Slough Mass Rapid Transport (SMaRT)

Options Assessment Report

Slough Borough Council

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ATKINS

Plan Design Enable

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1. Introduction

Introduction

1.1. This Option Assessment Report presents the consideration of options undertaken that led to choice of the preferred Slough Mass Rapid Transit scheme for which a business case is to be submitted.

1.2. The report is structured as follows:

- A presentation of the strategic context, drivers for transport intervention and associated intervention objectives is provided in Chapter 2;
- Chapter 3 provides details of the strategic appraisal and consideration of concept options for intervention and choice of preferred option for development;
- Chapter 4 outlines the highway design optioneering related to the preferred strategic option;
- The option development for bus service specifications which will take complement the scheme is presented in Chapter 5; and
- Chapter 6 provides the conclusions.

2. Strategic context and the drivers for transport intervention

2.1. Slough is one of the six unitary authorities within the Thames Valley Berkshire (TVB) sub-region which forms one of the UK's most important economic sub-regions for both national and international trade. A number of high-end technology, industrial and service companies wish to expand or move into the sub-region. Slough in particular is a key growth area for business and residents owing to its proximity to Heathrow and London.

2.2. There is a need for continues of improvements being made by Slough Borough Council to increase the level of accessibility to, from and around the town for residents, employees and visitors. Without the investment required to both improve sustainable transport and to mitigate the existing and forecast levels of congestion in Slough, there is concern that the viability of the ambitious employment and residential development, required to fulfil the sustainable economic growth objectives of the TVB sub-region, will be hampered.

Area description

2.3. Slough is a dense urban environment bounded by green belt, situated in the east of Berkshire and in the Thames Valley Berkshire sub-region. Slough is a thriving multicultural town in close proximity to Heathrow airport and London with excellent transport and communication links which account for its importance and success as a commercial centre'. Slough is a major employment centre with around 4,500 businesses providing 82,000 jobs.

2.4. Slough is well connected by road, dominated by the A4 which runs east-west through the centre of Slough, and the M4, which runs east-west to the south of the town.

2.5. The town centre is well served by buses and has approximately 75,000 bus journeys each week. Bus passenger numbers on the A4 between Slough and Langley, for example, are as high as those in the town centre itself. Eight hourly First bus services and five hourly Transport for London (TfL) bus services operate along the A4 corridor with a journey time of between 20 and 38 minutes, depending on whether the bus runs along the A4 throughout, (Route 77), or via Langley village (routes 75, 76 and 78) or via Colnbrook village (Route 81). Appendix E contains the bus map for Slough.

2.6. In terms of rail, the Great Western Mainline service serves the main Slough rail station, Langley, in the east and Burnham, in the west. Services between Slough and London (Paddington) are relatively frequent, (approximately six trains per hour). The fastest journey times to Paddington are approximately 20 minutes.

Socio-Economic Characteristics of Study Area

2.7. The 2011 census indicates that Slough has a population of 144,000. Various socio-economic problems have been identified in the borough, including:

- 20.8% of households show 'overcrowding' compared to just 8.5% across England and Wales;
- Slough's average household size is 2.8 people per household - the second highest across England and Wales;
- Almost 25% of households do not own a car. Of those that do, single car ownership is more common in Slough than across the rest of the nation;
- Of residents aged 16 to 74, 73.4% (73,819 people) are economically active; 26.6% are economically inactive (compared to 30.3% across England and Wales); whilst 2.1% of the workforce is unemployed;
- 20.1% of Slough residents aged 16 and over hold no qualifications. An above average percentage (14.7%) hold Level 1 qualifications, with lower than average possession of higher

levels. 13.7% of residents hold 'Other qualifications', reflecting the high level of non-UK immigrants; and

- 9.1% of our residents are aged 0-4 years old. This is the second highest proportion of any of the 348 local authorities;

Importance of the Heathrow Airport - Slough Relationship

2.8. London Heathrow airport is one of the largest international airports in the world; in 2013, 72 million passengers and 1.4 million tonnes of cargo passed through the airport. Following the opening of Terminal 5 (less than 7 miles from Slough town centre) in 2008, annual passenger numbers are expected to increase to 86 million by 2014 and eventually reach 90-95 million.

2.9. Heathrow has two major impacts on the economy of Slough. Primarily this is seen through the airport generating significant employment directly, in the form of on-site workers, and secondly through indirect supply chain linkages. The town's close proximity to the airport makes it a prime location for multinational industry.

2.10. In 2010, a survey was conducted to investigate Heathrow's labour market and found that Slough provided over 4,000 direct on-site employees. Further economic analysis estimated that a further 1,500 jobs off-site indirect jobs associated with the airport were taken by the residents of Slough.

