people directly and reliably to locations where groups of people have a “common purpose” – employment, education, leisure, community activities
6. Support local bus services, and make provision for these vehicles to have priority over other longer distance modes so that they are the most direct and reliable modes for local connectivity



7. Where seats cannot justifiably be made available on other modes, only then consider the degree of highway provision that should be made. And to redress the imbalance that already exists in terms of provision for this mode, consider only making safety improvements in any event.



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

## Introduction

The challenge should be laid down, and responded to, as to the reasons to provide additional highway capacity in any event. If people are going to choose to use the car, and impose greater congestion on themselves and others, then that is not a reason or justification to intervene in the network. If capacity already exists for that journey on an alternative mode – a train or bus service, then it is reasonable to argue that no mitigation for the highway should be provided, as this simply exacerbates a pre-existing undesirable course of action.

This is supported by consideration of value-for-money in terms of any investment, with an increasing recognition that adding capacity purely to deal with peak period events can be wasteful in terms of environmental, land use and monetary resources.

This approach is about redressing the balance – but only by ensuring that all those trips that legitimately need to be made can be, or are, accommodated on the transport network as a whole.

This approach is detailed comprehensively in the “Transport Approach – How we developed the transport philosophy for the new settlement” (April 2020) and “Transport Technical Appraisal” (June 2020) documents.

## 1.2 THE HIGHWAY CAPACITY ASSESSMENT

This report supplements earlier work by testing what might happen if the sustainable approach cannot be delivered, or is not as successful as envisaged.

Together the earlier documents already referred to and this document underpin a resilient assessment of the way that the transport network may be affected by the Sharpness Vale development.

Whereas the earlier documents proposed and assessed a holistic transport network approach, that applied a hierarchy to travel and movement demand – what may be termed an “Ideal” outcome, this one considers the “Fallback” position as a worst case assessment in terms of impacts on the highway network for the proposed Local Plan allocation. This is consistent with the adoption of a resilient approach. Part of resilience is to explore and accommodate a range of potential outcomes, and to show that the proposed scheme can cater for this wide range.

This would then be used to develop a structured “Monitor & Manage” approach to any future planning application obligations to allow prevailing circumstances to be responded to and ensure that the actual outcomes and impacts were effectively managed.

### 1.2.1 Basis of highway capacity assessment

This assessment is intended to provide confidence to the highway authorities, as well as the planning authority and other stakeholders, that the Sharpness Vale proposals have been considered in a “worst case” assessment that assumes that typical historical travel behaviours will persist should the development be built out. Therefore, it uses source data that utilizes data collected from existing developments (via the widely accepted TRICS database) to derive trip rates that mirror what is seen as existing developments.

The resulting assessment is essentially car-based in terms of the predominant travel mode, and is typical of larger scale developments built out in recent years.



### 1.3 STRUCTURE OF THIS REPORT

Following this Introduction, this Highway Capacity Assessment is structured as follows:

- A high-level review of the current demographic and transport conditions in Sharpness including public transport and car travel (**Section 2**)
- A description of the development proposals at Sharpness Vale (**Section 3**)
- A summary of the approach to trip generation, distribution and mode share for the “fallback” assessment (**Section 4**)
- A summary of existing traffic flows on the local highway network including a comparison between pre-Covid and post-Covid traffic levels (**Section 5**)
- A detailed review of the person trip generation for Sharpness Vale including journey purpose and internalisation assumptions (**Section 6**)
- Distribution of the external person trips to likely destinations split by journey purpose (**Section 7**)
- Mode share of external trips by journey purpose and destination (**Section 8**)
- A Traffic Impact Assessment including capacity assessments of key junctions likely to be impacted by Sharpness Vale and identification of highway improvement schemes (**Section 9**), and
- Conclusions (**Section 10**)



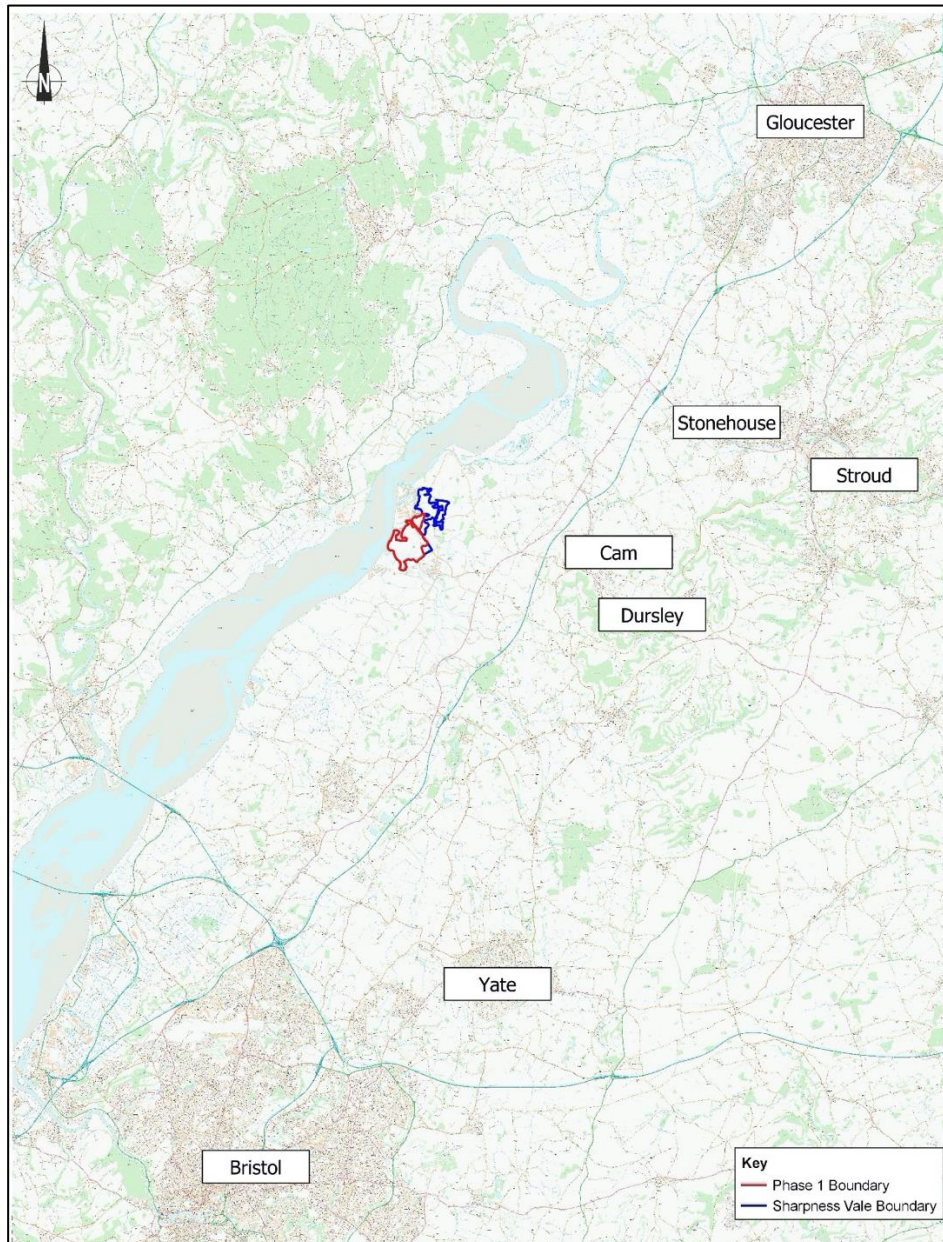
## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Sharpness Today – context to the assessment

### 2.0 SHARPNESS TODAY – CONTEXT TO THE ASSESSMENT

The proposed Sharpness Vale development lies generally to the south of Sharpness Docks, and to the west of the small settlement of Newtown. The development is north of the small town of Berkeley and lies adjacent to the River Severn running to the west of the site.

The general configuration of the location is shown on the plan below:



**Figure 2.1 – Strategic Site Location**

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The two areas shown red and blue on the plan at Figures 2.1 & 2.2 show together the whole of the Sharpness Vale growth point. The red area, to the south, shows the initial phase of development –

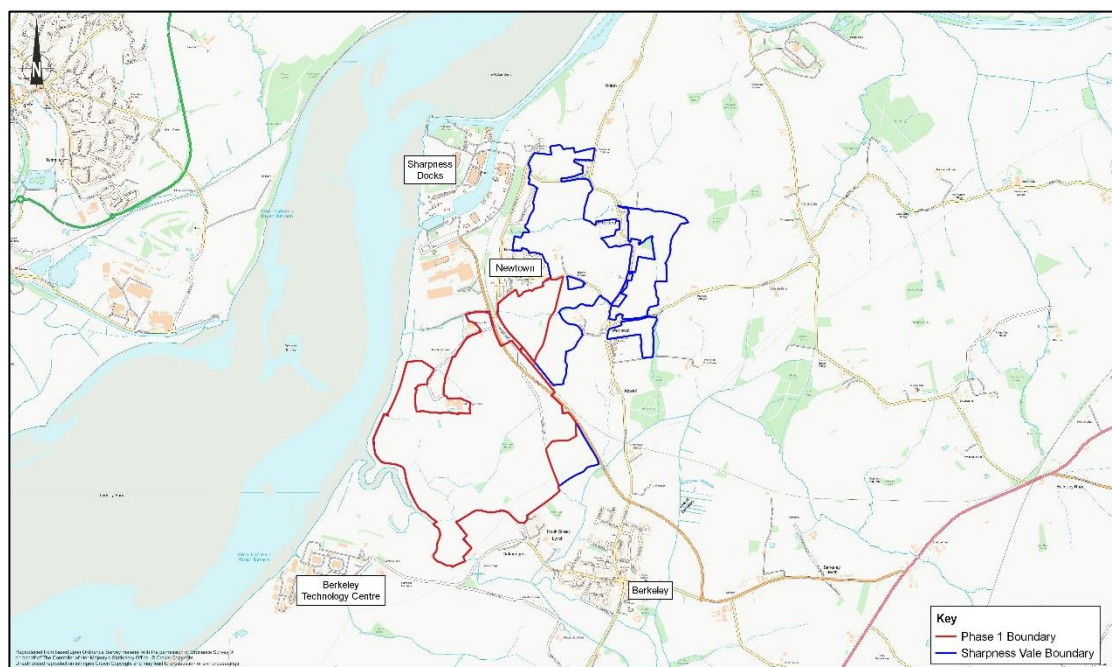


## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Sharpness Today – context to the assessment

the Local Plan allocation area of 2,400 homes and 10Ha of employment land, along with other supporting and core uses, and the blue area shows the further development area to the north which could accommodate an additional 2,600 homes, and which would be subject to a future Local Plan allocation.

The area immediately adjacent to the Sharpness Vale site is shown on the plan below. It comprises small settlements (Newtown) located close to the existing Sharpness Docks. The Docks are busy, and typically provides a landing for bulk goods of various types and descriptions. To the south of the area is the small town of Berkeley, and south of that the site of the former nuclear power station – now being decommissioned and gradually re-purposed for a range of non-residential uses. It currently includes education facilities and the police headquarters.



**Figure 2.2 – Detailed Site Location and Context**  
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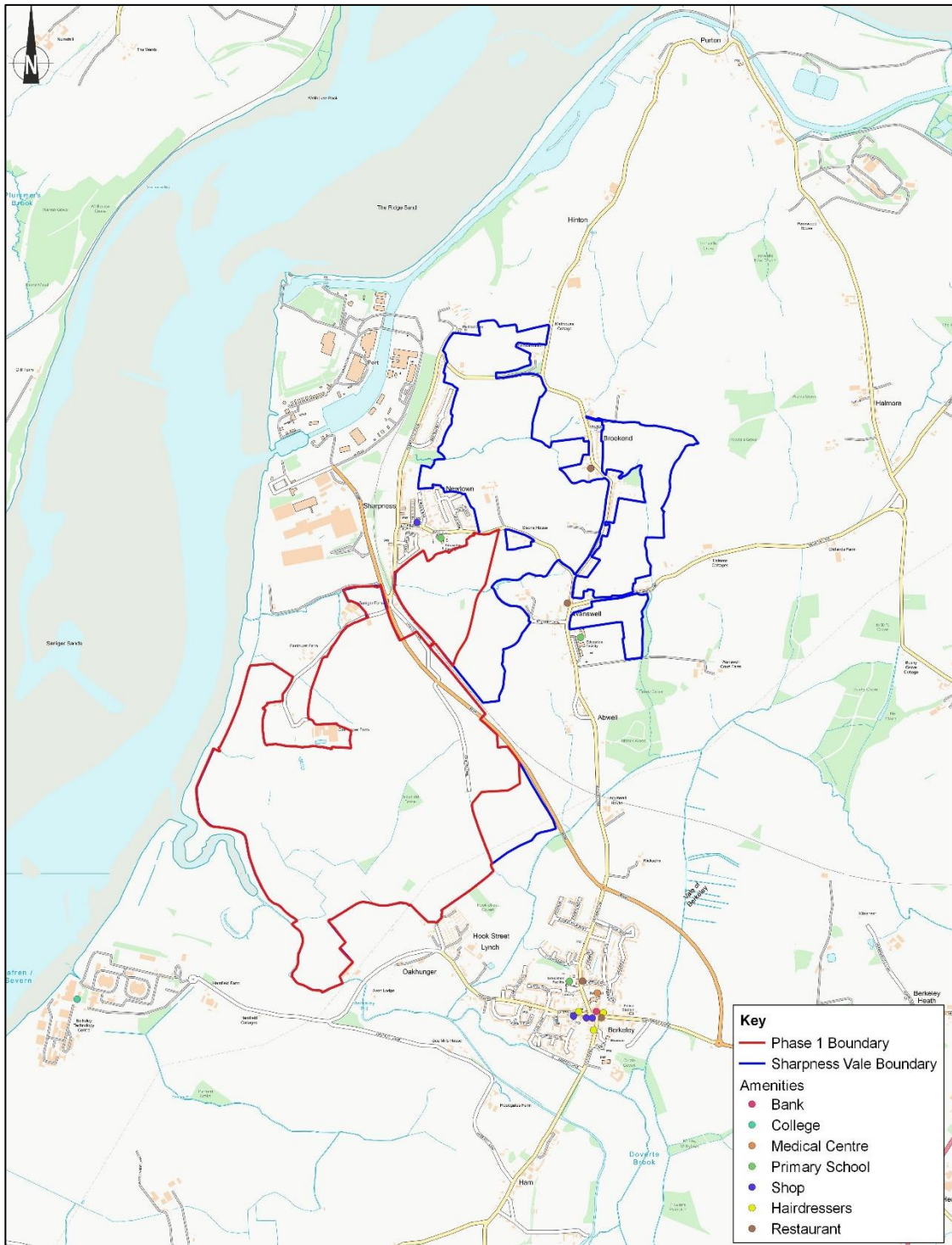
### 2.1.1 Local Amenities

Although mainly a series of small communities at present, the existing settlements do provide a range of facilities and amenities that already form part of the Sharpness area. These are easily accessible by the local walking, cycling and highway network, and they are highlighted on the plan below.



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Sharpness Today – context to the assessment



**Figure 2.3 – Existing Local Amenities**

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Sharpness Today – context to the assessment

### 2.2 TRANSPORT NETWORK

The local transport and movement network around Sharpness is typical of many similar rural areas – a network of single carriageway roads that have developed along the routes of longstanding movement corridors. Many of these may well reflect ancient or medieval trackways and they emerged as the most logical way for people to travel between settlements in the area.

It is not usual for these corridors to necessarily be able to easily accommodate motor traffic, as they were not designed with it in mind. Hence, over the years what may originally have been an undefined “multi-modal” movement corridor, available to vehicles, horses and pedestrians alike has been redefined as a primarily vehicle corridor, with specific provision for pedestrians having been lost over time.

However, the B4066 which links Sharpness to the nearby A38 strategic route, does provide a consistent level of service, at least in terms of vehicular movement. The carriageway has been configured to provide a wide, single carriageway road that is able to accommodate the noticeable flow of heavy goods vehicles associated with the docks and adjacent haulage and storage operations. There are no pinch points on the B4066, although sections of it around Berkeley and onwards to the A38 are now subject to a 40mph speed limit.

The A38 is a slightly higher standard of predominantly single carriageway road, running north-south on an alignment some seven kilometres drive east of Sharpness. Although not part of the Highways England strategic road network, the A38 performs a strategic function in the area, providing a key route between Gloucester to the north and Bristol to the south.

The railway came to Sharpness on 1<sup>st</sup> August 1876, when the station opened at Sharpness. The railway remained, until the loss of the bridge over the River Severn in the sixties, and service patterns have declined so that it is only a freight service branch at present. It has a pick up point for nuclear fuel transport at Berkeley, and the track remains open and operational as far as Sharpness, but there are no longer any stations on the line, or passenger services. Network Rail have advised that the trackwork and signalling have been reconfigured over recent decades to preclude passenger services, and so some work would be needed to recover these.

Local bus services ply their trade around the roads of Newtown, Sharpness and Berkeley, but these are relatively infrequent. They are probably sufficient to permit less economically active residents to travel without reliance on a car – as evidenced by the census statistics.

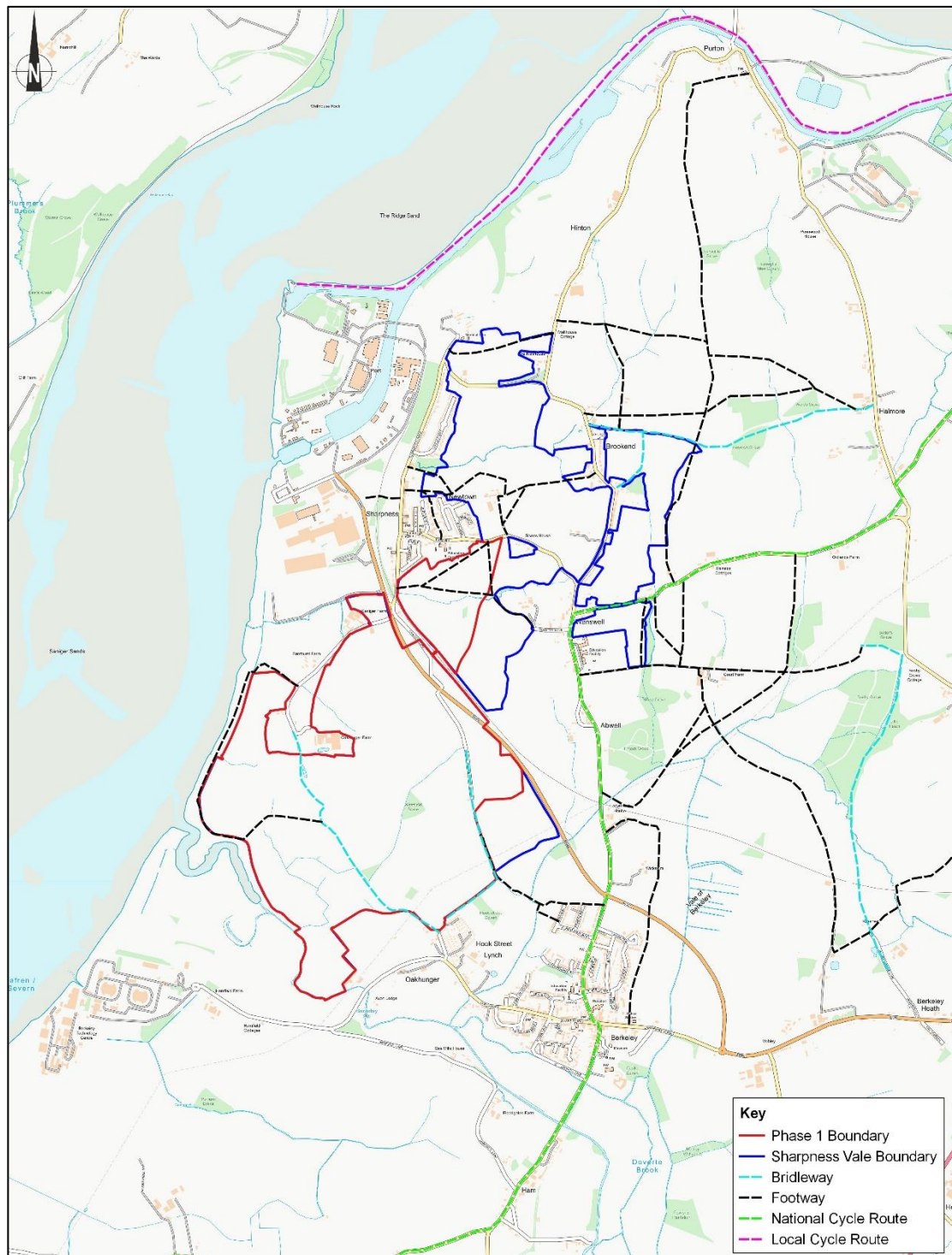
#### 2.2.1 Walking & Cycling

There is a comprehensive existing network of pedestrian and cycling routes around the area, as shown in **Figure 2.4** below.



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

## Sharpness Today – context to the assessment



**Figure 2.4 – Existing Walking and Cycling Network**  
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There are a number of existing walking routes across the proposed site with a network of existing footpaths. These should be retained in the development as it comes forward. It is noticeable that there are a greater number of existing routes on the later phase of development (shown blue on the





## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Sharpness Today – context to the assessment

plan), and so new routes will need to be developed, that connect to these existing routes, within the Local Plan allocation land (edged red on the plan above).