Problem identified & drivers for change

2.11. The 'key issues' for Slough, as identified by the Slough LDF (2006 to 2026) are:

- Overcrowding and congestion;
- Viability and vitality of the town centre and other key areas;
- The need to improve the image and environment of Slough; and
- Socio-economic characteristics;
  - Shortage of affordable housing and family housing;
  - Skills mismatch;
  - Pockets of deprivation; and
  - The need to plan for diversity.

Overcrowding and congestion

2.12. Slough's LTP 3 identified a number of challenges for Slough. Key areas of concern are as follows:

- Residents rely heavily on cars for their daily travel and this adds to traffic congestion and emissions of carbon and reduces the viability of bus services and contributes to poor health through lack of exercise;
- Many people living in Slough travel out of the town for work and access by public transport is poor compared to the private car;
- The growing traffic congestion problems have the potential to ultimately damage the local economy. Traffic levels outside the peak are rising, affecting the reliability of off-peak journey times, potentially threatening one of Slough's attractions for retail opportunities;
- Air quality in parts of the town is poor and could get worse. Slough compares poorly in comparative studies for natural environment quality, suffering from congestion, noise and poor air quality which are worsened by the proximity of Heathrow and motorways. Traffic is the main contributor to high levels of pollution in Slough town centre, and along the A4, particularly the London Road Section close to junction 5 of the M4; and

- Important places in Slough, like schools and colleges, the university, the industrial estates and major employment sites and the hospital find it harder and harder to cope with car access and traffic difficulties.

Viability and vitality of the town centre and key areas

2.13. Key areas of concern are as follows:

- Despite being recognised as a regional shopping centre, studies indicate that Slough is losing trade to competing centres. There are also around a million square feet of empty offices needing refurbishment;

- There is a need to ensure that Slough residents can take advantage of the opportunities available at Terminal 5 and any future airport expansions through transport provision and skills development. Following a consultation in 2005, a greater need to consider the needs of those who cannot access mainstream bus services was identified;

- In order to serve Heathrow, there is a need for more bus services – particularly to Heathrow Terminal 5 and Wexham Park Hospital. Heathrow airport is identified as being difficult to get to, particularly for shift workers at evenings and weekends and for those without a car. The LTP identifies the issues that have the best combination of need and the ability to act for the benefit of the largest sector of Slough's population as being access to Wexham Park hospital, and access to employment sites in and around Slough;

- There is also a need to improve access to Slough Trading Estate (SEGRO), including both employment and visitors transferring from transport hubs (Slough rail station and Heathrow Airport).

The need to improve the image and environment of Slough

2.14. Concerns are as follows:

- Consultation[1] demonstrated that in general, a poor perception of 'transport' in Slough prevails, for all modes. Other consultation with council members and stakeholders, found that there was a poor perception of safety and security at bus stops and on buses;

- The dual carriageway and traffic levels on the A4 cause severance and the pedestrian environment is described as poor; the underpass beneath the A4 is described as being an 'unpleasant and potentially threatening environment at any time of day'. The extent of perceived or actual severance varies, however the elderly, disabled and children are particularly vulnerable;

- Slough ranks poorly in comparative studies for natural environment quality, with a recent study[2] ranking the Borough at 350 out of 354. The Borough suffers from congestion, noise and poor air quality which are worsened by the proximity of Heathrow and motorways; and

- Crime levels are high in the Borough and there is a poor perception of personal security within the public realm.

Socio distributional issues in Slough

2.15. The key problems, issues and challenges associated with the study area are:

- A high level of socio-economic disadvantage prevails in Slough and includes some of the most deprived areas in the country. There is a need to ensure that Slough residents can take advantage of increased opportunities at Heathrow through improved public transport provision;

1 LTP 2 (2006 to 2011) http://www.slough.gov.uk/documents/LTP2-ch1-8.pdf
2 Slough LDF (2006 to 2026) http://www.slough.gov.uk/documents/Adopted_Core_Strategy_16-12-08.pdf

- Slough has a higher than average unemployment rate and that there is a requirement to provide a reliable level of accessibility to enable these Slough residents to access employment opportunities;
- The A4 accounts for a large percentage of road traffic accidents in Slough with 381 separate incidents recorded in the 5 years to March 2014; and
- The A4 causes severance and the pedestrian environment is poor in places.

Impact of Non-change

2.16. Without the introduction of proposed measures, congestion along the A4 in Slough will remain and become exacerbated by future traffic growth serving to further discourage new development and investment in the Slough Trading Estate and the Heart of Slough.