### 2.2.2 Local Bus Services

There are local bus services that serve the existing settlements in the area, and hence travel along the existing road network around the site. It is not surprising to note that there are no services that are aimed at the site directly, as it does not have any demand at present.

The existing bus stops that are closest to the site are those on Saniger Lane, Oldminster Road, Station Road and in Berkeley. These stops are served by the Stagecoach 62 service which provides a two-hourly service between Gloucester (approximately an hour and half journey time) and Bristol (approximately one-hour journey time).

In addition to the number 62 service, there are a number of school services that run twice a day from stops around the site. These bus services serve a number of schools across the area including those in Thornbury, Cam and Dursley and Kingswood. These bus services are summarised on the plan below, with service patterns outlined in **Table 2.1**.

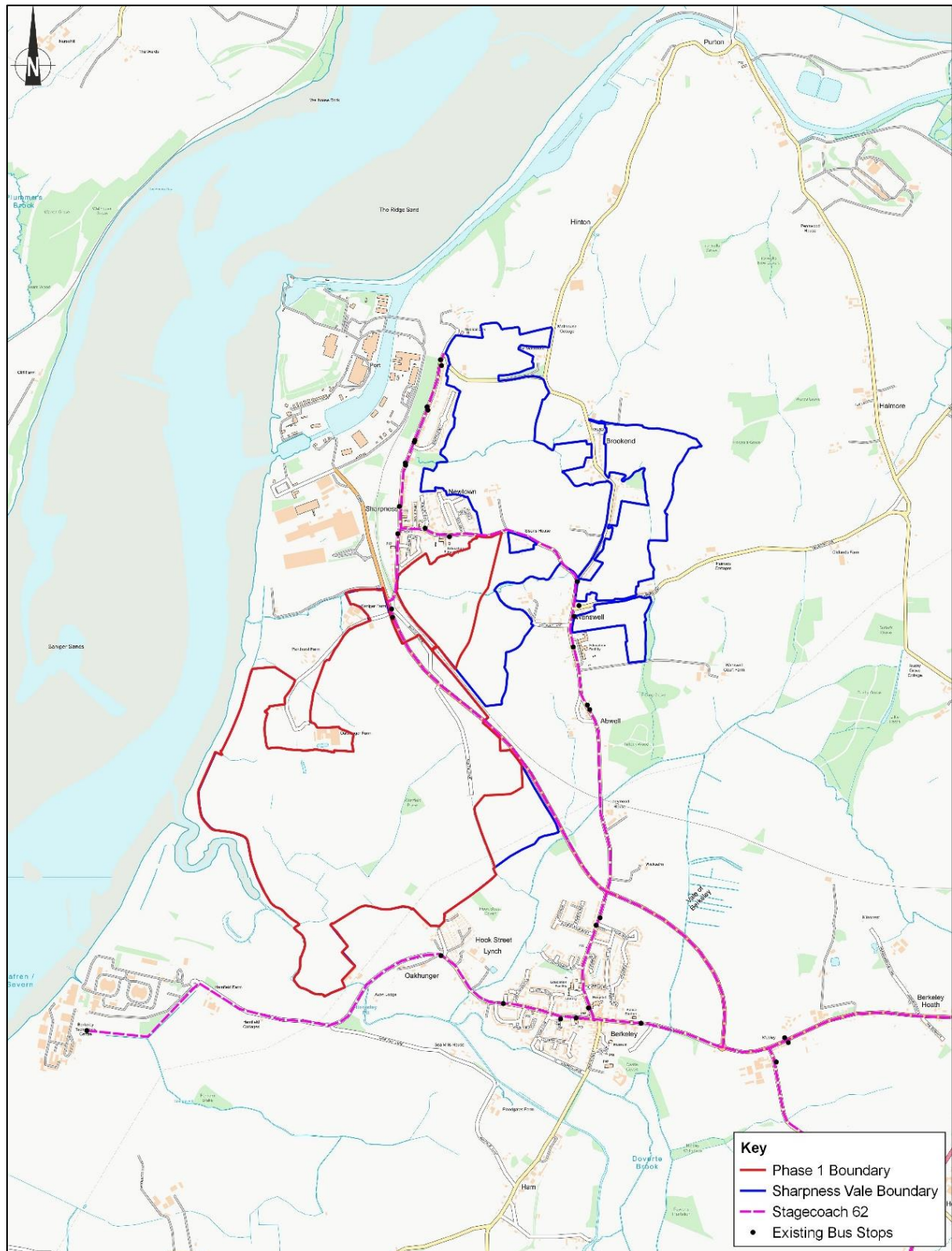
**Table 2.1 – Summary of Local Bus Services**

Service	Operator	Route	Frequency		
			Weekdays	Saturday	Sunday
X1	Taylor's Travel (School Bus)	Berkeley – Sharpness – Halmore – Rednock School	08:01 16:10	No Service	
X2	Taylor's Travel (School Bus)	Berkeley – Sharpness – Cambridge – Eastington – Stroud High and Marling School	07:15 18:00	No Service	
X6	Taylor's Travel (School Bus)	Sharpness – Berkeley – Stone – Charfield – Katharine Lady Berkeley School; Kingswood	07:26 15:25	No Service	
6	Ebley Coaches (School Bus)	Sharpness – Berkeley – Frampton – Eastington – The Stanleys – Maidenhill School	07:37 15:15	No Service	
207	Mike's Travel (School Bus)	Thornbury – Berkeley - Sharpness	07:55 16:10	No Service	
62	Stagecoach	Berkeley - Bristol	06:47 10:22 12:22 14:35 16:35	08:52 10:52 12:52 14:52 16:57 19:02	No Service



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Sharpness Today – context to the assessment

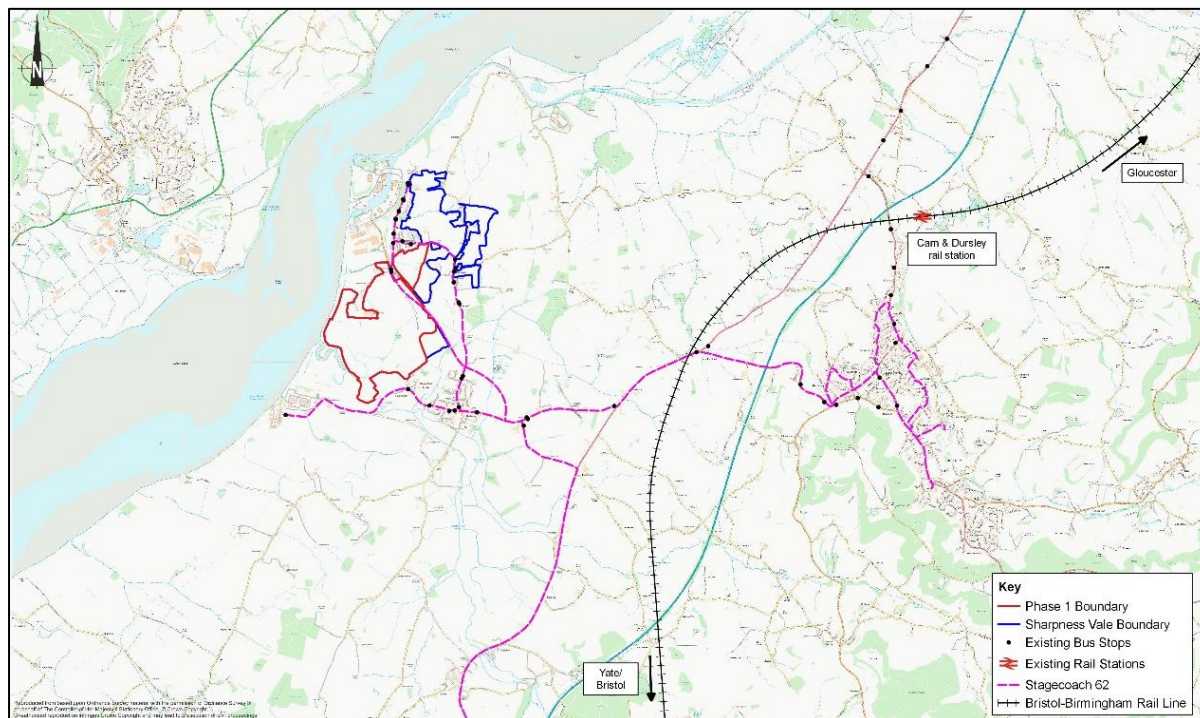


**Figure 2.5 – Existing Local Public Transport Network**  
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# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

## Sharpness Today – context to the assessment



**Figure 2.6 – Existing Strategic Public Transport Network**  
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### 2.2.3 The Railway

Although the railway continues to run through Sharpness, it is only used for freight services at present. Although services could run as far as the docks and provide services to it, the only current service is the nuclear waste disposal freight train that operates roughly once each week from the Berkeley sidings and pick-up facility. However – these trains do run up the line as far as Sharpness in order to be able “turn” the locomotive, which is not available at the pick-up facility.

From a passenger perspective, the nearest rail station to the site is Cam & Dursley, located approximately 11km from the site. The rail station can be accessed via the number 62 bus in an estimated 50 minutes, or via the A38 by car in an estimated 17 minutes.

Cam & Dursley rail station is located on the Bristol – Birmingham line and is served by northbound trains to Gloucester (with some trains continuing to Cheltenham, Ashchurch for Tewkesbury, Worcester Shrub Hill and Great Malvern) and southbound trains to Bristol Temple Meads (with some trains continuing to Bath, Westbury and Weymouth). The rail services at Cam and Dursley rail station are summarised below in **Table 2.2**.

Cam & Dursley Station provides both a car park and cycle parking provision for 30 bikes. The station has step free access to the platforms and a ramp is available for train access. Although no ticket office is provided there is a ticket machine and a customer help point available to offer assistance. A sheltered waiting area is provided on each platform as well as bench seating.



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

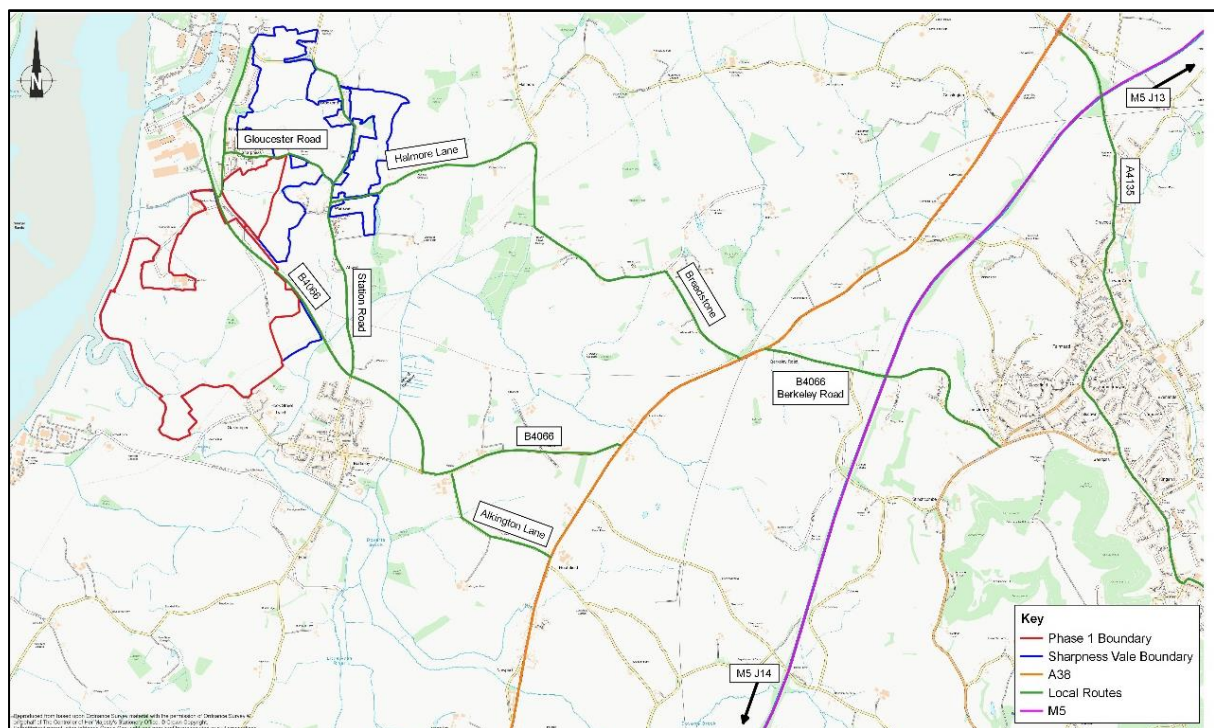
Sharpness Today – context to the assessment

**Table 2.2 – Summary of Rail Services from Cam & Dursley**

Direction	Destination	Journey Duration (minutes)	Frequency	
			Mon – Sun	Sun
Northbound	Gloucester	19	Hourly	Every other hour
	Cheltenham Spa	32	Every other hour	
	Ashchurch for Tewkesbury**	42		
	Worcester Shrub Hill	58		
	Great Malvern	80		
Southbound	Bristol Temple Meads	40	Hourly	Every other hour
	Bath Spa	65	Hourly	No Service
	Westbury	95	Hourly	
	Weymouth	195	Every other hour	

## 2.2.4 Highway network

The existing highway network in the vicinity of the Sharpness site is shown on the plan below, and described in the following sections:



**Figure 2.7 – Existing Road Network**  
 Contains Ordnance Survey data © Crown copyright and database right 2020



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Sharpness Today – context to the assessment

### 2.2.4.1 B4066

The B4066 is a two-way, single-carriageway road that links Severn Road in the Sharpness docks to the A38. From the north, at Sharpness docks, the B4066 is subject to the National Speed Limit and this changes to 40mph at the Canonbury Street roundabout. This speed limit continues until the B4066 reaches the A38. The B4066 provides a key route between Sharpness and the A38. The quality of the road is generally good from a vehicular perspective, with consistent carriageway width adequate for two lorries to pass each other, well-defined verges and road markings, consistent with its significant function being used by heavy vehicles travelling to and from the docks and the associated commercial activities.

### 2.2.4.2 Station Road

Station Road is a two-way, single-carriageway road which provides access from Berkeley to the villages of Wanswell and Brookend. The road is subject to the National Speed Limit and is generally well lit with a continuous footway on the western side.

A railway bridge with a height limit of 3.9m bisects the road approximately 500m north of the B4066 roundabout which requires tall vehicles to use the centre of the carriageway.

### 2.2.4.3 Alkington Lane

Alkington Lane is a two-way, single-carriageway road that links the A38 and B4066. The road is subject to a 40mph speed limit with localised reduction to 30mph around Cold Elm Farm. Alkington Lane is the principle route from the B4066 to the A38 for vehicles travelling south to destinations including Bristol and the M5 at Junction 14.

### 2.2.4.4 A38

The A38 is a two-way, predominantly single-carriageway road that can be accessed from Sharpness from the B4066 or via Alkington Lane. It is generally provided with wide lanes, with occasional central reservations at junctions and structures, and wide verges. The A38 connects Bristol, Gloucester and surrounding towns and villages including the local rail station at Cam and is subject to the National Speed Limit. Sharpness lies 5 kilometres to the west of the A38, reached using the B4066.

### 2.2.4.5 M5

The M5, part of the Highways England managed Strategic Road network, can be accessed via the A38 at Junction 13 (approximately 10km north) and Junction 14 (approximately 6km south) and provides access to Bristol, Taunton and Exeter to the south and Gloucester and Worcester to the north.



### 3.0 DEVELOPMENT AT SHARPNESS VALE

The growth point at Sharpness is designed to provide a new community that will minimise the need to travel by balancing the type and mix of housing to match, as closely as possible, the available employment, leisure and amenities that exist locally. This will reduce the need to travel, and provide a high quality and attractive place to live.

The masterplan (shown on the plan on the following page) shows how the new network of villages and communities can be configured around the railway line, with a new Sharpness station at the heart, accessible by walking, cycling, personal modes and, if necessary, by local bus services to allow travel further afield where a need cannot be met locally.



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Development at Sharpness Vale

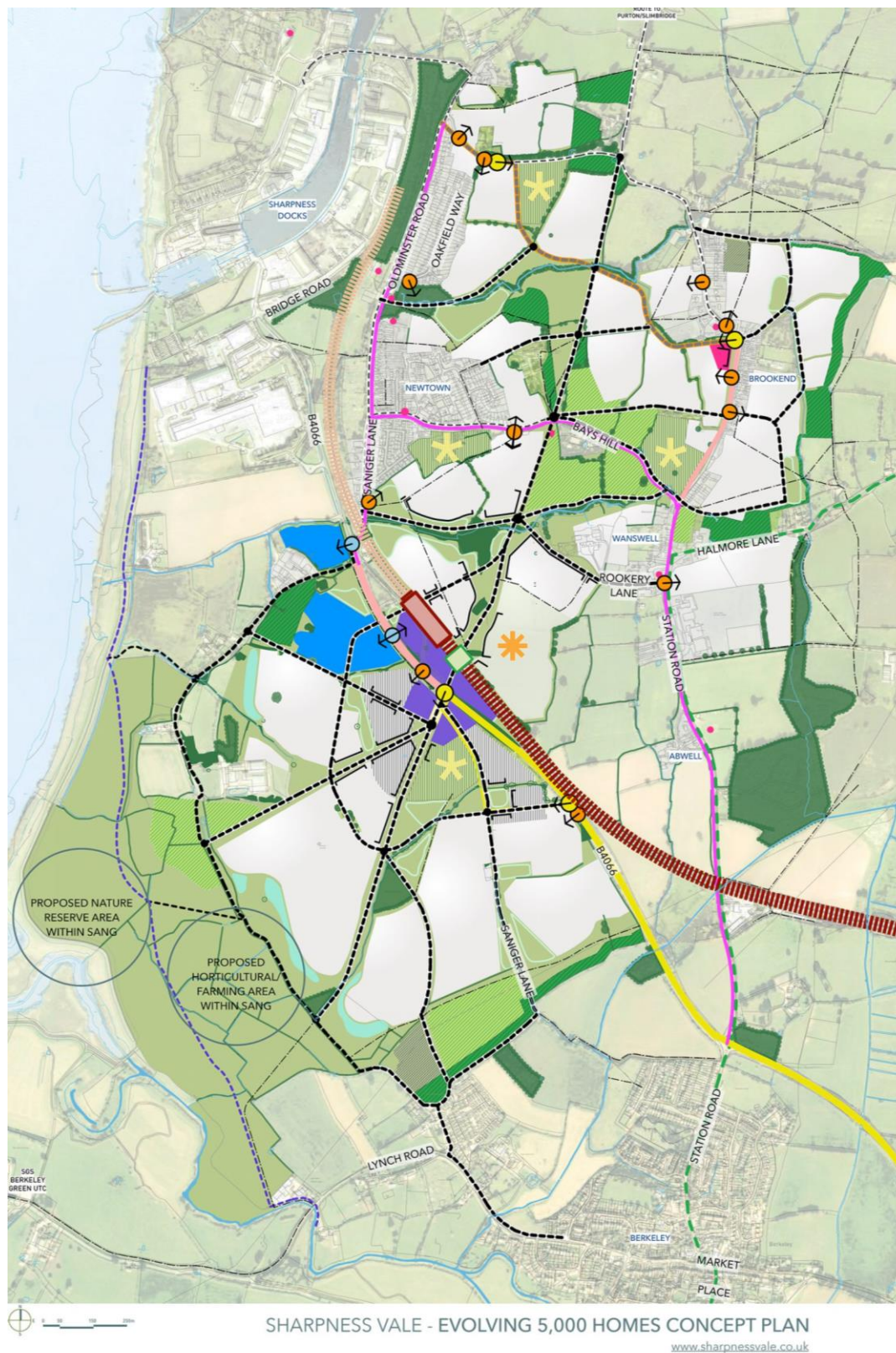


Figure 3.1 – Indicative Masterplan


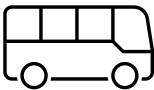

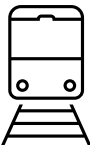



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Development at Sharpness Vale

In delivering the development, in the ideal case, there will need to be incremental provision of infrastructure. This is not unusual, and is often a challenge for larger scale developments. However, experience suggests that careful planning of sequential infrastructure delivery can work, and can secure the benefits of sustainable initiatives. Hence, although the delivery of a train service will require a certain level of patronage, that will itself require a certain level of development to be completed to generate it, there are mechanisms to allow sequential provision.

It is therefore expected that the sustainable transport provision will emerge, over time and alongside development following a series of steps:

Infrastructure	Outline trigger
	<p>Walking, cycling and personal mobility routes provided across the site to specified design code</p> <p>Commencement</p>
	<p>Local bus services expanded to provide linkages into development</p> <p>Early completions – c.50 homes</p>
	<p>Bespoke services developed – including high-quality coach services direct to Gloucester, via Cam &amp; Dursley, to mirror the rail service</p> <p>Development becoming established – c.300 – 450 homes</p>
	<p>First subsidised train services operate from Sharpness on limited basis – hourly, weekdays only perhaps</p> <p>Mixed use centre and further amenities established, first primary school open – c.1,000 – 1,200 homes</p>
	<p>Train service develops to operate more services, but still subsidised – twice hourly peak service, some weekend services</p> <p>Local Plan allocation nearing completion – c.2,400 homes</p>

Delivery of mitigation will be judged on a value-for-money basis, with consideration given to the environmental, resilience and sustainability benefits as well as the purely economic ones. The evaluation should also take account of the need to redress the balance between the private car and other modes – potentially adopting “positive discrimination” towards car use, and prioritising expenditure into sustainable modes and initiatives in preference.





## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Development at Sharpness Vale

In reality, investment in peak period highway infrastructure improvements sterilises land, and may not be cost effective or may have disproportionate environmental and land use costs when compared to the benefits that can be achieved.

And it is clear that the network can cater for ALL travel demands in these periods by enhancing the network in relation to overall capacity and not playing off one mode against another.

Which means providing sufficient travel for the movements that people need to make:

- match local employment to the demographic of the houses being built
- recognise “work from home” and local work space hubs as part of the “movement demand” mix, and cater for these with walk and cycle routes
- support them with appropriate and specific “movement corridors” through the site that provide for walking, and then segregated use by cycles and all manner of other personal transport modes that aren’t yet legal on the public highway, but will be, and should be anyway in our current world – e-scooters, hover boards, segways etc.
- calculate the number of “seats” needed to provide for the residual trips that have to go off-site, and then provide them via rail, bespoke coach, local bus, Uber, car share, whatever is needed to provide those seats to the places people need to go
- accept some residual trips that are left to use the highway network – but it is likely that they are so small that they can be accommodated on the “network”
- consider the need to do some highway works to achieve the overall aim – but that is most likely to revolve around priority for bespoke coaches and buses, better walk / cycle / personal mode provision and safety schemes
- the off-peak situation is of lower concern, as the “transport network” as a whole has excess capacity across almost all modes
- use “Mobility as a Service” to incentivise residents to engage with the “movement network” in the most convenient way at any given time
- recognise that this isn’t necessarily a lower cost approach – there is a need to cost to provide what is needed. But it is more sustainable and better value for money

The approach adopted through planning should be resilient and flexible.

As an example, the current “work from home” ethos (WfH) that has occurred as a result of Covid-19 is now known to be permanent for many people. Even allowing for the pandemic to be managed away, via vaccine or some other measures, too many employers have worked out that they can slash their fixed costs by maintaining the WfH ethos – and so they will. Employees, similarly, have adapted to this way of working very quickly. There are increasing declarations by companies that they don’t intend to return to full office working even after the pandemic is resolved.

(<https://www.bbc.co.uk/news/business-53901310>; <https://www.bbc.co.uk/news/business-53303364>; <https://www.theguardian.com/technology/2020/may/12/twitter-coronavirus-covid19-work-from-home>)



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Development at Sharpness Vale

By next March – the earliest that WfH guidance will be lifted, many businesses and people will have experienced a full year of WfH – it will have become an embedded way of working, and employers will have had to resolve many of the infrastructure issues associated with it – in other words, they will have invested in WfH, and won't therefore be minded to go back.

Sharpness Vale will be responsive to this, and other circumstantial changes, through wise planning and careful adoption of flexible mechanisms throughout realisation of the scheme.

The scheme will be capable of reconfiguring to best advantage – for example, even smaller homes may need to have a viable “office” or “work” space, there may be more private gardens, more small scale, local public space, more matching of employment uses to walkable homes, and more recognition homes should be configured as a viable “village” model.

Hence, it is not expected that the “Fallback” assessment case that is set out in the following sections of this document will be the prevailing circumstance at Sharpness. The intention is that something quite different, and more resilient and sustainable emerges. But it is accepted that, in a properly resilient planning approach, the worst case should be considered.



## 4.0 APPROACH TO “FALLBACK” ASSESSMENT

Given the scale of the Sharpness Vale development and the likely build-out over many years, forecasting the movements of future residents and visitors across a wide range of possible outcomes is vital to understanding what transport infrastructure may be required on and off-site, and how delivery may be assured and a suitable planning consent structured.

The aspiration is that Sharpness Vale would provide for transport in a completely novel way, providing sufficient local employment and movement networks and sufficient public transport provision to meet all of the travel demands of development in the peak periods, when it is busiest. The details of that assessment have already been set out in earlier work.

However, in order to provide evidence that the development can be accommodated whatever the circumstances, this assessment, explores the effects on the local highway network should residents continue to rely on the private car. The analysis set out here replicates the predominantly car-based travel patterns that are typical of many existing settlements. It assumes that no special provision will be made for sustainable travel, and that the new community will not be especially encouraged or incentivised to adopt non-car modes of travel.

The analysis utilises a first principles, evidence-based approach to trip generation, distribution and mode share. It considers the movement of people rather than vehicles, allowing for a more detailed analysis of journey purpose and travel mode.

As with all traffic forecasts which look many years into the future (in this case, 2040), the reality is that we are seeking to define future events against the likelihood of a range of possible outcomes. The way people travel is currently changing and will continue to do so as new technologies emerge and the private car becomes more undesirable due to cost and climate concerns. National and local investment in public transport, sustainably planned developments and changing attitudes will likely result in a shift away from car use towards more sustainable modes.

Conversely, the impact of Covid-19 on traffic levels must be considered. The early months of the Covid-19 pandemic saw a drastic reduction in travel as the nationwide lockdown closed workplaces, schools and leisure facilities. As these facilities began to gradually reopen, traffic levels began to increase and, as of September 2020, car traffic levels are at around 90% of pre-Covid levels. Public transport patronage has been slower to recover as people are encouraged to travel by car if possible; rail use and bus use is currently at around 40% and 55% of pre-Covid levels respectively. It is currently unknown if or when travel patterns will return to some sort of normality but it is likely that there will be some long-lasting changes as a result of Covid-19.

A key aspiration of the development at Sharpness Vale is to provide residents with a sustainable transport option to complete every journey including reopening the Sharpness Branch Line, an extensive bus and coach strategy and on-site infrastructure to facilities walking, cycling and other personal mobility modes. This was considered in some detail in the Sharpness Vale – Transport Technical Appraisal (provided in Appendix A) which included an assessment of the multi-modal trip generation from Sharpness Vale, assuming that the proposed public transport infrastructure was in place.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Approach to “Fallback” Assessment

As already set out in preceding sections, where previous work has considered the “Ideal” case of sustainable transport achievement, the technical assessments in this Highway Capacity Assessment consider a ‘Worst Case’. They therefore set out what highway mitigation would be necessary to deliver the Sharpness Vale scheme under a “traditional” assessment approach, and consider the extent to which this can be delivered within land that is in the control of the promoters or within the highway boundary.

The “Fallback” case is predicated on the assumptions that:

- there remains a high level of car use in the future year of 2040 with approximately 85-95% of trips being undertaken as either a car driver or car passenger
- the passenger services on the Sharpness Branch Line and bespoke coach and bus network is not provided. Instead, a more typical expanded local bus service would be provided which will cater for a lower level of public transport trips consistent with other similar areas
- there would be a low level of internalisation of trips within the development but the majority of peak period trips will travel off-site
- although primary school provision would be made locally, on-site, all secondary school trips would be to destinations away from Sharpness.

The trip generation, distribution and mode share methodology is presented in detail in the Sections 5 to 7. The approach is summarised below and the steps are set out graphically on the following page at Figure 4.1.

#### Step 1: Person trip generation

- i. The total Sharpness Vale person trip generation (for the 2,400 homes and 10 hectares of employment, and the other supporting and core uses proposed) has been calculated using person trip rates from the TRICS database
- ii. Journey purpose data for Stroud has been extracted from the TEMPro database and applied to the person trips
- iii. An internalisation factor based on existing data sources and consideration of the proposed on-site facilities has been applied to each journey purpose to derive the number of internal and external person trips (in common with a traditional Transport Assessment approach)

#### Step 2: Distribution of external person trips by journey purpose

- iv. External person trips have been distributed by journey purpose, as follows:
  - a. **Work & Employment Trips:** based on 2011 Census Journey to Work and Method of Travel to Work trips
  - b. **Education Trips:** based on existing secondary school catchment areas



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Approach to “Fallback” Assessment

- c. **Shopping and Personal Business Trips:** a straight-forward proximity method which gives greater attractiveness to places of greater scale that are nearer the site
- d. **Leisure Trips:** calculated using a method which combines population data, distance from Sharpness Vale and the amount of leisure facilities to provide an overall score for each destination and a resultant percentage distribution

### Step 3: Mode share of external person trips by journey purpose and destination

- v. For each journey purpose, mode share data from the National Travel Survey has been applied to the external person trips to derive the mode split between car, car passenger, bus and rail



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

## Approach to “Fallback” Assessment

Base Traffic Flows										
Base flows from either Septmeber 2020 Surveys or May 2014 Surveys increased to 2020 traffic levels using TEMPro - whichever is higher has been used to provide a robust baseline										
Traffic Growth										
Growth factors for 2020-2040 extracted from TEMPro for the Stroud Local Authority area and alternative housing and employment assumptions applied to account for Local Plan allocations										
Committed Development										
<u>Northwest of Berkeley</u> Planning application (20-0100-FUL) for 120 homes awaiting decision			<u>Sharpness Docks</u> Planning application (17-0798-OUT) for 300 homes, employment, leisure and holidays lodges awaiting decision				<u>East of Berkeley</u> 188 dwellings current under construction			
2040 Base Scenario										
Base Traffic Flows X TEMPro Growth + Flows from Committed Development										
Person Trip Generation										
Journey Purpose	Residential								Employment	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
	Going to Work		Education		Shopping and PB		Leisure		Coming to Work at Sharpness	
	41%	35%	32%	9%	20%	27%	7%	30%		
	904	677	695	168	433	520	147	583	526	400
	Internalisation Factor	18%		50%		30%		25%		18%
Internal Trips	131	85	348	84	130	156	37	146	47	30
External Trips	773	592	348	84	303	364	111	438	479	369
Distribution of External Person Trips by Journey Purpose										
Destinations	Going to Work		Education		Shopping and PB		Leisure		Coming to Work at Sharpness	
	Places with employment opportunities, including: Cam, Dursley, Bristol, South Gloucestershire, Gloucester, Stroud & Stonehouse		Rednock School or Katharine Lady Berkeley's School		Supermarkets, shops and facilities in: Cam, Dursley, Stroud, South Gloucestershire, Bristol & Gloucester		Wide range of potential destinations		Residential areas within commuting distance, including: Cam, Dursley, South Gloucestershire, Gloucester, Stroud & Stonehouse	
Mode Share of External Person Trips by Journey Purpose										
Mode Share	Going to Work		Education		Shopping and PB		Leisure		Coming to Work at Sharpness	
	Car	PT	Car	PT	Car	PT	Car	PT	Car	PT
	85%	15%	87%	13%	93%	7%	94%	6%	85%	15%
2040 Base + Development Scenario										
2040 Base Scenario flows + development traffic assigned onto the highway network										

Figure 4.1 – Structure of Assessment



## 5.0 BASE AND FUTURE YEAR TRAFFIC FLOWS

The proposed methodology for defining the baseline traffic case on the local highway network in the vicinity of the site relies on both historic data and recent surveys. Although it would be usual to rely simply on current survey data, the current Covid-19 pandemic, and the effects of Government restrictions and on-going changes to travel patterns means that a broader consideration of flow data is necessary to define a suitably robust baseline for the assessment case.

The need for a clear baseline definition arises as a result of the Covid-19 outbreak, and the consequent material changes to traffic patterns that have been observed on the highway network across the UK, including those within Gloucestershire and Stroud.

### 5.1 CONTEXT

The effect of the Government's decision to "lockdown" in late March 2020 meant that large numbers of trips being made in relation to education, employment, retail and leisure activities was halted. At that time it was recognised by Transport Planners that an unusual and non-typical set of circumstances applied, and that traffic data could not be considered representative if it were to be collected during the lockdown period.

In recent weeks, however, Government guidance has eased the restrictions related to lockdown, and many businesses have re-opened. There is a new strategy targeted at local controls, where an outbreak may occur, and so the majority of lockdown had ended around the end of August and early September – although many businesses were still not operational as they had been before, and many workers continued to work from home. Employees at that time have been advised that they could return to work if they and their employers wish them to do so, in a Covid Secure environment.

In this context, most activities were not restricted at that time.

Therefore, there was window of opportunity to undertake surveys, in part to see how they compared with previous understanding of the flow levels in the area, and in part recognizing that a "new normal" was emerging.

It is noted that many companies decided that they would not return to their previous locations or working patterns. Many decided that, even if and when they re-open their offices, they will do so in a limited way, and that the number of people in the office will be limited. The requirements of social distancing make this necessary. But, in addition, some firms have discovered that people can work from home very effectively, and so they have less incentive to return to the old patterns of working.

(It is important to note that, at the time of writing this text in late September 2020, much of the country has returned to a heightened state of lockdown – but the window when surveys could be undertaken, in early September, was not affected by significant lockdowns or controls by comparison.)

#### 5.1.1 The "new normal"

It is likely that transport planners are going to have to determine at what point assessment baselines can be determined again, and how to do so.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Base and Future Year Traffic Flows

It seems highly unlikely that there will be a return to the previous conditions (i.e. that prevailed in 2019 and the first two months of 2020) at any time in the foreseeable future. Instead, it is expected that a “new normal” will develop, which revolves around local lockdowns and controls, and the new patterns of working that are becoming more consolidated over time.

The DfT have provided information regarding the way that traffic has changed as a result of the Covid-19 pandemic: <https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic>.

This data shows that flow levels declined markedly in the early part of the lockdown, but have steadily risen in the period since May and June, and almost returned to pre-lockdown levels in July. These statistics are measured on a daily and weekly basis, as a proportion of the flows observed in February 2020. They are also national averages, and so may or may not reflect what is happening in a particular location. The daily / weekly parameter also means that these statistics only provide an overall trend of what is happening and cannot provide evidence of what may be happening during the weekday peak periods, morning and evening, for example.

Nevertheless, they do show that traffic levels, at least, have recovered to levels that may well be representative.

Therefore, it can be argued that it is legitimate to now start collecting data again – albeit that this should probably be done in a way that reflects the local circumstances and conditions:

- It would not be appropriate to collect traffic data if a “local lockdown” is in place in the relevant area;
- Care should be taken in selecting which days to undertake surveys, as there are known to be lower levels of activity on Mondays and Fridays now, reflecting changing working patterns, and people working from home more.
- Any turning count data that is collected over a limited period (for example, weekday peak periods) should be supplemented by ATC data over a sufficient number of days either side to evidence that the recorded day is typical.

### 5.1.2 Baseline data

The evidence base for the proposed Sharpness Vale growth point needs to be able to show that the impacts of the development can be accommodated on the local transport network. In order to do this, an appropriate baseline case must be developed for the assessment of the scheme.

This case will need to be slightly different to the cases that we may have relied upon in the past, as it is likely to need to respond to a number of sources of data, and to seek to bring these together to derive a likely baseline scenario that development traffic can then be applied to.

The following sources have therefore been used in this assessment:

#### ***Traffic count data:***

Video surveys and ATC counts were commissioned on the B4066 corridor between the A38 and Sharpness, with the A38 / B4066, A38 Alkington Lane and roundabouts on the B4066 picked up.





## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Base and Future Year Traffic Flows

The surveys were undertaken early in September, once the school term had begun and in a period of relatively low lockdowns – only Leicester was in a formal local lockdown during this period.

ATC data was picked up for a two-week period following the turning counts, with profiles of hourly flows established on the A38 and B4066 corridors throughout the week – on both weekdays and weekends.

#### **Available assessment data:**

Historic assessment data from publicly available sources was used – most notably related to previous planning applications in the area that were accompanied by assessments utilizing local count data. This data all pre-dated the Covid-19 lockdown changes, and so is representative of the previously prevailing conditions.

Where this data may be from some time ago, it will be factored to the current base year (2020) using standard TEMPRO growth factors.

## 5.2 FUTURE YEAR ASSESSMENT CASE

The Highway Capacity Assessment needs to show that the development will be deliverable, with mitigation if necessary, at the end of the Local Plan period. Therefore, it has been necessary to derive forecast flow levels on the highway network at the end of the Local Plan review period in 2040, and then allow for the case with and without the Sharpness development.

Bearing in mind the potential uncertainties related to the establishment of baseline data, it is also considered that a key sensitivity test should be undertaken, adding an additional impact to the development to provide a “buffer” against uncertainties in the overall assessment that can be undertaken at this time. The criteria for this buffer case are set out further on in the document.

## 5.3 DATA COLLECTION – SEPTEMBER 2020

To understand the traffic flows on the road network in the vicinity of Sharpness Vale, a series of Manual Classified Count (MCC) and Automatic Traffic Count (ATC) surveys were undertaken. The MCCs were undertaken on Thursday 3<sup>rd</sup> September 2020 at the following locations, shown in **Figure 5.1**:

- 1) B4066/ Saniger Lane T-junction
- 2) B4066/ Station Road Roundabout
- 3) B4066/ Canonbury Street Roundabout
- 4) B4066/ Alkington Lane T-junction
- 5) A38/ Alkington Lane/ Wick Road Staggered T-junction
- 6) A38/ B4066 T-junction, and
- 7) A38/ Breadstone T-junction.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Base and Future Year Traffic Flows

The ATC surveys were undertaken for a continuous period of two weeks from Thursday 3<sup>rd</sup> to Thursday 17<sup>th</sup> September at the following locations, also shown in **Figure 5.1**:

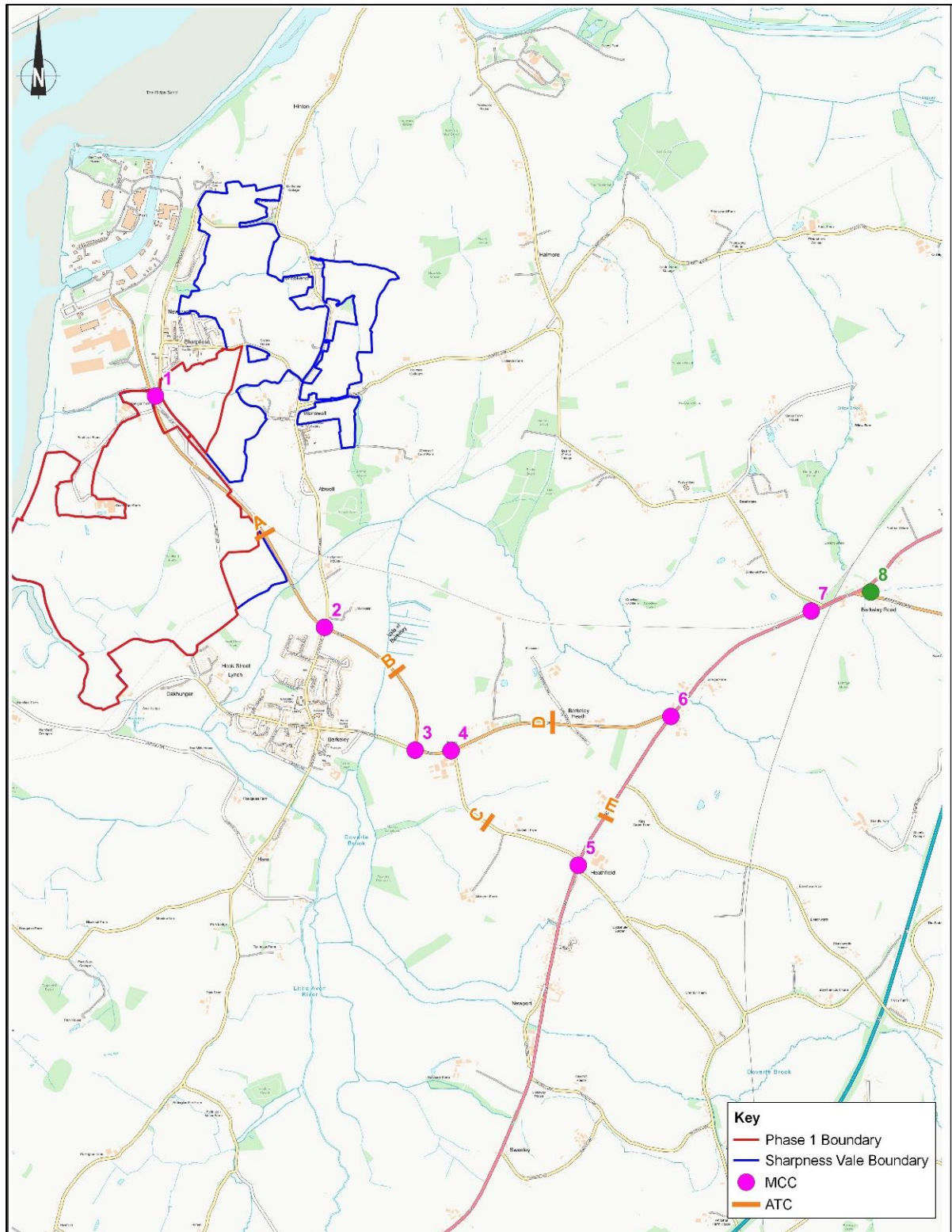
- A. B4066 (between Saniger Lane and Station Road)
- B. B4066 (between Station Road and Canonbury Street)
- C. Alkington Lane (between B4066 and A38), and
- D. B4066 (between Alkington Lane and A38)
- E. A38 (between B4066 and Alkington Lane)

The full traffic survey results are provided in **Appendix B**.



# SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

## Base and Future Year Traffic Flows



**Figure 5.1 – Assessment Area**

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## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Base and Future Year Traffic Flows

#### 5.3.1 Comparison with historic datasets

To understand how the data collected in September 2020 compares with pre-Covid traffic levels, data from the Severn Meadows planning application (ref. 15/0735/OUT) has been used. Although this planning application uses data which was collected in May 2014, and hence is now more than six years old, these traffic flows are the most comprehensive data for the junctions in the vicinity of Sharpness Vale. This data represents a known, fixed point, which provides a comparable for the data that has been counted in September 2020.