2.17. Specific outcomes of a Do Nothing case will include:

- The constraints of the existing transport conditions will act as an inhibitor to growth with private sector investment attracted to other areas with better accessibility;
- The A4's ongoing Air Quality issues will be exacerbated without the mitigation afforded by the scheme; and
- Sections of Slough's resident population will continue to be disadvantaged by restricted accessibility to jobs and services.

Strategic Objectives

2.18. The strategic objectives have been defined to address directly the problems discussed earlier in this chapter. They align closely with the established policies and plans of the scheme promoters, the Local Economic Partnership and Central Government.

2.19. The desired outcomes from each objective have been considered and are shown in Table 3.3.

Table 2.1 Objectives and desired outcomes

Objectives	Desired Outcomes
(1) Provide a high quality, safe, convenient and reliable alternative to the car and improve public perception of transport in Slough	Increase PT modal split Increase PT capacity Improve PT reliability Improve PT journey times Improve personal security Reduce casualty frequency and severity
(2) Alleviate the severe congestion on the A4 by allowing better flow of traffic	Improve (or keep to neutral) car journey times
(3) Minimise the impact of noise and air pollution and greenhouse gases on the A4 corridor	Reduce (or keep to neutral) carbon dioxide emissions and noise levels
(4) Support economic development in Slough and Heathrow and contribute to tackling deprivation	Support employment and housing development planned for Slough. Improve PT journey times between areas of deprivation in Slough and employment opportunities Provide regular PT frequency throughout

Objectives	Desired Outcomes
	the day, supporting shift workers Provide affordable transport Reduce unemployment in Slough

2.20. The A4 carries high volumes of traffic and like many busy roads experiences congestion and bottlenecks. This results in some of the worst environmental conditions in terms of air and noise pollutants. The proposal to improve public transport on the A4 corridor will:

- Improve bus service frequency, journey times, reliability and journey quality;
- Improve accessibility for all, particularly in off peak periods;
- Encourage modal shift and would ultimately reduce congestion and its environmental impacts, aligning particularly; and
- Enhance the viability of the town centre and other key areas.

2.21. Reduced congestion on the A4 corridor will help to consolidate Slough as a commercial centre, complementing the Heart of Slough town centre regeneration scheme. If Slough is to compete with other regional centres then the increase in traffic and congestion on this route needs to be reversed, in order to attract investment and allow local residents an easy route to work in neighbouring boroughs, and vice versa.

2.22. Accessibility between the town and Heathrow Airport, a key employment area with strong links to Slough residents, would be improved, facilitating the airport's role as a regional and national gateway. Potential future expansion of the Airport will in part depend upon improving accessibility and achieving modal shift to public transport for workers / visitors and thereby reducing its carbon footprint. Achieving this, by improving the quality, coverage and frequency of services is an agenda shared by BAA.

2.23. As part of the Heart of Slough town centre development there is a transport vision for Slough to be a regional transport hub, along with a planned redevelopment of the area adjacent to the railway station, incorporating a new bus station as a focal element. The proposed bus improvements on the A4 corridor between Slough and Heathrow Airport will be a complimentary measure that will increase the accessibility of a major employment centre to residents of Slough, reducing journey times whilst improving quality and reliability of public transport in the area. The scheme will contribute towards improving the image of transport in Slough, helping to maintain Slough as a commercial centre.

2.24. In the six years covered by the SEP, an estimated 108,000m^2 of office space is planned for Slough generating over 4,700 direct Full Time Employment (FTE) jobs and over 2,000 indirect jobs for the local economy and beyond. The selected option will need to improve accessibility for those workers, providing an alternative to car travel and reducing congestion which could otherwise threaten the investment required for that level of development.

2.25. Slough has been identified as an area with a relatively high level of unemployment, a high proportion of unskilled workforce and a high proportion of those without a car. Therefore improving accessibility for all and providing a step change in public transport provision, particularly in the off peak periods, will enable more Slough residents to benefit from a large existing and potentially expanding place of work at Heathrow Airport.

2.26. Slough has been shown to have a relatively high and mixed proportion of ethnic background people in the community. Some studies have shown that some ethnic minority groups are more likely to be associated with lower income and therefore, as described above, may more directly benefit from improvements to public transport and links to Heathrow airport.

3. Strategic Option Appraisal

Introduction

3.1. This section discusses a high level strategic appraisal of concept intervention options, drawing on professional judgement and knowledge the characteristics of the study area and the requirements associated with implementation of such schemes in practice. The assessment determined the best option (s) to be the focus of further development and appraisal with the aim of successfully delivering the sustainable transport and fulfilling the sustainable economic growth objectives of the sub-region, recognising the practical delivery constraints involved.