The 2014 traffic survey data has been growthed to 2020 traffic levels using the TEMPro factors in **Table 5.1** to provide a comparable baseline to the survey data, shown in **Table 5.2**.

**Table 5.1 – TEMPro Growth Factors (2014-2020)**

	Morning Peak (8am to 9am)	Evening Peak (5pm to 6pm)
Rural – Principal	1.0924	1.0893
Rural – Minor	1.0883	1.0924

**Table 5.2 – Traffic Flow Comparison**

Higher comparable shown bold and shaded

Junction		Morning Peak (8am to 9am)			Evening Peak (5pm to 6pm)		
		2020 (growthed from 2014)	2020 Surveys	Diff.	2020 (growthed from 2014)	2020 Surveys	Diff.
1	B4066/ Saniger Lane	<b>322</b>	306	-5%	<b>334</b>	256	-23%
2	B4066/ Station Road	474	<b>490</b>	3%	513	388	-24%
3	B4066/ Canonbury Street	753	<b>766</b>	2%	791	619	-22%
4	B4066/ Alkington Lane	751	<b>784</b>	4%	785	635	-19%
<b>Average for B4066</b>		2,300	<b>2,346</b>	2%	<b>2,423</b>	1,898	-28%
5	A38/ Alkington Lane/ Wick Road	<b>1,043</b>	982	-6%	<b>1,135</b>	890	-22%
6	A38/ B4066	<b>1,196</b>	1,118	-7%	<b>1,383</b>	1,033	-25%
7	A38/ Breadstone	<b>1,326</b>	1,191	-10%	<b>1,481</b>	1,155	-22%
8	A38/ B4066 Berkeley Road	<b>1,352</b>	-	-	<b>1,499</b>	-	-
<b>Average for A38</b>		<b>3,565</b>	3,291	-8%	<b>3,999</b>	3,078	-30%

Assuming that the 2014 flows from the previous planning application are representative, and that the B4066 and A38 have broadly followed the TEMPRO growth patterns, then it is interesting to compare the flow levels with those counted in September 2020.

The overall averages show that flow levels remain below what might be expected in both the morning and evening peak periods – especially so in the evening peak, where levels are 30% below what might have been expected.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Base and Future Year Traffic Flows

The comparison in **Table 5.2** shows a number of notable changes between the 2014 surveys and 2020 surveys:

- in the morning peak hour, traffic flows at the B4066/ Saniger Lane junction and the three A38 junctions are between 5% and 10% lower in the 2020 surveys than the 2014 surveys growthed to 2020 traffic levels
- in the morning peak hour, the 2020 survey traffic flows at the other B4066 junctions are between 2% and 4% higher than the 2014 surveys growthed to 2020 traffic levels
- in the evening peak hour, the 2020 survey traffic flows are substantially lower (between 19% and 25%) at all survey junctions

There are likely a number of Covid-19 related reasons for these differences, and it is difficult to fully explain the changes, as there may be a series of factors that may be working both together and in counter-balance to each other:

- the increase in vehicles on the B4066 junctions in the morning peak, with a reduction on the A38 may point to more local trips being made by car – this could in turn relate to parents taking children to school – which would result in greater local trips, and then perhaps returning home to work rather than carrying on to an office further away.
- There may be higher car trip generation in the morning peak related to local school activity as parents may be less likely to share journeys with other families, or to encourage children to use public transport.
- This increased activity may be offset by a much lower overall level of car usage to travel to work – this is most clearly seen in the significant reductions on the A38 in the evening peak period – this supports the theory that the morning peak is dominated by school trips, as the return from work trips that would otherwise be expected are not being seen.
- It also suggests that, although there may well be some switching of public transport trips to car trips, this is not enough to return flows to their historic levels on the A38 or B4066 (although it is understood that this effect may be more likely to occur in town and city centres, where public transport use was very high, and has remained very low).
- Overall there is around a 28-30% reduction in evening peak period flows – this supports the theory that many people remain unable to work (due to furlough or redundancy) or are continuing to work from home.

Analysis of data from the ATC surveys has also been undertaken to determine traffic patterns throughout the day and week. This showed that daily traffic flows during the week are fairly similar each day with a slight 'peak' on Wednesdays and the other four weekdays within around 5%. As is often the case, the morning peak appears to be between 8am and 9am but this is only slightly higher than the traffic flow between 7am and 8am, possibly reflecting an increase in commuters travelling earlier. In the evening, there is no one hour peak; instead, traffic begins to increase at 3pm (as parents pick children up from school) and reduce after 6pm. This three hour peak could indicate a certain amount of peak spreading is occurring, as commuters travel home earlier, possibly picking children up on the way.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Base and Future Year Traffic Flows

Although it is difficult to pinpoint the exact reasons for these changes, it is clear that Covid-19 has had a significant effect on both traffic flows and patterns. It may be some months before traffic levels return to 'normal' – although it is also quite possible that the traffic levels we see now are maintained as travel patterns and employment change. Evidence from 9/11 shows that it took three years for airline passenger levels to stabilise to trends that could then be interpreted as "normal". The extended period of Covid-19 impacts, and the fact that some travel pattern changes will now become embedded may mean that it takes far longer before clear trends emerge.

## 5.4 DERIVING DATA FOR THIS ASSESSMENT

As the purpose of this assessment is to give confidence regarding the effects of the development in the likely highest car trip generation case (the "Fallback case") it would make sense to adopt a worst-case approach to the adoption of baseline traffic flows. Therefore, to provide a baseline which represents the 'worst case', the 2020 Base scenario adopts the higher of the two available flow datasets at each location to be assessed. (i.e. the bold and shaded traffic flow data from **Table 5.2**).

It is accepted that this means there is some inconsistency with regard to overall network flows (i.e. the flows between adjacent junctions would not necessarily be balanced). However, for the purposes of establishing a robust evidence base for Local Plan purposes, and in the context of Covid-19 uncertainties, this is deemed to provide a robust assessment case.

### 5.4.1 Traffic Growth

The 2020 base data needs to be manipulated to represent a future case for the end of the Local Plan period in 2040, which will then form the baseline for comparison of the effects when the traffic from the Sharpness Vale development is added to it. This manipulation needs to take account of:

- Development that is already committed, but which has not been constructed, but which will add traffic to the network;
- The effects of the other Local Plan related traffic generation – adopting a robust assumption that this would be approved, and would be delivered as planned within the Local Plan period; and,
- The effects of general traffic growth that may pass through the area, as forecast by DfT.

Taking these in turn:

#### 5.4.1.1 Committed Developments

A review of committed developments in the vicinity of Sharpness Vale has been undertaken. Due to their proximity to the proposed development, traffic flows from the three developments in **Table 5.3** have been extracted from the relevant Transport Assessment and have been added manually to the 2020 Base scenario.

**Table 5.3 – Committed Development Sites**

Site	Planning Ref.	Proposals	Status
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## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Base and Future Year Traffic Flows

Northwest of Berkeley (PS33)	S.20/0100/FUL	Residential development of up to 107 dwellings	Awaiting Decision
Sharpness Docks (PS34)	S.17/0798/OUT	Mixed use development which includes up to 300 dwellings, industrial and distribution development, 2 no. marinas, ancillary retail/ food and drink uses, commercial floor space, up to 100 holiday lodges/camping pitches and hotel	Awaiting Decision
Land at Rear of Canonbury Street	S.14/0619/FUL	Residential development of 188 dwellings	Under Construction

#### 5.4.1.2 TEMPro Growth

TEMPro growth factors are derived by DfT and provided to local authorities and developers to allow them to take account of additional growth related to both planned development (Local Plan allocations of housing and employment development) and general background growth in traffic volumes.

TEMPro data for the Stroud Local Authority area has been examined to determine the expected growth in housing and jobs. This shows, between 2020 and 2040, an increase of 7,551 homes and 3,775 jobs across the district. The proposed allocations in the Stroud District Local Plan Review have been considered to determine whether this provides an accurate representation of growth across the district.

The Draft Local Plan includes allocated sites totalling 8,725 new homes plus an additional small site allowance of 1,350 homes for a total of 10,075 new homes by 2040. In terms of job creation, the Draft Local Plan allocated 61ha of employment land which could create up to 6,300 new jobs. The following three site allocations have been removed from the TEMPro growth as they have been added to the traffic flows manually (in the case of PS33 and PS34, as described in **para 5.2.1**) or are the subject of this Highway Capacity Assessment (PS36).

- PS33 – Northwest of Berkeley (120 homes)
- PS34 – Sharpness Docks (300 homes and 7ha of employment)
- PS36 – Sharpness Vale (2,400 homes and 10ha of employment)

This data is shown in **Table 5.4**. Housing growth of 2,820 homes and employment growth of 1,756 jobs (based on Sharpness Vale and Sharpness Docks providing approximately 28% of the districts employment growth) has been removed to derive the adjusted TEMPro growth projections.

**Table 5.4 – TEMPro Growth Projections**

	Housing			Employment		
	2020	2040	Diff.	2020	2040	Diff.
TEMPro Growth	51,388	58,939	+7,551	59,488	63,263	+3,775
Local Plan Allocations			+10,075			+6,300
Local Plan Allocations (minus PS33, PS34 and PS36)			+7,255			+4,544
<b>Adjusted TEMPro Growth Projections</b>	<b>51,388</b>	<b>58,643</b>	<b>+7,255</b>	<b>59,488</b>	<b>64,032</b>	<b>+4,544</b>



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Base and Future Year Traffic Flows

The adjusted TEMPro growth projections in **Table 5.4** have been used to calculate the growth factors shown in **Table 5.5** which have been applied to the 2020 Base traffic flows to form the 2040 Base scenario.

**Table 5.5 – TEMPro Growth Factors (2020-2040)**

	<b>Morning Peak (8am to 9am)</b>	<b>Evening Peak (5pm to 6pm)</b>
Rural – Principal	1.1874	1.1857
Rural – Minor	1.1860	1.1843
Rural – Motorway	1.1122	1.2236

## 5.5 ASSESSMENT SCENARIOS

On the basis of the preceding sections, there are four assessment scenarios that can be derived from the data to assess the effects of the Sharpness Vale proposals:

- **2020 Base** – adopting the higher of either the September 2020 traffic surveys or 2014 traffic surveys growthed to 2020 traffic levels
- **2040 Base** – 2020 Base growthed to 2040 traffic levels using the adjusted TEMPro factors set out in **Table 5.4** plus forecast flows from committed developments
- **2040 Base + Development** – 2040 Base plus Sharpness Vale development traffic (discussed in **Sections 8-10**)
- **2040 Base + Development (Sensitivity)** – 2040 Base plus 10% additional traffic growth plus Sharpness Vale development traffic

The sensitivity test is derived as a robust assessment base which takes account of the potential uncertainties in the way that traffic flow patterns may adjust once the Covid-19 pandemic has passed, and activity returns to a “new normal”. It seems likely, based on the evidence of the traffic surveys, that flow levels may be lower in the future, as it would be expected that when the pandemic has passed people would be very willing to use public transport again, but some would continue to work from home on some or all days of the week.

However – in order to provide a robust assessment case, this Highway Capacity Assessment assumes that traffic flows would end up fully 10% higher than the current predictions would suggest. Whilst this is extraordinarily robust, it means that there can be considerable confidence that, if the flows from Sharpness Vale can be shown to be manageable, through mitigation schemes, on the highway network in these conditions then the “Fallback” case is proven to be deliverable.





## 6.0 TRIP GENERATION

This section set out the methodology used to calculate the person trip generation for Sharpness Vale including consideration of journey purpose and trip internalisation.

### 6.1 PERSON TRIP GENERATION

The total person trip generation of Sharpness Vale has been calculated using person trip rates from the TRICS database for the morning (8am to 9am) and evening (5pm to 6pm) peak hours using the selection criteria set out in **Table 6.1**. This selection criteria was considered appropriate since, when completed, Sharpness Vale will be of a sufficient scale to reflect movement provision that will reflect that seen in the suburban / edge of town / neighbourhood centres located developments that have been captured in the TRICS database. (In using TRICS there is a need to balance gaining sufficient sample sites to offset any locations that may be outliers in terms of travel patterns, but not to select sites that are vastly different to the proposed location – hence, it would not have been appropriate to select Inner City locations for inclusion in an appraisal at Sharpness).

**Table 6.1 – Person Trip Rate Parameters**

TRICS Parameter	Residential	B1 Employment	B2 Employment
Land Use	03 – Residential	02 - Employment	02 - Employment
Category	A – Houses Privately Owned	B – Business Park	D – Industrial Estate
Area	England and Wales		
Locations	Suburban Area, Edge of Town, Neighbourhood Centre		

The person trip rates for residential and employment uses for the morning and evening peak hours are shown in **Table 6.2** and the full TRICS outputs are provided in **Appendix C**. The resultant person trip generation is shown in **Table 6.3**.

**Table 6.2 – Person Trip Rates**

	Morning Peak (8am to 9am)			Evening Peak (5pm to 6pm)		
	Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
Residential	0.176	0.732	0.908	0.564	0.248	0.812
B1 Business Park	1.673	0.225	1.898	0.158	1.296	1.454
B2 Industrial Estate	0.502	0.232	0.734	0.100	0.444	0.544

**Table 6.3 – Person Trip Generation**

	Morning Peak (8am to 9am)			Evening Peak (5pm to 6pm)		
	Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
Residential (2,400 dwellings)	422	1,757	2,179	1,354	595	1,949
B1 Business Park (20,000m <sup>2</sup> )	335	45	380	32	259	291
B2 Industrial Estate (20,000m <sup>2</sup> )	100	46	147	20	89	109
<b>Total Person Trip Generation</b>	<b>857</b>	<b>1,848</b>	<b>2,706</b>	<b>1,405</b>	<b>943</b>	<b>2,348</b>



## 6.2 JOURNEY PURPOSE

TEMPro provides journey purpose data by mode based on results from the National Travel Survey. Data for the Stroud local authority area for the future year of 2050 has been extracted to determine the likely journey purpose for future residents of Sharpness Vale in the morning and evening peak hours. The Stroud local authority area was chosen over the Stroud 012 Middle Super Output Area (MSOA) as it is likely more representative of the development in terms of the future population of Sharpness Vale, which represents a change to the housing mix and demographic pattern of the area at present.

The home-based journey purpose data were aggregated into four categories:

- Work – TEMPro ‘Work’ and ‘Employers Business’ trips
- School – TEMPro ‘Education’ trips
- Shopping and Personal Business – TEMPro ‘Shopping’ and ‘Personal Business’ trips
- Leisure – TEMPro ‘Recreation/Social’, ‘Visiting Friends and Relatives’ and ‘Holiday/Day Trip’ trips

The proportion of residents making these trips based on TEMPro data is shown in **Table 6.4**.

**Table 6.4 – Proportion of residential trips by journey purpose (2,400 homes + 40,000m<sup>2</sup> employment)**

Journey Purpose	Morning Peak Hour (8am to 9am)				Evening Peak Hour (5pm to 6pm)			
	%	Arr.	Dep.	Tot	%	Arr.	Dep.	Tot
Work	41%	175	729	904	35%	470	207	677
School	32%	135	560	695	9%	117	51	168
Shopping and PB	20%	84	349	433	27%	361	159	520
Leisure	7%	29	119	147	30%	405	178	583
<b>Total</b>	<b>100%</b>	<b>422</b>	<b>1,757</b>	<b>2,179</b>	<b>100%</b>	<b>1,354</b>	<b>595</b>	<b>1,949</b>

### 6.2.1 Trip Internalisation

In addition to the 2,400 houses proposed at Sharpness Vale, a range of community facilities will be provided including primary schools, a secondary school, shops and facilities in the mixed-use hub and employment opportunities to complement those at the Docks. The provision of such facilities will result in a number of internalised trips – those which will remain within the site and therefore not join the surrounding movement network. These internalised trips have been quantified for the four journey purposes set out above.

In addition to the trips which will stay within the Sharpness Vale development, trips which will route to/from the areas immediately adjacent to the site have also been considered as internal trips. These destinations are:

- The town of Berkeley and villages/ hamlets of Sharpness, Newtown, Brookend, Wanswell and Abwell



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Trip Generation

- Gloucestershire Science and Technology Park which includes South Gloucestershire and Stroud College, the University of Gloucestershire’s Cyber Security Centre and a number of other businesses, and
- Existing employment at Sharpness Docks.

#### 6.2.1.1 Work and Employment Trips into Sharpness

Sharpness Vale will provide employment opportunities on site in the form of a 10-hectare business park in the centre of the settlement, designed to complement the existing employment activities at the Docks, as well additional jobs in the mixed-use hub.

To understand the current proportion of residents who live and work in the same area, 2011 Census Journey to Work data has been examined for the 15 Stroud Middle Super Output Areas (MSOAs). The number of journeys which start and end in the same MSOA have been extracted and divided by the total number of journeys to work. **Table 6.5** shows this data.

**Table 6.5 – Stroud MSOA Internal Journey to Work Trips**

MSOA	Location	% of Internal Work Trips
Stroud 001	Hardwicke	4%
Stroud 002	Painswick	7%
Stroud 003	Frampton on Severn	12%
Stroud 004	Cashes Green	8%
Stroud 005	Stonehouse	25%
Stroud 006	Stroud	21%
Stroud 007	Rodborough	7%
Stroud 008	Bussage	6%
Stroud 009	Kings Stanley	6%
Stroud 010	Amberley	8%
Stroud 011	Cam	12%
Stroud 012	Berkeley	18%
Stroud 013	Nailsworth	15%
Stroud 014	Dursley	15%
Stroud 015	Wotton Under Edge	19%
<b>Average</b>		<b>12%</b>
<b>Average (selected MSOAs)</b>		<b>18%</b>

**Table 6.5** shows an average internalisation of 12% across the Stroud MSOAs. However, several of these MSOAs have limited employment opportunities which results in a low proportion of work trips staying within the MSOA. An average of the MSOAs most similar to Sharpness Vale in terms of their population and employment opportunities has also been calculated (highlighted in green) which shows an average work trip internalisation of 18%.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Trip Generation

Therefore, an internalisation factor of 18% has been applied to the work trips generated by Sharpness Vale.

The internalised work trips are between the residential development and the employment development to be provided on-site. Therefore, it is assumed that internalisation only applies to the departing work journey purpose trips from the residential development in the morning peak hour (with the equivalent number internalised from the arriving trips to the employment development in the morning peak hour) and to the arriving work journey purpose trips from the residential development in the evening peak hour (with the equivalent number internalised from the departing trips to the employment development in the evening peak hour).

The number of internalised work trips is shown in **Table 6.6**.

**Table 6.6 – Internal and external work journey purpose trips (2,400 homes + 40,000m<sup>2</sup> employment)**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
Residential – Internal	0	131	131	85	0	85
Employment – Internal	47	0	47	0	30	30
<b>Total Internal</b>	<b>47</b>	<b>131</b>	<b>178</b>	<b>85</b>	<b>30</b>	<b>115</b>
Residential – External	175	598	773	386	207	592
Employment – External	388	91	479	52	318	369
<b>Total External</b>	<b>563</b>	<b>689</b>	<b>1,252</b>	<b>437</b>	<b>524</b>	<b>962</b>

It should be noted that any home working trend as a result of Covid-19 is ignored in this assessment.

#### 6.2.1.2 School Trips

As shown in **Table 6.4**, a significant proportion of morning peak hour trips will be journeys to school. Gloucestershire County Council's pupil yields from new housing developments show the following number of pupils will be generated from the 2,400 dwellings at Sharpness Vale:

- Primary: 42 pupils per 100 dwellings = 1,008 pupils
- Secondary: 21 pupils per 100 dwellings = 504 pupils

Sharpness Vale will provide on-site primary school provision through the expansion of existing schools and new schools, offering a good opportunity for many of these school trips to be within the site. Although sufficient primary school provision will be provided on-site, largely negating the need for pupils to travel off-site to other schools, it is accepted that there will be a small element of external education trips as a result of parental and student choice.

Although it is likely that there will be Secondary School provision on site at Sharpness Vale – possibly in modular form for the first phase of development – for the purposes of this assessment, it has been assumed that all secondary school pupils will travel to existing off-site secondary schools and 25% of primary pupils will travel off-site, resulting in 50% of the total pupils generated by Sharpness Vale travelling off-site with the remaining 50% of education trips remaining on-site.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Trip Generation

The number of internal and external school trips is shown in **Table 6.7**.

**Table 6.7 – Internal and external school journey purpose trips (2,400 homes + 40,000m<sup>2</sup> employment)**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
Internal	67	280	348	58	26	84
External	67	280	348	58	26	84

### 6.2.1.3 Shopping and Personal Business Trips

The National Travel Survey defines shopping trips as ‘*all trips to shops or from shops to home, even if there was no intention to buy*’ whilst personal business trips are defined as ‘*visits to services, e.g. hairdressers, launderettes, dry-cleaners, betting shops, solicitors, banks, estate agents, libraries, churches; or for medical consultations or treatment*’. It should be noted that NTS data splits all trips out by a single journey purpose, and hence as a single trip can only have one purpose, there is a possibility that linked trips are counted as two trips. This creates a robust framework, but in the context of peak hour trips the overlap is considered to be small.

The average trip length for a number of journey purposes can also be extracted from National Travel Survey data<sup>1</sup>. This shows for the South West area in 2017/2018, the average trip lengths for shopping and personal business trips are 4.4 and 5.1 miles respectively.

Sharpness Vale will include a mixed-use local centre close to the rail station which would include small scale local shops and services such as a supermarket, bank, hairdresser and post office. Additionally, Berkeley provides a number of shops and services including two local food stores, four hairdressers, a beauty salon, a doctors surgery, a pharmacy, an opticians, two cafes, a bakery, a church and a library. These existing facilities combined with those to be provided at Sharpness Vale will significantly reduce the need for residents to travel out of the local area.

It is also important to consider how the use of these services are changing and its impacts on travel. Some of the key trends in shopping and personal business journey trip purpose are listed below.

- **People are travelling less** – National Travel Survey data<sup>2</sup> shows that, across England, the number of trips per person per year for shopping and personal business trips has reduced by 15% and 22% respectively
- **Online food shopping** – online food delivery services are now offered by most supermarkets and are particularly popular amongst the younger generation: in 2019, 45% of 25-34 year olds had purchased food shopping online compared to 19% of 55-64 year



<sup>1</sup> National Travel Survey Table NTS9912 Average trip length by purpose

<sup>2</sup> National Travel Survey Table NTS0403 Average number of trips (trip rates) per person per year by trip purpose

## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Trip Generation

olds and 13% of those aged 65+<sup>3</sup>. Online groceries are expected to make up 10% of the sector by 2023, compared to 7% in 2018<sup>4</sup>.

- **Online comparison goods shopping** – between 2008 and October 2019, the proportion of retail money spent online has increased from 4.9% to 19.2%<sup>5</sup>. Next day delivery ( e.g. Amazon Prime), collection services (e.g. Doodle and Amazon Lockers) and free returns offer consumers greater flexibility
- **Online services** – many of the personal business serviced described in paragraph 5.4.13 can now be undertaken easily online including banking, betting, estate agents and even online medical consultations

Again, all of this ignores the reductions in trips that may have resulted from the Covid-19 limitations at the current time, and assumes that levels of activity from late 2019 and early 2020 would have persisted.

Based on the evidence above, it is expected that a proportion of shopping and personal business trips will be undertaken in the local area or will not comprise of a peak period trip at all as the ‘trip’ will be undertaken online. (Online deliveries, although resulting in vehicular activity, amalgamate many trips into a single movement – hence one van would be expected to make numerous deliveries within the development site, and most of this activity would be outside of the network peak periods). Therefore, an internalisation factor of **30%** has been used with the remaining 60% travelling off-site. The number of internal and external shopping and personal business trips is shown in **Table 6.8**.

**Table 6.8 – Internal and external shopping and personal business journey purpose trips (2,400 homes + 40,000m<sup>2</sup> employment)**

Land Use	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
Internal	25	105	130	108	48	156
External	59	244	303	253	111	364

#### 6.2.1.4 Leisure Trips

The Sharpness Vale proposals include significant areas of formal sports provision as well as a network of pedestrian and cycle priority routes through the site which will be suitable for leisure activities. A number of leisure facilities are located in the local area including several pubs, takeaways, Hamfields Leisure, Sharpness Village Hall and tennis courts on Oldminster Road. Additionally, the proposed Sharpness Dock development will create new leisure and amenity space including new marinas which could deliver a mix of commercial, retail, food and drink uses.



<sup>3</sup> <https://www.statista.com/statistics/286116/food-and-groceries-online-purchasing-in-great-britain-by-demographic/>

<sup>4</sup> <https://www.bbc.com/news/business-47900669>

<sup>5</sup>

<https://www.ons.gov.uk/businessindustryandtrade/retailindustry/articles/howourinternetactivityhasinfluencedthewayweshop/october2019>

## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Trip Generation

The NTS data utilised in this appraisal provides further details of the purposes that lie behind leisure trips, as least of the evening peak period when far more leisure trips occur than in the morning. This shows that around half of the trips are for recreation and social purpose, and half for visiting friends and family or holidays and day trips. NTS also provides information about the average distance travelled for such trips – 11 miles for visiting friends and relatives in their homes, 6.1 miles if meeting them somewhere public (a restaurant or pub) and 7.6 miles from sport, entertainment and recreational trips.

On the basis of these statistics, it has been assessed that 25% of leisure trips will stay on-site with the remaining 75% travelling off-site. The number of internal and external leisure trips is shown in **Table 6.9**.

**Table 6.9 – Internalised leisure journey purpose trips (2,400 homes + 40,000m<sup>2</sup> employment)**

Land Use	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
Internal	7	30	37	101	45	146
External	21	89	111	304	134	438

### 6.2.2 Total Internal and External Trips

The total number of internal and external person trips by each journey purpose is shown in **Table 6.10**.

**Table 6.10 – Total internal and external trips (2,400 homes + 40,000m<sup>2</sup> employment)**

Journey Purpose		Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
		Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
<b>Internal Trips</b>							
Residential	Work	0	131	131	85	0	85
	School	67	280	348	58	26	84
	Shopping and PB	25	105	130	108	48	156
	Leisure	7	30	37	101	45	146
Employment		47	0	47	0	30	30
<b>Total</b>		<b>147</b>	<b>546</b>	<b>693</b>	<b>353</b>	<b>148</b>	<b>501</b>
<b>External Trips</b>							
Residential	Work	175	598	773	386	207	592
	School	67	280	348	58	26	84
	Shopping and PB	59	244	303	253	111	364
	Leisure	21	89	111	304	134	438
Employment		388	91	479	52	318	369
<b>Total</b>		<b>710</b>	<b>1,302</b>	<b>2,013</b>	<b>1,052</b>	<b>795</b>	<b>1,847</b>



## 7.0 TRIP DISTRIBUTION

This section outlines the destinations which residents of Sharpness Vale may choose to travel to for each journey purpose.

### 7.1.1 Internal Trips

As shown in **Table 6.10**, approximately 25% and 21% of trips will be internalised in the morning and evening peak hours respectively. Due to the short distance of most of these internalised trips, it is expected that walk, cycle and personal micro-mobility modes will be the predominant travel mode with some undertaken by local bus services and only a small number undertaken by car, as a result of the layout of the development, and the reduction in status given to the car.

The destinations which these internal trips will travel to will be spread around the Sharpness Vale development and to existing facilities in Newtown, Sharpness and Berkeley; therefore, detailed distribution of internal trips has not been considered at this stage. It will be necessary to consider these, and give expression to them as part of a future planning application and detailed Transport Assessment.

### 7.1.2 External Trips

#### 7.1.2.1 Home to Work Trips from Sharpness Vale

The work trip distribution uses 2011 Census Journey to Work data for the Stroud 012 MSOA in which the Sharpness Vale development is located. **Table 7.1** shows the 2011 Census distribution and resultant two-way person trips by destination.

**Table 7.1 – 2011 Census and Proposed Work Trip Distribution (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	2011 Census	Two-Way Person Trips	
		Morning Peak (8am to 9am)	Evening Peak (5pm to 6pm)
Cam/ Dursley	8%	65	50
Bristol	11%	83	64
South Gloucestershire	35%	271	208
Gloucester	13%	100	77
Stroud/ Stonehouse	16%	122	94
Cheltenham	3%	26	20
Tewkesbury	4%	30	23
Wotton Under Edge	5%	42	32
Frampton on Severn	4%	33	25
<b>Total</b>	<b>100%</b>	<b>773</b>	<b>592</b>





Trip Distribution

**7.1.2.2 Employment Trips to the commercial development at Sharpness Vale**

To understand the destinations that people are currently travelling from in order to access existing employment opportunities in and around Sharpness (including the Docks, Howard Tenens and Berkeley town centre), 2011 Census Method of travel to work (workday population) data has been examined. **Table 7.2** shows that the majority of work trips originate in locations within 20km of Sharpness including Cam, Dursley, South Gloucestershire, Gloucester, Stroud, Stonehouse and Wotton Under Edge.

The employment offer at Sharpness Vale is planned to be different to the existing activity, and to complement it, with more office and light industrial jobs in the business park as well as retail and service industry jobs across the development. It is possible that the origins of employees may differ from existing patterns, as a result of the different types of work being undertaken in the new employment area, but for the purposes of this appraisal we have applied the 2011 Census Methodology for Travel to Work (workday population) data as the most reasonable proxy.

**Table 7.2 – 2011 Census and Proposed Employment Trip Distribution (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	2011 Census	Two-Way Person Trips	
		Morning Peak (8am to 9am)	Evening Peak (5pm to 6pm)
Cam/ Dursley	8%	138	106
Bristol	11%	29	22
South Gloucestershire	35%	99	76
Gloucester	13%	62	48
Stroud/ Stonehouse	16%	76	59
Cheltenham	3%	10	8
Tewkesbury	4%	12	10
Wotton Under Edge	5%	31	24
Frampton on Severn	4%	21	16
<b>Total</b>	<b>100%</b>	<b>479</b>	<b>369</b>

**7.1.2.3 School Trips**

As described in **Section 6.4**, the on-site education provision will result in 50% of education journey purpose trips staying within the wider Sharpness Vale area, at new and existing schools. Sharpness Vale is within the catchment area for Rednock School in Dursley and Katharine Lady Berkeley’s School in Wotton Under Edge and it has been assumed for the purposes of this assessment that 50% of the external school trips will travel to each facility, as shown in **Table 7.3**.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Trip Distribution

**Table 7.3 – Proposed School Trip Distribution (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	Education Facility	Proposed Distribution	Two-Way Person Trips	
			Morning Peak (8am to 9am)	Evening Peak (5pm to 6pm)
Cam/ Dursley	Rednock School	50%	174	42
Wotton Under Edge	Katharine Lady Berkeley's School	50%	174	42
<b>Total</b>		<b>100%</b>	<b>153</b>	<b>348</b>

#### 7.1.2.4 Shopping and Personal Business Trips

The external shopping and personal business trips are likely to comprise of comparison shopping and trips to services which cannot be done within Sharpness Vale or the local area. These trips are expected to route to local town centres (Stroud, Stonehouse, Cam and Dursley), supermarkets or further afield to Bristol and Gloucester for city centre shops and facilities which are not available in the smaller settlements. Sharpness Vale is well located for access to these off-site facilities: Cam, Dursley, Stroud, Stonehouse and Thornbury are within 20km and Gloucester, Bristol and Cribbs Causeway are within 30km.

The proposed shopping and personal business trip distribution is shown in **Table 7.4**. It has been assumed that Cam/ Dursley will be the most popular destination as it provides a range of facilities and is within 10km of Sharpness Vale. Supermarkets in Quedgeley (Gloucester) and Thornbury (South Gloucestershire) are also likely to be popular destinations as the next layer of provision beyond the most local facilities. Smaller proportions of people are likely to travel to Bristol, Stroud and Stonehouse, and most likely for more occasional comparison shopping and more significant personal business trips.

**Table 7.4 – Proposed Shopping and Personal Business Trip Distribution (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	Facilities	Proposed Distribution	Two-Way Person Trips	
			Morning Peak (8am to 9am)	Evening Peak (5pm to 6pm)
Cam/ Dursley	<b>Supermarkets:</b> Tesco, Sainsburys and Lidl	40%	144	173
Bristol	City Centre Shops	10%	36	43
South Gloucestershire	<b>Supermarkets:</b> Tesco, Morrisons, Asda Cribbs Causeway	20%	72	87
Gloucester	<b>Supermarkets:</b> Asda, Tesco Extra City Centre Shops	20%	72	87
Stroud/ Stonehouse	<b>Supermarkets:</b> Sainsburys, Waitrose, Tesco	10%	36	43
<b>Total</b>		<b>100%</b>	<b>360</b>	<b>433</b>



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Trip Distribution

#### 7.1.2.5 Leisure Trips

The leisure trip category covers a range of potential journey purposes including visiting friends and family (either at someone's home or elsewhere) and types of entertainment including sports clubs, cinema, voluntary work and going to a restaurant.

To provide an indication of where leisure trips may travel to, the following methodology has been undertaken:

1. 2011 Census population data and the distance from Sharpness Vale has been extracted for each destination – this provides a useful proxy for trips to visit friends and family (i.e. someone is likely to know more people in a place with a higher population and therefore more likely to travel there to visit them)
2. The distance between Sharpness Vale and the destination has been extracted from Google Earth
3. A population weighting has been assigned to each destination based on the following values
  - **1.0** = Less than 50,000
  - **1.2** = 50,000 – 99,999
  - **1.4** = 100,000 – 199,999
  - **1.6** = 200,000 – 399,999
  - **1.8** = 400,000+
4. A distance weighting has been calculated using  $1 / \text{distance}$
5. A review of the leisure facilities in each destination has been undertaken and each destination has been ranked from 1 to 9 with the destination with the most leisure facilities scoring a 9 and the least scoring a 1
6. The population weighting, distance weighting and leisure facilities rank have been multiplied together to give an overall score
7. The score proportions have been calculated to determine the percentage distribution

The leisure trip distribution calculations are shown in **Table 7.5** and the resultant morning and evening peak hour leisure trips are shown in **Table 7.6** for each destination.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Trip Distribution

**Table 7.5 – Leisure Trip Distribution Calculations**

Destination	Population	Distance from Sharpness Vale (km)	Population Weighting	Distance	Leisure Facilities	Score	% Dist.
Cam & Dursley	14,859	9	1.0	0.11	6	0.67	23%
Bristol	428,100	30	1.8	0.03	9	0.54	19%
South Gloucestershire	262,767	22	1.6	0.05	7	0.51	16%
Gloucester	136,362	25	1.4	0.04	8	0.45	13%
Stroud/ Stonehouse	69,072	19	1.2	0.05	4	0.25	8%
Cheltenham	116,447	35	1.4	0.03	5	0.20	7%
Tewkesbury	19,778	40	1.0	0.03	2	0.05	2%
Wotton Under Edge	8,606	12	1.0	0.08	3	0.25	10%
Frampton on Severn	6,554	11	1.0	0.09	1	0.09	3%

**Table 7.6 – Proposed Leisure Trip Distribution (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	Proposed Distribution	Two-Way Person Trips	
		Morning Peak (8am to 9am)	Evening Peak (5pm to 6pm)
Cam/ Dursley	23%	25	100
Bristol	19%	21	83
South Gloucestershire	16%	17	69
Gloucester	13%	14	57
Stroud/ Stonehouse	8%	9	35
Cheltenham	7%	8	31
Tewkesbury	2%	2	7
Wotton Under Edge	10%	11	43
Frampton on Severn	3%	3	12
<b>Total</b>		<b>111</b>	<b>438</b>



### 7.1.3 Person Trip Distribution Summary

The person trip distribution for each journey purpose for the morning and evening peak hours is shown in **Tables 7.7** and **7.8** respectively.

**Table 7.7 – Morning Peak Hour Distribution (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	Residential				Employment	Total
	Work	School	Shopping and PB	Leisure		
Cam/ Dursley	65	174	121	25	138	<b>524</b>
Bristol	83		30	21	29	<b>164</b>
South Gloucestershire	271		61	17	99	<b>448</b>
Gloucester	100		61	14	62	<b>238</b>
Stroud/ Stonehouse	122		30	9	76	<b>238</b>
Cheltenham	26			8	10	<b>44</b>
Tewkesbury	30			2	12	<b>44</b>
Wotton Under Edge	42	174		11	31	<b>258</b>
Frampton on Severn	33			3	21	<b>56</b>
<b>Total</b>	<b>773</b>	<b>348</b>	<b>303</b>	<b>111</b>	<b>479</b>	<b>2,013</b>

**Table 7.8 – Evening Peak Hour Distribution (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	Residential				Employment	Total
	Work	School	Shopping and PB	Leisure		
Cam/ Dursley	50	42	146	100	106	<b>445</b>
Bristol	64		36	83	22	<b>205</b>
South Gloucestershire	208		73	69	76	<b>426</b>
Gloucester	77		73	57	48	<b>255</b>
Stroud/ Stonehouse	94		36	35	59	<b>224</b>
Cheltenham	20			31	8	<b>59</b>
Tewkesbury	23			7	10	<b>40</b>
Wotton Under Edge	32	42		43	24	<b>141</b>
Frampton on Severn	25			12	16	<b>53</b>
<b>Total</b>	<b>592</b>	<b>84</b>	<b>364</b>	<b>438</b>	<b>369</b>	<b>1,847</b>



## 8.0 MODE SHARE

To derive the mode share for each journey purpose, mode share data from the National Travel Survey has been extracted. This gives an accurate representation of how people currently travel across England whilst not making any allowance for mode shift caused by travel planning, on-site infrastructure provision or changing travel habits. This data has been aggregated into the four journey purposes, as shown in **Table 8.1** below. A comparison with mode share data from the TEMPro database for Stroud District is also provided which shows the National Travel Survey data is largely comparable with the TEMPro data.

**Table 8.1 – National Travel Survey Travel Mode by Journey Purpose**

Journey Purpose	Car Driver	Car Passenger	Bus/ Coach	Train
Work and Employment	75%	10%	6%	10%
School	42%	44%	11%	2%
Shopping and Personal Business	64%	29%	5%	1%
Leisure	50%	44%	3%	3%
<b>Average</b>	<b>58%</b>	<b>32%</b>	<b>6%</b>	<b>4%</b>
<b>TEMPro Mode Share for Stroud District</b>	<b>63%</b>	<b>31%</b>	<b>5%</b>	<b>1%</b>

The following sections provide the mode share by destination and journey purpose. An adjustment has been made to the percentage mode share for some destinations if the public transport option is not considered feasible; for example, it is highly unlikely anybody would get the bus to Cheltenham when the train would be much quicker. Therefore, the mode share for the unfeasible public transport mode has been added to the other public transport option (so in this case, the Cheltenham bus mode share has been added to the train mode share).

### 8.1.1.1 Work and Employment Trips

The work and employment trip mode share by destination is shown in **Table 8.2** with the resultant work and employment trips shown in **Tables 8.3** and **8.4** respectively.

**Table 8.2 – Work and Employment Trip Mode Share by Destination**

Destination	Mode				Total
	Car Driver	Car Passenger	Bus/ Coach	Train	
Cam/ Dursley	75%	10%	15%		100%
Bristol	75%	10%	6%	10%	100%
South Gloucestershire	75%	10%	6%	10%	100%
Gloucester	75%	10%		15%	100%
Stroud/ Stonehouse	75%	10%	15%		100%
Cheltenham	75%	10%		15%	100%
Tewkesbury	75%	10%		15%	100%
Wotton Under Edge	75%	10%	15%		100%
Frampton on Severn	75%	10%	15%		100%



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Mode Share

**Table 8.3 – Morning and Evening Peak Work Trips by Destination and Mode (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	% Distribution	Morning Peak (8am to 9am)					Evening Peak (5pm to 6pm)				
		Car Driver	Car Passenger	Bus/ Coach	Train	Total	Car Driver	Car Passenger	Bus/ Coach	Train	Total
Cam/ Dursley	8%	49	6	10		65	38	5	8		50
Bristol	15%	63	8	5	8	83	48	6	4	6	64
South Gloucestershire	28%	204	26	15	26	271	156	20	12	20	208
Gloucester	20%	76	10		15	100	58	7		12	77
Stroud/ Stonehouse	12%	92	12	19		122	71	9	14		94
Cheltenham	3%	19	2		4	26	15	2		3	20
Tewkesbury	4%	22	3		5	30	17	2		3	23
Wotton Under Edge	5%	32	4	6		42	24	3	5		32
Frampton on Severn	4%	25	3	5		33	19	2	4		25
<b>Total</b>	<b>100%</b>	<b>581</b>	<b>74</b>	<b>60</b>	<b>58</b>	<b>773</b>	<b>445</b>	<b>57</b>	<b>46</b>	<b>45</b>	<b>592</b>

**Table 8.4 – Morning and Evening Peak Employment Trips by Destination and Mode (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	% Distribution	Morning Peak (8am to 9am)					Evening Peak (5pm to 6pm)				
		Car Driver	Car Passenger	Bus/ Coach	Train	Total	Car Driver	Car Passenger	Bus/ Coach	Train	Total
Cam/ Dursley	29%	104	13	21		138	80	10	16		106
Bristol	6%	22	3	2	3	29	17	2	1	2	22
South Gloucestershire	21%	75	10	5	10	99	57	7	4	7	76
Gloucester	13%	47	6		10	62	36	5		7	48
Stroud/ Stonehouse	16%	57	7	12		76	44	6	9		59
Cheltenham	2%	8	1		2	10	6	1		1	8
Tewkesbury	3%	9	1		2	12	7	1		1	10
Wotton Under Edge	6%	23	3	5		31	18	2	4		24
Frampton on Severn	4%	16	2	3		21	12	2	2		16
<b>Total</b>	<b>100%</b>	<b>360</b>	<b>46</b>	<b>48</b>	<b>25</b>	<b>479</b>	<b>277</b>	<b>35</b>	<b>37</b>	<b>20</b>	<b>369</b>



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Mode Share

### 8.1.1.2 School Trips

The school trip mode share by destination is shown in **Table 8.5** with the resultant morning and evening peak trips shown in **Table 8.6**.

**Table 8.5 – School Trip Mode Share by Destination**

Destination	Mode				Total
	Car Driver	Car Passenger	Bus/ Coach	Train	
Cam/ Dursley	42%	44%	13%		100%
Wotton Under Edge	42%	44%	13%		100%

**Table 8.6 – Morning and Evening Peak School Trips by Destination and Mode (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	% Distribution	Morning Peak (8am to 9am)					Evening Peak (5pm to 6pm)				
		Car Driver	Car Passenger	Bus/ Coach	Train	Total	Car Driver	Car Passenger	Bus/ Coach	Train	Total
Cam/ Dursley	50%	73	77	23		174	18	19	6		42
Wotton Under Edge	50%	73	77	23		174	18	19	6		42
<b>Total</b>	<b>100%</b>	<b>147</b>	<b>154</b>	<b>46</b>		<b>348</b>	<b>36</b>	<b>37</b>	<b>11</b>		<b>84</b>





## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Mode Share

### 8.1.1.3 Shopping and Personal Business Trips

The shopping and personal business trip mode share by destination is shown in **Table 8.7** with the resultant morning and evening peak trips shown in **Table 8.8**.

**Table 8.7 – Shopping and Personal Business Trip Mode Share by Destination**

Destination	Mode				Total
	Car Driver	Car Passenger	Bus/ Coach	Train	
Cam/ Dursley	64%	29%	7%		100%
Bristol	64%	29%	5%	1%	100%
South Gloucestershire	64%	29%	5%	1%	100%
Gloucester	64%	29%		7%	100%
Stroud/ Stonehouse	64%	29%	7%		100%

**Table 8.8 – Morning and Evening Peak Shopping and Personal Business Trips by Destination and Mode (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	% Distribution	Morning Peak (8am to 9am)					Evening Peak (5pm to 6pm)				
		Car Driver	Car Passenger	Bus/ Coach	Train	Total	Car Driver	Car Passenger	Bus/ Coach	Train	Total
Cam/ Dursley	40%	78	35	8		121	94	42	9		146
Bristol	10%	20	9	2	0	30	23	11	2	0	36
South Gloucestershire	20%	39	18	3	1	61	47	21	4	1	73
Gloucester	20%	39	18		4	61	47	21		5	73
Stroud/ Stonehouse	10%	20	9	2		30	23	11	2		36
<b>Total</b>	<b>100%</b>	<b>195</b>	<b>88</b>	<b>15</b>	<b>5</b>	<b>303</b>	<b>234</b>	<b>106</b>	<b>18</b>	<b>6</b>	<b>364</b>



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Mode Share

### 8.1.1.4 Leisure Trips

The leisure trip mode share by destination is shown in **Table 8.9** with the resultant morning and evening peak trips shown in **Table 8.10**.

**Table 8.9 – Leisure Trip Mode Share by Destination**

Destination	Mode				Total
	Car Driver	Car Passenger	Bus/ Coach	Train	
Cam/ Dursley	50%	44%	6%		100%
Bristol	50%	44%	3%	3%	100%
South Gloucestershire	50%	44%	3%	3%	100%
Gloucester	50%	44%		6%	110%
Stroud/ Stonehouse	50%	44%	6%		100%
Cheltenham	50%	44%		6%	100%
Tewkesbury	50%	44%		6%	100%
Wotton Under Edge	50%	44%	6%		100%
Frampton on Severn	50%	44%	6%		100%

**Table 8.10 – Morning and Evening Peak Leisure Trips by Destination and Mode (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	% Distribution	Morning Peak (8am to 9am)					Evening Peak (5pm to 6pm)				
		Car Driver	Car Passenger	Bus/ Coach	Train	Total	Car Driver	Car Passenger	Bus/ Coach	Train	Total
Cam/ Dursley	23%	13	11	2	0	25	50	44	6	0	100
Bristol	19%	10	9	1	1	21	41	36	3	2	83
South Gloucestershire	16%	9	8	1	1	17	34	30	2	2	69
Gloucester	13%	7	6	0	1	14	29	25	0	4	57
Stroud/ Stonehouse	8%	4	4	1	0	9	18	15	2	0	35
Cheltenham	7%	4	3	0	1	8	16	14	0	2	31
Tewkesbury	2%	1	1	0	0	2	4	3	0	0	7
Wotton Under Edge	10%	5	5	1	0	11	21	19	3	0	43
Frampton on Severn	3%	1	1	0	0	3	6	5	1	0	12
<b>Total</b>	<b>100%</b>	<b>55</b>	<b>48</b>	<b>4</b>	<b>3</b>	<b>111</b>	<b>218</b>	<b>191</b>	<b>17</b>	<b>11</b>	<b>438</b>



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

Mode Share

### 8.1.2 Total Trips

The total Sharpness Vale two-way peak hour trip generation by destination and mode is shown in **Table 8.11**.

**Table 8.11 – Morning and Evening Peak Total Trips by Destination and Mode (2,400 homes + 40,000m<sup>2</sup> employment)**

Destination	Average % Distribution	Morning Peak (8am to 9am)					Evening Peak (5pm to 6pm)				
		Car Driver	Car Passenger	Bus/ Coach	Train	Total	Car Driver	Car Passenger	Bus/ Coach	Train	Total
Cam/ Dursley	25%	317	143	64		524	279	120	45		445
Bristol	10%	114	29	9	12	164	130	55	10	11	205
South Gloucestershire	23%	326	61	24	37	448	295	79	22	30	426
Gloucester	13%	169	40		30	238	170	58		28	255
Stroud/ Stonehouse	12%	173	32	33		238	156	41	28		224
Cheltenham	3%	31	7		6	44	36	16		6	59
Tewkesbury	2%	33	5		7	44	28	6		5	40
Wotton Under Edge	10%	134	89	35		258	81	43	17		141
Frampton on Severn	3%	42	6	8		56	37	9	7		53
<b>Total</b>	<b>100%</b>	<b>1,338</b>	<b>411</b>	<b>173</b>	<b>91</b>	<b>2,013</b>	<b>1,211</b>	<b>427</b>	<b>129</b>	<b>81</b>	<b>1,847</b>
<b>All Purpose Mode Share</b>		<b>66%</b>	<b>20%</b>	<b>9%</b>	<b>5%</b>		<b>66%</b>	<b>23%</b>	<b>7%</b>	<b>4%</b>	



## 9.0 TRAFFIC IMPACT ASSESSMENT

This section sets out the results of the junction capacity assessments for the eight junctions identified in **Section 5**. The modelling summaries and commentary focus on the 2040 Base + Development (Sensitivity) scenario – as this is the scenario with the highest traffic flows – and seek to identify mitigation schemes to improve capacity where junctions are found to operate over capacity as a result of Sharpness Vale traffic flows being added to them.

### 9.1 LOCAL ROAD NETWORK

A summary of the junction capacity test results for each of the assessment scenarios at each of the local highway junctions on the A38 and B4066 around Sharpness, and based on the current layout as at today, is provided in **Table 9.1**.

**Table 9.1 – Junction Capacity Assessment Summary**

Fig 5.1 Ref	Junction	2020 Base	2040 Base	2040 Base + Dev.	2040 Base + Dev (10% Sensitivity)
1	B4066/ Saniger Lane	✓	✓	✗	✗
2	B4066/ Station Road	✓	✓	✗	✗
3	B4066/ Canonbury Street	✓	✓	✗	✗
4	B4066/ Alkington Lane	✓	✓	✗	✗
5	A38/ B4066	✓	✗	✗	✗
6	A38/ Alkington Lane	✓	✗	✗	✗
7	A38/ Breadstone	✓	✓	✗	✗
8	A38/ B4066 Berkeley Road	✓	✗	✗	✗

The summary shows that:

- All of the junctions are performing within their theoretical capacity in the current (2020) assessment case.
- All of the B4066 junctions continue to operate within capacity in the 2040 assessment case without any development added at Sharpness Vale.



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Traffic Impact Assessment

- The A38 junctions begin to show signs of stress in the 2040 assessment case without Sharpness Vale development – only the little used Breadstone junction remains within theoretical capacity in this assessment case.
- All junctions are beyond their theoretical capacity when the Sharpness Vale traffic is added to the assessment, and the current junction layout is retained.

Overall, were no development to take place at Sharpness Vale it seems likely that the local highway authority would have needed to intervene to effectively manage the A38 junctions along this section of the route by 2040 in order to accommodate the forecast Local Plan growth and background growth (excluding Sharpness Vale). However, the B4066 junctions are likely to continue to operate acceptably in the future – which is, perhaps, not surprising as there is little scope for significant increases in activity without any development.

The 2040 Base + Development scenarios show that all junctions are expected to operate over capacity (i.e. with and RFC of over 0.85). This is maintained in the Sensitivity case (not surprisingly, as this features higher traffic flow volumes). The junction configurations have not been designed with higher flows and significant development in mind, so the junctions wouldn't have been expected to be capable of dealing with increased traffic flows.

The assessment has therefore considered the detail of each junction performance, and the extent to which it is possible to mitigate the effects of the Local Plan allocation. The analysis for each location is set out in detail in this section of the assessment report, but, for ease of reference, the ability to mitigate each junction is summarised in **Table 9.2:**

**Table 9.2 – Mitigation Scheme Summary**

Junction & Plan Reference	Capacity Issues	Mitigation Scheme	2040 Base + Dev (10% Sensitivity) + Mitigation Scheme
<b>B4066/ Saniger Lane (41745/5507/013)</b>	Queuing and delay turning into and out of Saniger Lane	Staggered junction with proposed employment access	✓
<b>B4066/ Station Road (41745/5507/011)</b>	Queueing and delay on the B4066 arms	Increased flare lengths and entry widths	✓
<b>B4066/ Canonbury Street (41745/5507/010)</b>	Queueing and delay on the B4066 arms	Increased flare lengths and entry widths	✓
<b>B4066/ Alkington Lane (41745/5507/009)</b>	Queuing and delay on B4066 and Alkington Lane	Signalisation including banning the right turn out of Alkington Lane	✓
<b>A38/ B4066 (41745/5507/008)</b>	Queuing and delay on A38 and B4066	Creation of a roundabout	✓
<b>A38/ Alkington Lane (41745/5507/014)</b>	Queuing and delay on A38 and Alkington Lane	Signalisation including banning the left turn out of Alkington Lane and the right turn from A38 N to Alkington Lane	✓
<b>A38/ Breadstone</b>	Queuing and delay on Breadstone	Mitigation possible, but likely to be undesirable due to network management issues	✗
<b>A38/ B4066 Berkeley Road (41745/5507/012)</b>	Queuing and delay on A38 S and B4066 Berkeley Road	Signalisation	✓



**9.1.1 B4066/ Saniger Lane priority junction**

The B4066/ Saniger Lane priority T-junction provides access towards Sharpness Docks via the B4066 and to Newtown via Saniger Lane. The B4066 is approximately 7.1m wide in the vicinity of the junction and Saniger Lane narrows to 3m in each direction under the railway bridge. In Phase 1 of the Sharpness Vale development, some homes may be accessed from Saniger Lane to the north of the railway bridge.

The capacity assessment of this junction is summarised in **Table 9.3** which shows it would operate slightly over capacity in the 2040 Base + Development and Base + Development (Sensitivity Scenario). It is clear that the right-turning traffic from the B4066 into Saniger Lane impedes through-flowing traffic movements, and this leads to poor junction performance.

This junction is located opposite one of the Sharpness Vale development parcels which is currently intended for employment development. Therefore, a staggered T-junction has been designed (shown in **drawing number 41745/5507/013**) which provides ghost island right turn lanes into the employment access and Saniger Lane. The modelling of this scheme is also shown in **Table 9.3** which demonstrates the mitigation scheme operates within capacity with minimal queueing or delay. To achieve adequate visibility from Saniger Lane and the employment access, some vegetation clearance along the B4066 may be required; this can be confirmed at a later stage.

Full capacity assessment outputs for the existing and improved layout are provided in **Appendix D**.

**Table 9.3 – B4066/ Saniger Lane Results Summary**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	RFC	Queue	Delay	RFC	Queue	Delay
<b>2040 Base + Development (Sensitivity)</b>						
Saniger Lane to B4066 S	0.78	4	24	0.97	14	79
Saniger Lane to B4066 N	0.22	1	30	0.86	2	380
B4066 S to Saniger Lane	0.93	12	49	0.96	14	74
<b>2040 Base + Development (Sensitivity) – with mitigation</b>						
Saniger Lane to B4066 S	0.67	2	14	0.84	5	29
Saniger Lane to B4066 N	0.15	1	18	0.10	1	30
B4066 S to Saniger Lane	0.15	1	16	0.48	1	25
Employment Access to B4066 S	0.66	2	14	0.79	4	23



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#### 9.1.2 B4066/ Station Road roundabout

The B4066/ Station Road priority roundabout is located south-east of the site, approximately 0.6km north of Berkeley town centre and provides access to the B4066 Berkeley Bypass.

The capacity assessment of this junction is summarised in **Table 9.4** which shows it would operate over capacity in the 2040 Base + Development and 2040 Base + Development (Sensitivity) scenario. The results show that the Station Road North and Station Road South arms operated within capacity but the B4066 West and B4066 East arms experienced an increase in queueing and delay as Sharpness Vale traffic crosses the roundabout.

Overall, the Station Road arms of the junction have low flows, and correspondingly low RFC values, indicating that the roundabout overall is not under particular stress. The issue relates to the throughput of the B4066 approaches, which needed to be enhanced to allow the greater flow to be accommodated.

To mitigate this impact, the flare on the B4066 arms could be extended, as shown in **drawing number 41745/5507/011**. The results of mitigation scheme modelling in **Table 9.4** show the junction would operate within capacity with minimal queueing and delay.

Full capacity assessment outputs for the existing and improved layout are provided in **Appendix D**.

**Table 9.4 – B4066/ Station Road Results Summary**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	RFC	Queue	Delay	RFC	Queue	Delay
<b>2040 Base + Development (Sensitivity)</b>						
Station Road N	0.22	1	5	0.13	1	4
B4066 E	0.81	5	13	0.91	9	26
Station Road S	0.20	1	5	0.31	1	7
B4066 W	1.10	81	178	1.05	46	112
<b>2040 Base + Development (Sensitivity) – with mitigation</b>						
Station Road N	0.24	1	6	0.14	1	5
B4066 E	0.74	3	8	0.82	5	13
Station Road S	0.20	1	5	0.31	1	7
B4066 W	0.81	5	11	0.77	4	9



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#### 9.1.3 B4066/ Canonbury Street roundabout

The B4066/ Canonbury Street priority roundabout is located to the east of Berkeley and provides access to Berkeley town centre via Canonbury Street and the B4066 Berkeley bypass.

The capacity assessment of this junction is summarised in **Table 9.5** which shows it would operate over capacity in the 2040 Base + Development (Sensitivity) scenario. The queuing and delay on the B4066 North and B4066 East arms increase with an increase in the amount of right turning traffic from the B4066 East to B4066 North resulting in a queue of 50 vehicles in the 2040 Base + Development (Sensitivity) evening peak scenario.

There are disproportionate flow levels at the roundabout, with the B4066 arms very much busier than the Canonbury Street arm. Hence, these approaches need to be enhanced to improve performance with development traffic added.

To mitigate this impact, the flare on the B4066 arms could be extended, as shown in **drawing number 41745/5507/010**. The results of mitigation scheme modelling in **Table 9.5** show the junction would operate within capacity with minimal queuing and delay.

Full capacity assessment outputs for the existing and improved layout are provided in **Appendix D**.

**Table 9.5 – B4066/ Canonbury Street Results Summary**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	RFC	Queue	Delay	RFC	Queue	Delay
<b>2040 Base + Development (Sensitivity)</b>						
B4066 N	0.91	9	21	0.79	4	10
B4066 E	0.96	17	41	1.04	50	102
Canonbury Street	0.26	1	5	0.50	1	8
<b>2040 Base + Development (Sensitivity) – with mitigation</b>						
B4066 N	0.85	6	12	0.74	3	8
B4066 E	0.75	3	7	0.81	5	10
Canonbury Street	0.27	1	5	0.52	2	9





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#### 9.1.4 B4066/ Alkington Lane priority junction

The B4066/ Alkington Lane priority T-junction is located to the east of Berkeley and immediately to the east of the Canonbury Street roundabout is an important junction as it splits traffic travelling north toward Gloucester (via the B4066) and south towards Bristol and South Gloucestershire (via Alkington Lane).

The junction is relatively close to the B4066 / Canonbury Street roundabout to the west, and the two junctions may well have an interaction if traffic levels rise such that queueing activity could influence driver perception of one junction from the other. This would need to be considered in more detail as part of future Transport Assessment, but for the purposes of this assessment it is noted that in the mitigation case the queues at this junction are unlikely to influence the operation of the nearby roundabout, and vice versa. Hence, this is not considered to be a significant factor in determining the deliverability of the mitigation proposals at both locations.

The capacity assessment results showed that, in the 2020 and 2040 Base scenarios, the junction is expected to operate within capacity with minimal queueing or delay. In the 2040 Base + Development Scenario, the junction operates over capacity with significant queueing and delay on Alkington Lane and the B4066 south arm as vehicles wait to turn right into Alkington Lane. The diagram below shows the morning peak hour Sharpness Vale development traffic at the B4066/ Alkington Lane junction.

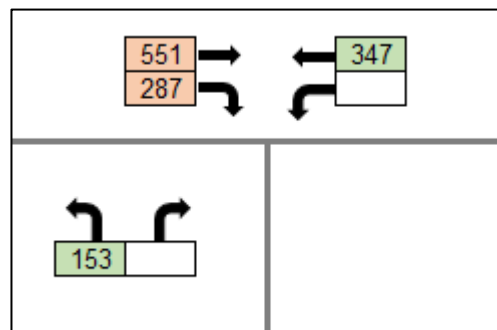


Figure 9.1 – Traffic flows at B4066 / Alkington Lane

The addition of almost 300 right turning vehicles as well as almost 900 vehicles travelling along the B4066 results in fewer gaps for vehicles turning left from Alkington Lane and right from the B4066. It is clear that the current priority junction arrangement would not be appropriate in a future assessment scenario with Sharpness Vale; therefore, a junction improvement scheme which involves signalisation of the junction with an extended right turn lane from the B4066 has been designed (as shown in **drawing number 41745/5507/009**). The introduction of traffic signals on a road that already has a 40mph speed limit in force is in line with current design guidance.

This mitigation scheme involves banning the right turn out of Alkington Lane to the B4066 East to optimize the operation of the signals and allow for more green time for the Alkington Lane and B4066 West arms. The traffic survey results show only six vehicles in the morning peak hour and three in the evening peak hour turning right out of Alkington Lane as this movement returns traffic to the A38 in any case. If a driver did travel down Alkington Lane and wish to turn right, they would have to turn around at the B4066/ Canonbury Street roundabout which is only a short diversion of 500m.



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The results of mitigation scheme modelling in **Table 9.6** show the junction would then operate within capacity in the evening peak and slightly over capacity in the morning peak, albeit with minimal queuing and delay. Full capacity assessment outputs for the existing and improved layout are provided in **Appendix D**.

**Table 9.6 – B4066/ Alkington Lane Results Summary**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	RFC	Queue	Delay	RFC	Queue	Delay
<b>2040 Base + Development (Sensitivity)</b>						
Alkington Lane to B4066 W	*	*	*	*	*	*
Alkington Lane to B4066 E	*	*	*	*	*	*
B4066 W to Alkington Lane	1.71	575	1,620	1.35	257	1,273
<b>2040 Base + Development (Sensitivity) – with mitigation</b>						
B4066 E	91.1%	21	35	85.8%	19	31
Alkington Lane	75.5%	10	31	85.7%	15	40
B4066 W (Ahead and Right)	91.4%	17	18	80.8%	12	12
PRC for Signalled Lanes	-1.5			4.9		
Cycle Time	72			81		

### 9.1.5 A38/ B4066 priority junction

The A38/ B4066 priority T-junction is located on a key route for vehicles travelling north from Berkeley towards Gloucester. The capacity assessment results are summarised in **Table 9.7** which show the junction operates over capacity with significant queuing and delay both with and without development in the future year case. It would be expected that the highway authority may well have had to consider measures to improve this junction in any event, without the effects of the Sharpness Vale development before the end of the Local Plan period in 2040.

The addition of traffic from Sharpness Vale adds approximately 900 vehicles to this junction in the morning peak hour and 800 in the evening peak hour, and so it is clear that a change to the junction design philosophy will be required at this location as a result of development. It would not be expected that a priority junction would be able to cater for these levels of demand.

Changing the form of the junction to a higher capacity layout essentially comprises two alternatives:

- A roundabout, which would provide a more balanced level of priority between all of the approach arms; and,
- A traffic signal junction that would allow positive apportionment of flow to the different arms.

In general terms, the roundabout solution provides a lower maintenance option, and is likely to be more appropriate in this type of rural location. Hence, this would be the better alternative if it can be



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made to work at this location. Although roundabouts do not provide easy solutions for bus priority or to cater for walking cycling, they can be combined with partial signal schemes, or adjacent light-controlled crossings to make positive provision for these modes. This level of detail would be appropriate to consider as part of a future Transport Assessment to support a planning application.

The A38 at this location is subject to a 50mph speed limit, which would be entirely consistent with the adoption of a roundabout junction.

The December 2014 Stroud Capacity Assessment prepared by Atkins to inform the Stroud District Infrastructure Development Plan demonstrated turning the existing priority T-junction into a roundabout was sufficient to mitigate the impact of housing and employment development from the Local Plan of 4,450 dwellings and 52.5 hectares of employment. The design of this mitigation scheme has been replicated and updated using a topographical survey as a base, as shown in **drawing number 41745/5507/008**. The modelling of the roundabout mitigation scheme is summarised in **Table 9.7** which shows the junction then operates within capacity with minimal queueing or delay.

Full capacity assessment outputs for the existing and improved layout are provided in **Appendix D**.

**Table 9.7 – A38/ B4066 Results Summary**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	RFC	Queue	Delay	RFC	Queue	Delay
<b>2040 Base + Development (Sensitivity)</b>						
B4066 to A38 N	2.66	703	5,146	2.97	780	6,201
B4066 to A38 S	*	*	*	*	*	*
A38 N to B4066	1.51	386	1,383	1.76	508	2,038
<b>2040 Base + Development (Sensitivity) – with mitigation</b>						
A38 S	0.45	1	7	0.85	6	27
B4066	0.72	3	8	0.84	5	15
A38 N	0.83	5	11	0.73	3	7

### 9.1.6 A38/ Alkington Lane priority junction

The A38/ Alkington Lane priority T-junction is the principal access point to the A38 for vehicles travelling south towards Bristol and South Gloucestershire. The assessment shows that it will be operating over capacity by 2040 with or without the Sharpness Vale development, and so some intervention may have been necessary by the highway authority by this time in any event.

When development traffic is added, unsurprisingly, the capacity assessment results in **Table 9.8** show that the junction operates over capacity in the 2040 Base + Development (Sensitivity) scenario with long queues on Alkington Lane.

To mitigate this impact, a junction improvement scheme which involves signalisation of the junction is proposed, as shown in **drawing number 41745/5507/014**. This scheme involves the following:



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- restricting movements between Alkington Lane and the A38 North arms to maximise signal operation. Few vehicles complete these movements as nearly all traffic travelling north along the A38 currently uses the A38/ B4066 junction in any case, and would continue to do so.
- construction of an uncontrolled left turn slip lane from the A38 South to Alkington Lane as this movement is never opposed.
- retaining the A38/ Wick Road junction as a priority T-junction. The signalisation of the A38/ Alkington Lane junction will increase the number of gaps for vehicles turning into and out of Wick Road which will significantly reduce any delays here.

It is noted that, at this location, the A38 is subject to a 50mph speed limit, which would be acceptable alongside the introduction of traffic signals sufficient to control vehicle speeds on approach to the junction. As this junction is close to the proposed A38 / B4066 roundabout scheme, and not far from the 40mph speed limit that applies to the A38 a short distance to the south when it passes through the small settlement of Newport there may be a case to consider a reduction to 40mph over this section – but this is not a necessity for the mitigation schemes that are proposed. It would be appropriate to consider this in a future Transport Assessment, especially as part of a scheme to improve the route and local connections for walking and cycling.

The capacity assessment results for the mitigation scheme in **Table 9.8** show the junction operates within capacity with minimal queueing or delay. Full capacity assessment outputs for the existing and improved layout are provided in **Appendix D**.

**Table 9.8 – A38/ Alkington Lane Results Summary**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	RFC/ DOS	Queue	Delay	RFC/ DOS	Queue	Delay
<b>2040 Base + Development (Sensitivity)</b>						
Alkington Lane to A38 N	1.91	11	3,058	1.74	8	2,173
Alkington Lane to A38 S/ Wick Road	2.06	330	2,736	1.91	195	1,843
A38 S to A38 N/ Alkington Lane/ Wick Road	0.03	0	18	0.03	0	10
Wick Road to A38 S	2.85	3	2,637	0.00	0	16
Wick Road to A38 N/ Alkington Lane	3.04	9	1,990	0.57	2	93
A38 N to A38 S/ Alkington Lane/ Wick Road	0.07	1	8	0.04	0	10
<b>2040 Base + Development (Sensitivity) – with mitigation</b>						
A38 N (Ahead)	75.1%	12	28	35.8%	4	12
A38 S (Ahead and Left)	55.5%	6	10	86.7%	12	15
Alkington Lane (Right)	77.6%	13	25	84.1%	10	38
PRC for Signalled Lanes	16.0			7.0		
Cycle Time	72			61		



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#### 9.1.7 A38/ Breadstone priority junction

The A38/ Breadstone priority T-junction is located close to where the Sharpness Branch Line joins the mainline.

The capacity assessment results in **Table 9.9** show that the Breadstone arm of the junction operates over capacity due to an increase in the number of vehicles on the A38 which reduces the ability of vehicles in the side road to take advantages of gaps to emerge onto the A38. (The asterisks in the output table demonstrate that the computer model was unable to find sufficient gaps for the waiting side road vehicles to enter the junction).

**Table 9.9 – A38/ Breadstone Results Summary**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	RFC	Queue	Delay	RFC	Queue	Delay
<b>2040 Base + Development (Sensitivity)</b>						
Breadstone to A38 N	*	*	*	*	*	*
Breadstone to A38 S	*	*	*	*	*	*
A38 N to Breadstone	0.27	1	14	0.43	1	24

It would be possible to mitigate this junction through a change to the junction form – a roundabout or traffic signals. Indeed, as this junction is close to the A38 / B4066 Berkeley Road junction considered below, it would be possible to consider these junctions together for mitigation purposes, most likely as a staggered traffic signal-controlled junction.

However – no mitigation scheme has been proposed at this junction at this stage, as there is a secondary issue with respect to this location and development at Sharpness. A positively controlled junction at this location could encourage the use of the Breadstone lanes as a route from Sharpness to the A38. This road is a single carriageway road, with two lanes marked for much of its length, but it may not be a desirable route for Sharpness related traffic to use. This routing will need to be considered as part of a future Transport Assessment.

At present, therefore, it is not considered appropriate to suggest a mitigation scheme here that might encourage the use of the Breadstone route to the A38 from Sharpness, especially in the context that all of the Sharpness traffic flows can be accommodated at the other junctions on the A38.

Full capacity assessment outputs for the existing layout are provided in **Appendix D**.

#### 9.1.8 A38/ B4066 Berkeley Road priority junction

The A38/ B4066 Berkeley Road priority T-junction lies to the eastern side of the A38, and is not directly impacted by traffic routing to and from Sharpness. However, it provides a key location on the A38 where traffic routes towards Cam & Dursley. Therefore, the addition of traffic from Sharpness is likely to have an effect on the performance of this junction.



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The capacity assessment results are summarised in **Table 9.7** which show the junction operates over capacity with significant queueing and delay both with and without development in the future year case. It would be expected that the highway authority may well have had to consider measures to improve this junction in any event, without the effects of the Sharpness Vale development before the end of the Local Plan period in 2040.

A junction improvement scheme which involves signalisation of the junction has been proposed, as shown in drawing number **41745/5507/012**. This scheme involves restricting movements from the B4066 Berkeley Road to the A38 North arms to maximise signal operation; currently, approximately 40 vehicles make this manoeuvre in each of the morning and evening peak periods. The majority of traffic which travels north from Cam and Dursley to the A38 uses the A38/ A4135 roundabout and it would be expected that if the B4066 Berkeley Road to A38 North movement was banned at this junction, vehicles would use the A38/ A4135 roundabout route instead without creating any additional capacity issues on that route.

The capacity assessment results for the mitigation scheme in **Table 9.10** show the junction operates within capacity in the morning peak hour and slightly over capacity in the evening peak hour, albeit with minimal queueing or delay. This is considered a significant betterment over the situation that would otherwise exist without development or the mitigation scheme in any event, and so the effects of Sharpness Vale can be considered to be mitigated. A more detailed assessment of this location would be undertaken as part of a detailed Transport Assessment with any planning application and an even better performing mitigation scheme may well be capable of being delivered.

Full capacity assessment outputs for the existing and improved layout are provided in **Appendix D**.

**Table 9.10 – A38/ B4066 Berkeley Road Results Summary**

	Morning Peak Hour (8am to 9am)			Evening Peak Hour (5pm to 6pm)		
	RFC/ DOS	Queue	Delay	RFC/ DOS	Queue	Delay
<b>2040 Base + Development (Sensitivity)</b>						
B4066 Berkeley Road to A38 S	1.99	225	2,336	1.40	100	732
B4066 Berkeley Road to A38 S	1.48	251	1,479	1.53	455	1,640
A38 S to A38 N/ B4066 Berkeley Road	0.10	1	11	0.11	1	13
<b>2040 Base + Development (Sensitivity) – with mitigation</b>						
A38 N (Ahead and Left)	82.2%	8	42	86.8%	10	52
A38 N (Ahead)	82.5%	8	42	87.1%	11	53
A38 S (Ahead and Right)	85.2%	11	11	95.2%	17	20
B4066 Berkeley Road	77.0%	12	18	50.5%	7	11
PRC for Signalled Lanes	5.7			-5.8		
Cycle Time	60			70		



## 9.2 STRATEGIC ROAD NETWORK

Traffic flows from the Sharpness Meadows 2014 traffic surveys have been used to calculate the percentage impact of the Sharpness Vale development traffic at M5 Junctions 13 and 14 based on the worst case forecast traffic flows used in this assessment. The flows and impacts are set out in table 9.11 below:

**Table 9.11 – M5 Junction 14 Traffic Flows**

	Morning Peak (8am to 9am)		Evening Peak (5pm to 6pm)	
	M5 J13	M5 J14	M5 J13	M5 J14
2014 Surveys	2,414	2,419	2,623	2,448
2020 Base	2,692	2,698	2,917	2,723
2040 Base	3,299	3,306	3,570	3,331
Sharpness Vale Development Traffic	321	440	305	424
% Increase	+9.7%	+13.3%	+8.5%	+12.7%

The impacts at both junctions are not considered to be large in scale, representing between an 8% and 14% increase in the flows that the junctions are forecast to accommodate in 2040. Although not a large-scale impact, it is likely that these impacts will need to be mitigated, and so improvement schemes will need to be developed as part of any more detailed Transport Assessment of the proposals in due course. For clarity, impacts may arise both at the junctions serving the motorway and in respect of the merges and diverges that allow traffic to access and exit the motorway carriageways.

The assessment of specific mitigation measures has not been undertaken at this stage for two key reasons:

First, the impacts on the strategic network arise as a result of planned Local Plan development (which in this case happens to be located at Sharpness Vale). Therefore, if the local housing need is met, then these impacts will need to be accommodated on the strategic highway network in any case. Hence, this is not directly an issue that arises from Sharpness Vale itself, but a function of meeting the growth requirements of Stroud district. It is expected that the Council, and promoters of the allocation sites in the district, will need to work with Highways England to fully understand the impacts and derive mitigation proposals. These are likely to need to be apportioned to the various allocation sites on a suitable technical basis.

Second, it is understood that Highways England may have developed, or may need to develop, improvement schemes at the junctions in any event, before the Local Plan allocation developments are being developed. They have already advised that they are examining an upgrade scheme for M5 Junction 14, linked to the Local Plan proposals arising from the authority areas to the south of Stroud. Although it is understood that this particular Local Plan may have been delayed, it is likely that it will come forward in some form, and so a comprehensive mitigation scheme will need to be developed by HE, and involve all of the public sector and private developer stakeholders.



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It is not considered that any current proposals exist for upgrades to M5 Junction 13, and so it may be that this location simply needs to be considered in the context of the cumulative Stroud district Local Plan allocations.

More detailed liaison with Highways England will need to be undertaken as part of the emerging Local Plan process, alongside Stroud District Council, to determine the appropriate management and mitigation strategy for this location.





## 10.0 CONCLUSIONS & SUMMARY

This Highway Capacity Assessment has considered the local highway network impacts for the proposals to allocate up to 2,400 homes and 10Ha of employment uses, and other supporting land uses, at Sharpness Vale as part of the Stroud Local Plan to 2040. The analysis takes a “worst case” approach, on the basis that the planned sustainable transport improvements and incentives will not be delivered, and hence, for the purposes of this assessment at least, the development would be predominantly reliant on the private car.

This “worst case” approach is not what is planned at Sharpness Vale, and other evidence has been prepared in respect of the innovative transport strategy that is proposed. This assessment comprises a theoretical appraisal to provide evidence to the Council and wider stakeholders that the Local Plan allocation development can be accommodated on the highway network if other initiatives prove incapable of delivery.

A range of traffic data sources have been used, including contemporary data collected at the local highway junctions and on the links during the early part of September 2020. This period was affected by changes to travel patterns in response to the Covid-19 pandemic. However, historic data from before this period, and the use of National traffic factors has enabled a representative assessment of the current and future flows on the network. This has been supplemented by an additional Sensitivity Test allowance that further enhances the robustness of the assessment undertaken.

The assessment is able to demonstrate that the highway effects of the Local Plan scheme could be accommodated on the highway network, with the delivery of a range of mitigation proposals that would improve the capacity at the local highway junctions on the B4066 and the A38. All of these schemes have been shown to be deliverable within the public highway boundary, and so there is no land ownership impediment to their delivery.

Further detailed design would be needed to understand the full costs and design requirements of the junction schemes, but this would typically be undertaken as part of a Transport Assessment when a planning application was submitted. At this stage, it is sufficient to demonstrate that the effects of the proposed development can be accommodated, with deliverable mitigation.

The proposals include mitigation proposals at the following junctions (which are shown on the plans referenced and appended to this assessment):

- B4066 / Saniger Lane (41745/5507/013)
- B4066/ Station Road (41745/5507/011)
- B4066/ Canonbury Street (41745/5507/010)
- B4066/ Alkington Lane (41745/5507/009)
- A38/ B4066 (41745/5507/008)
- A38/ Alkington Lane (41745/5507/014)
- A38/ B4066 Berkeley Road (41745/5507/012)



## SHARPNESS VALE – HIGHWAY CAPACITY ASSESSMENT

### Conclusions & Summary

It is noted in the assessment that the A38 junctions considered will all require some degree of improvement by the end of the Local Plan period in any event, whether development at Sharpness is progressed or not. It is therefore possible that the highway authority would have needed to undertake improvements at these junctions in the meantime in any case. The exact proportionate impact of the Sharpness Vale development will therefore need to be assessed in the context of any future Transport Assessment.

The B4066 junctions will all operate well into the future, but do need mitigation to cope with the effects of development at Sharpness.

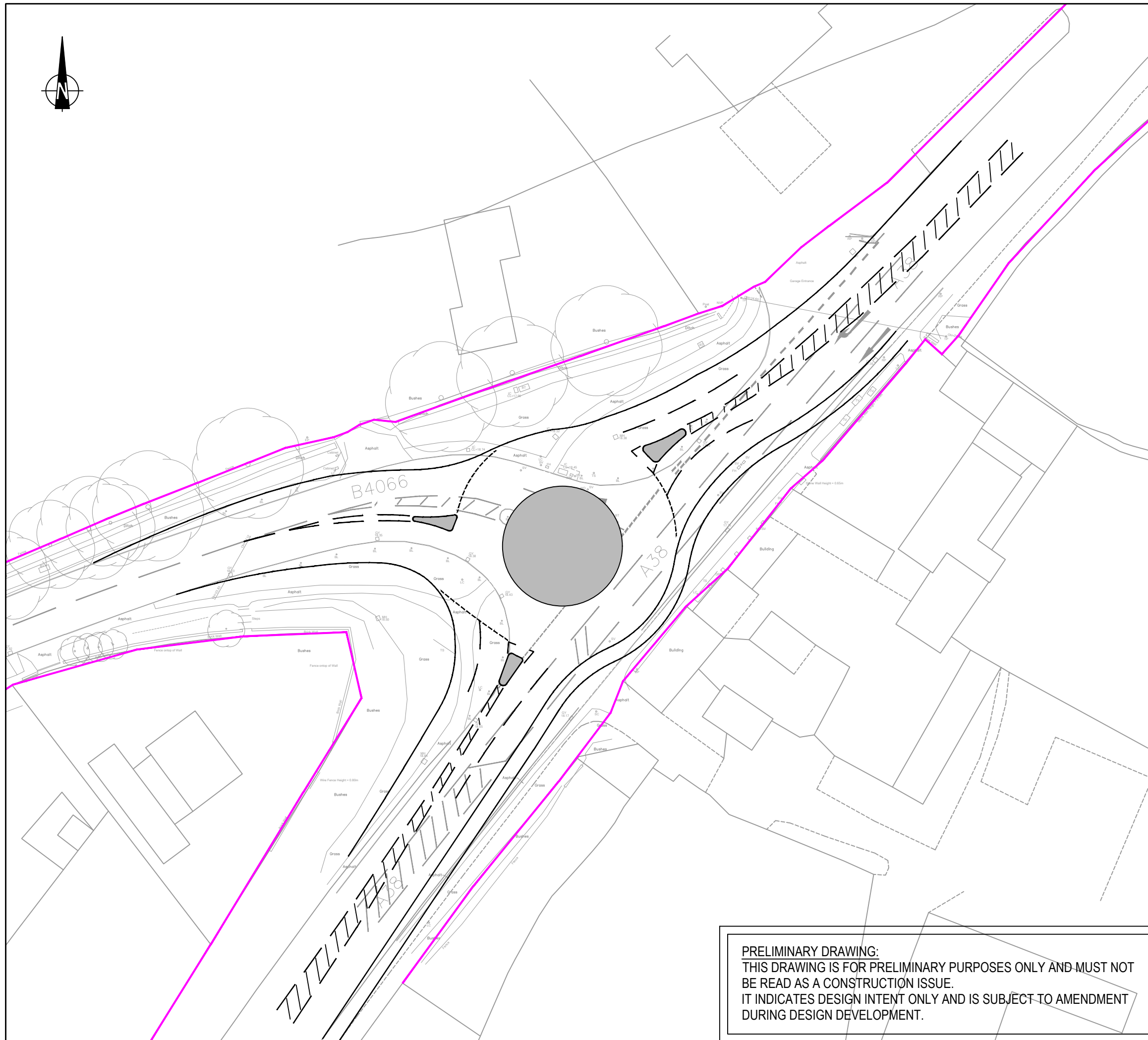
The assessment also considers the potential increase in traffic flows that would result at the adjacent motorway junctions on the M5. These would be sufficient to require more detailed investigation, although they are not considered so high as to be incapable of management at these locations. The assessment also notes that, as this traffic would be generated by housing associated with meeting the Districts housing need wherever it was located, these impacts do not fundamentally arise as a result of the allocation at Sharpness Vale, and they will need to be considered in the context of the Local Plan as a whole.

Overall the assessment demonstrates that the effects of the “worst case” highway effects on the local highway network can be accommodated by the highway network, with mitigation measures that are deliverable within the highway boundary in each case.



## Drawings





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- HIGHWAY BOUNDARY
- PROPOSED NEW EDGE OF CARRIAGEWAY
- PROPOSED ROAD MARKINGS

Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status  
**PRELIMINARY**

**SHARPNESS VALE  
 A38/ B4066 JUNCTION  
 PROPOSED ROUNDABOUT JUNCTION  
 ARRANGEMENT**

Client  
**SHARPNESS  
 DEVELOPMENTS LLP**

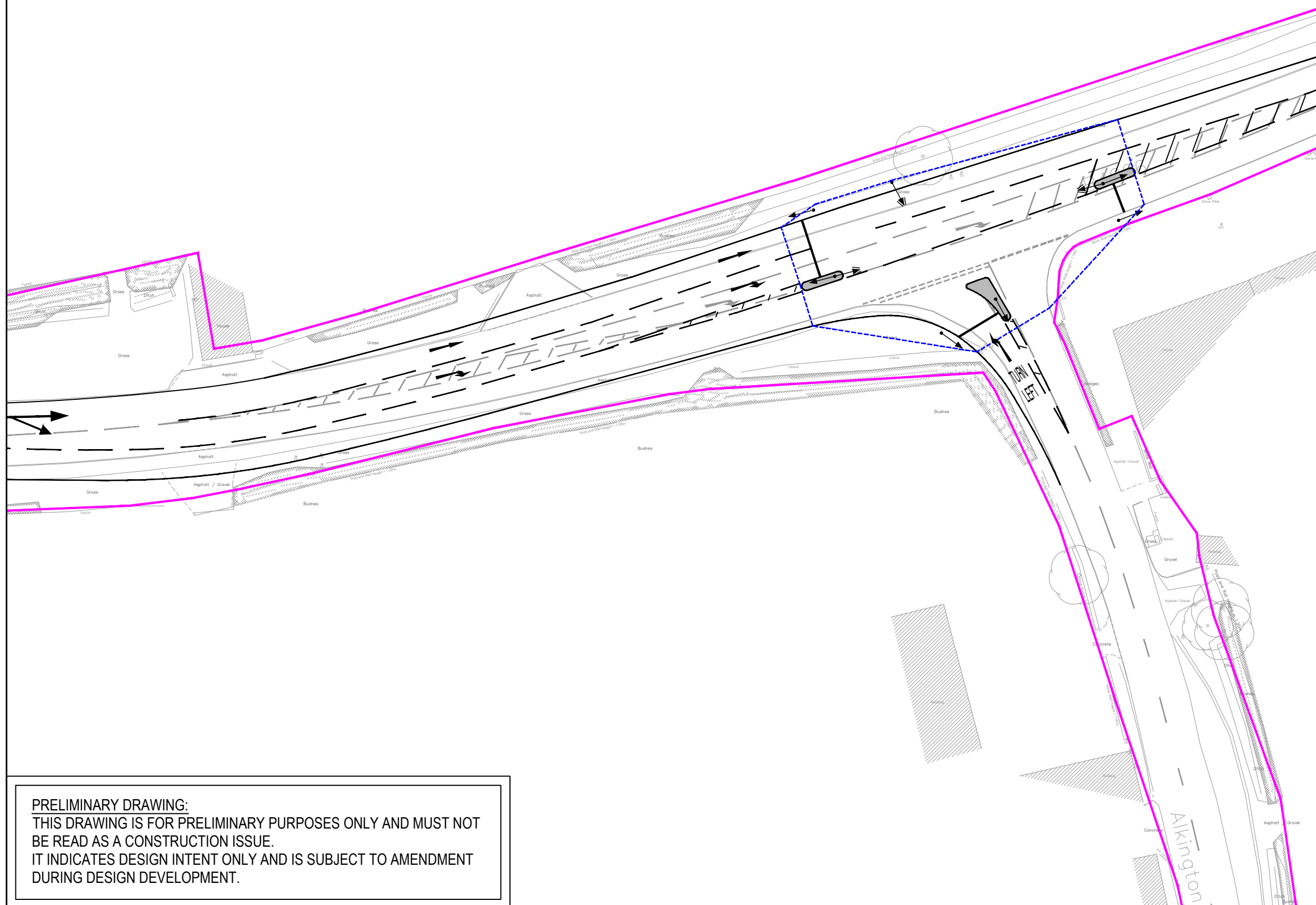


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Drawing Number  
**41745/5507/008**

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- KEY**
- HIGHWAY BOUNDARY
  - PROPOSED NEW EDGE OF CARRIAGEWAY
  - PROPOSED ROAD MARKINGS
  - INTERVISIBILITY ZONE
  - PRIMARY TRAFFIC SIGNAL
  - SECONDARY TRAFFIC SIGNAL


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Drawing Issue Status  
**PRELIMINARY**

**SHARPNESS VALE  
 B4066/ ALKINGTON LANE  
 PROPOSED SIGNALISED JUNCTION  
 ARRANGEMENT**

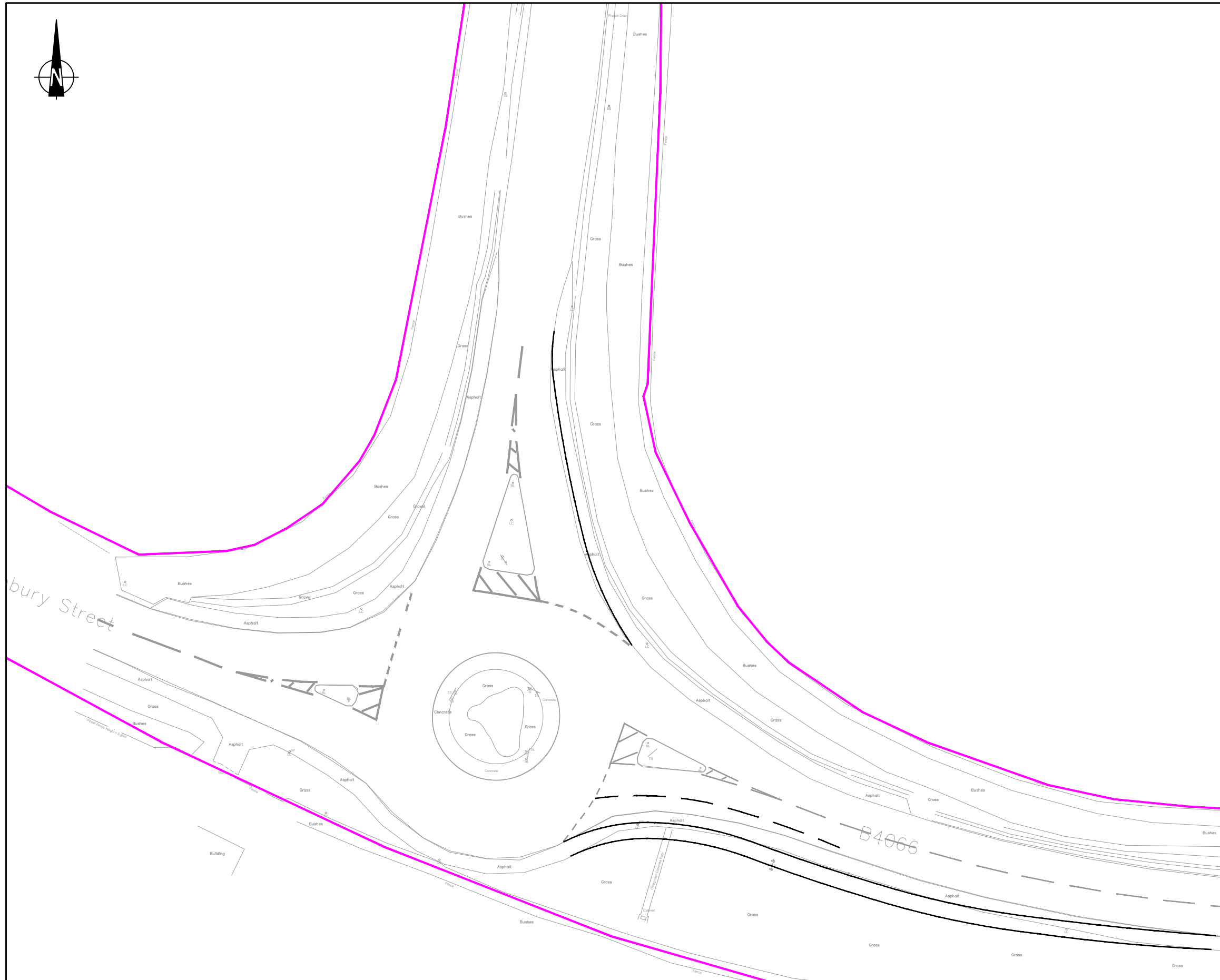
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- KEY**
- HIGHWAY BOUNDARY
  - PROPOSED NEW EDGE OF CARRIAGEWAY
  - PROPOSED ROAD MARKINGS


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**SHARPNESS VALE  
 B4066/ CANONBURY STREET ROUNDABOUT  
 PROPOSED MITIGATION SCHEME**

Client  
**SHARPNESS DEVELOPMENTS LLP**

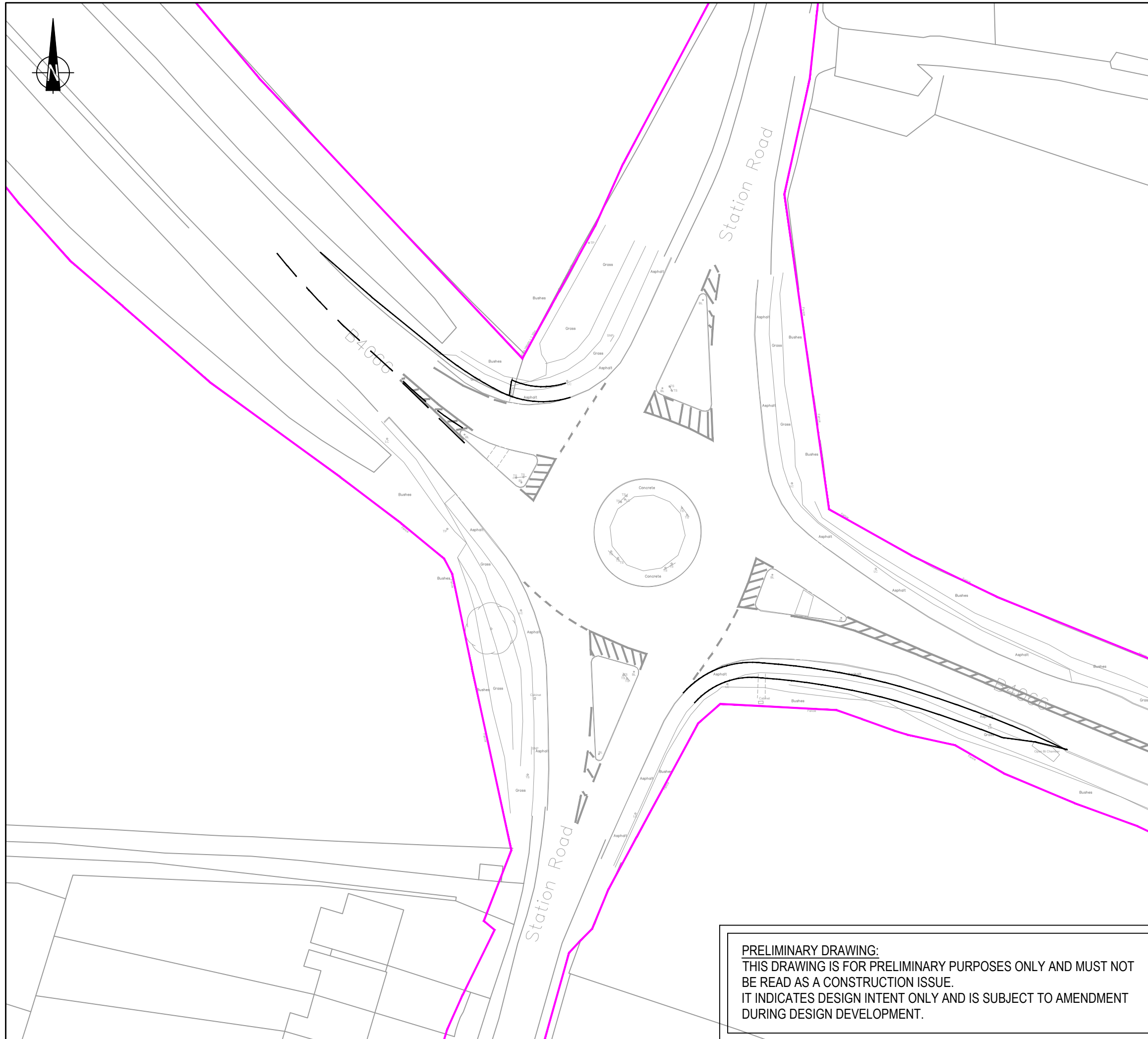


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**KEY**

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	PROPOSED ROAD MARKINGS


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**SHARPNESS VALE  
 B4066/ STATION ROAD ROUNDABOUT  
 PROPOSED MITIGATION SCHEME**

Client  
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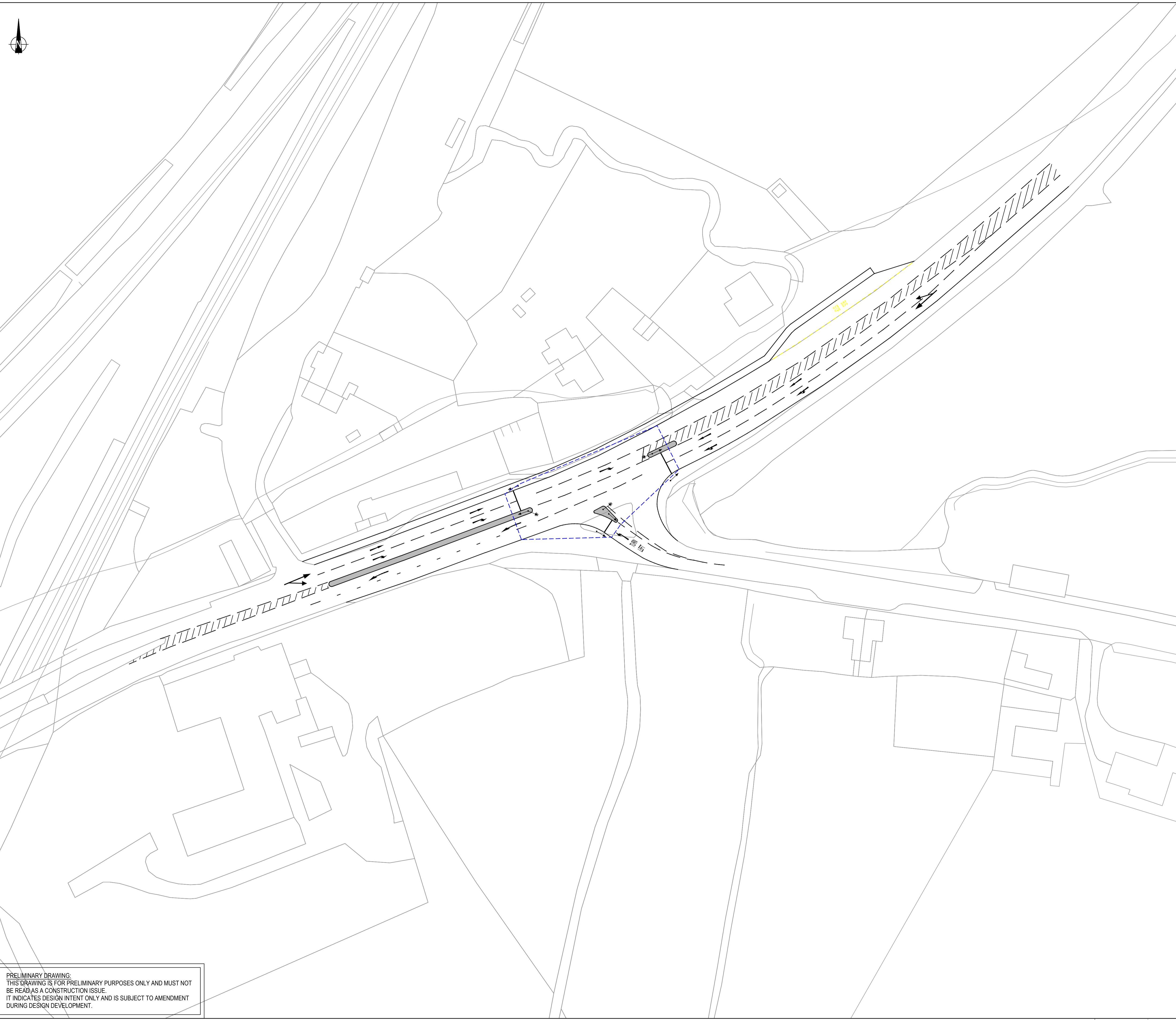


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- KEY**
- PROPOSED NEW EDGE OF CARRIAGEWAY
  - - - PROPOSED ROAD MARKINGS
  - - - INTERVISIBILITY ZONE
  - PRIMARY TRAFFIC SIGNAL
  - SECONDARY TRAFFIC SIGNAL

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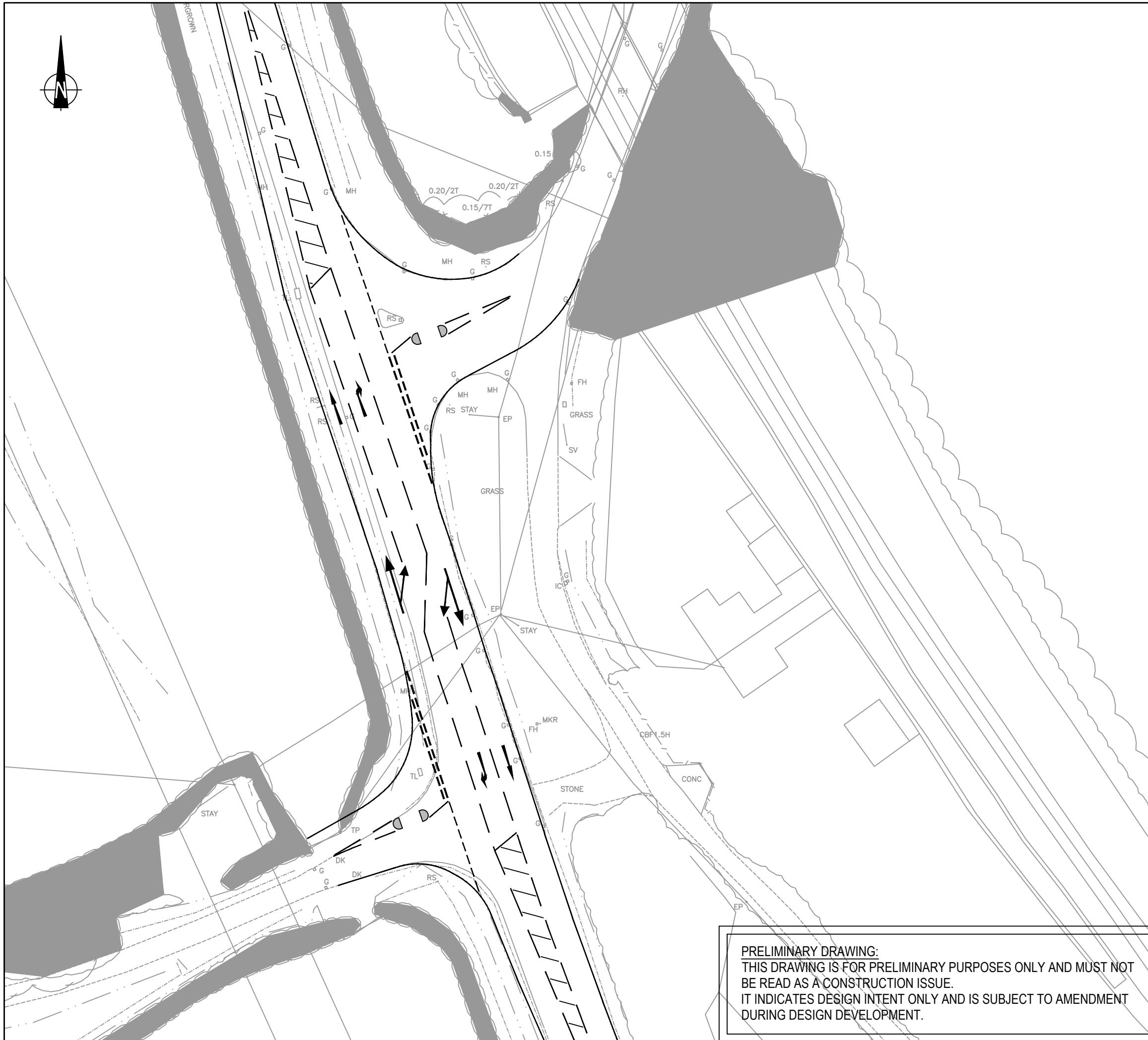
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**SHARPNESS VALE  
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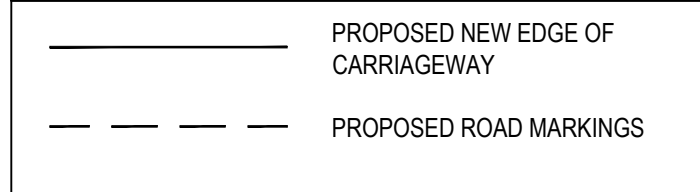
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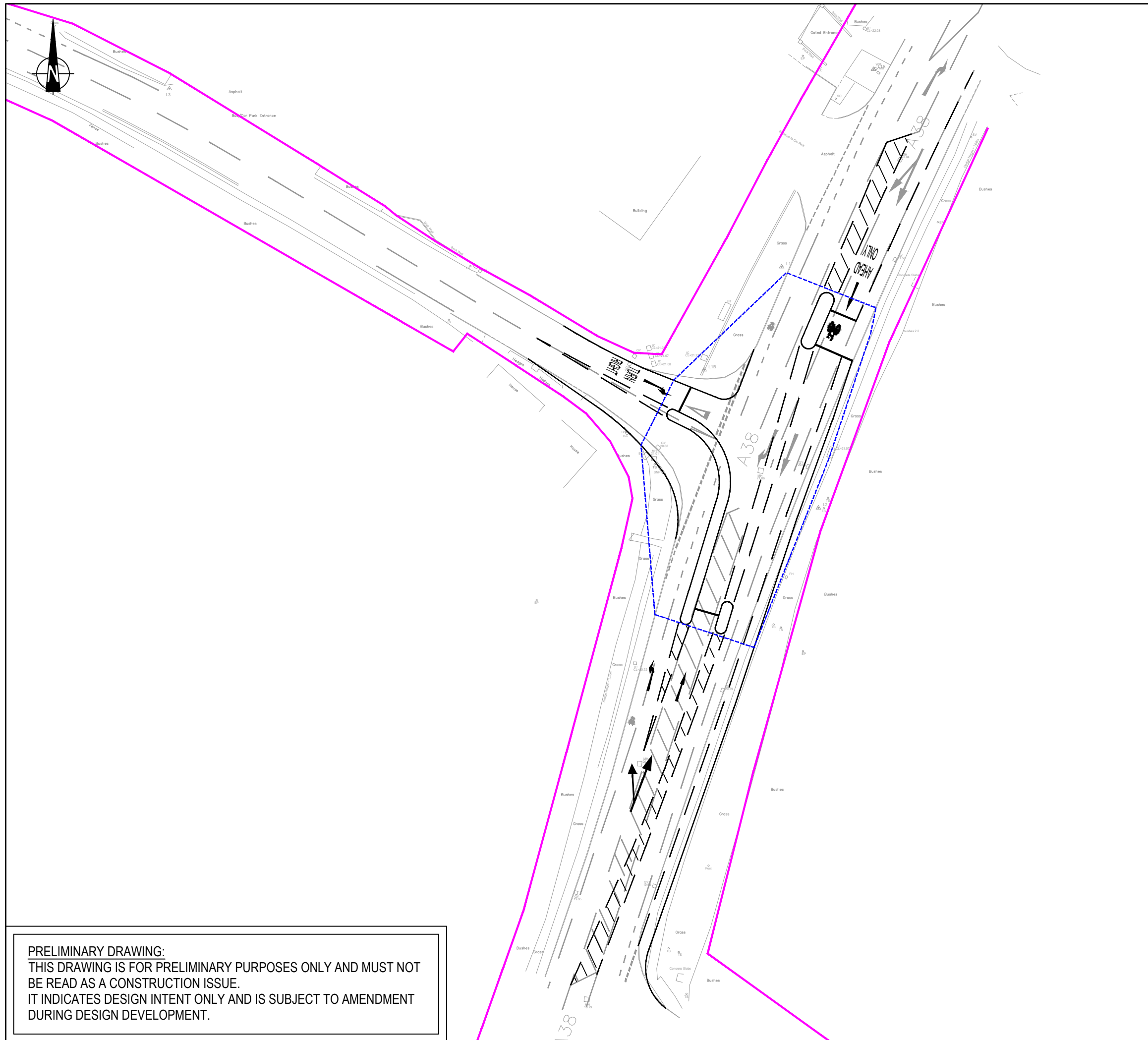
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 PROPOSED SIGNALISED JUNCTION  
 ALTERNATIVE ARRANGEMENT**

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