Concept options identified for strategic appraisal

3.2. Five transport intervention options in concept were considered: a "do minimum"; heavy rail, light rail, guided bus transit and non-guided bus transit. A brief description of each option in concept is presented in Table 3.1 below.

Table 3.1 Concept Options Considered

Options	Description
Do Minimum	Maintain existing provision of highway and public transport infrastructure and services with improvements limited to already funded and committed schemes and ongoing implementation.
Heavy Rail with complementary bus enhancements	Enhance local heavy rail service provision paralleling the A4 corridor combined with enhancement of bus connections/services between rail station and key trip attractors / generators
Light Rail with complimentary general traffic and bus measures	Introduction of a dedicated light rail (tram) scheme along the A4 corridor between the Slough Trading Estate and Heathrow Airport including provision of facility for fleet and light rail system maintenance. Would involve significant transfer of general traffic highway capacity to light rail and associated requirements for land take / reconfiguration of land to accommodate stops and interchange facilities. Some reconfiguration of bus services likely from bus operators.
Guided Bus Transit with complementary general traffic measures	Introduction of bus transit system along the A4 corridor incorporating kerb guided sections of busway to deliver full segregation of buses from other traffic – design adopts a "neutral at worst, beneficial where possible" impact on general traffic guiding principle.
Non-guided Bus Transit with complementary general traffic measures	Introduction of a bus transit system along the A4 corridor based on introduction of on road bus priority measures and enhancement to existing bus service levels and performance, and introduction of complementary general traffic measures – design adopts a "neutral at worst, beneficial where possible" impact on general traffic guiding principle.

The Strategic Appraisal Framework Adopted

3.3. A qualitative strategic appraisal framework was adopted as this was felt to be proportionate and sufficient to determine the appropriate option(s) to be the focus for more detailed and quantitative appraisal in the form of a business case.

3.4. The option appraisal framework adopted was two tiered:

- An assessment against objectives and desired outcomes
    - Assessment against strategic intervention objectives
    - Assessment against Strategic Economic Plan priorities
- An assessment of deliverability against key deliverability criteria

3.5. Each of these areas of option assessment is discussed in more detail below.

Assessment against objectives and desired outcomes

3.6. All options considered would need to enhance connectivity and accessibility between a number of key trip attractors and generators, reflecting the criticality of the A4 corridor as a section of route for journeys in the sub-region:

- The A4 forms the spine of a 12 km strategic public transport corridor that links Maidenhead, Slough and Heathrow and plays an important role in providing surface access to the airport. All options will need to focus on the 6.7km section of the A4 corridor between the junction of Dover Road to the west of Slough town centre, and the junction with High Street Langley approximately 300m from the M4 Junction 5.
- The Slough Trading Estate is one of the largest business parks in Europe, consisting of 486 acres of commercial property to the west of Slough town centre and immediately north of the A4 Bath Road. There are over 450 businesses on the site employing over 20,000 people. SEGRO, the owners of the trading estate, have planning permission to expand the site with over 150,000m2 of office, leisure and amenity space which could lead to the creation of over 4,000 additional jobs;
- Slough town centre is recognised as a regional shopping centre, however in recent years it has lost trade to other competing centres. To counter this downturn, a £450 million regeneration project known as the Heart of Slough has been ongoing since 2010. Since then, traffic management on the A4 has been radically changed to resolve issues of severance; in addition to highways works, a new bus station has been built and the rail station access improved. Several developments are planned for the Heart of Slough and the rest of the town centre which will deliver a further 60,700m2 of office space, and 2,700 new residential units within the next six years; and
- London Heathrow airport is one of the largest international airports in the world; in 2013, 72 million passengers and 1.4 million tonnes of cargo passed through the airport. Following the opening of Terminal 5 (less than 7 miles from Slough town centre) in 2008, annual passenger numbers are expected to increase to 86 million by 2014 and eventually reach 90-95 million.

3.7. The evaluation criterion takes into consideration the need to enhance accessibility along priority routes which will be essential for Slough and the wider region. The priority routes are identified as:

- Between A4 corridor and Slough town centre
- Between the Slough town centre and Heathrow Airport
- Between Slough Trading Estate and residents of Slough
- Between Heathrow Airport and residents of Slough
- Between Slough Trading Estate and Heathrow Airport

3.8. The five options introduced in Table 2.1 were examined against the Local and Central Government priorities for transportation and the Thames Valley Berkshire LEP Strategic Economic plan, discussed in further detail below.

National transport priorities

3.9. The Government has long-term objectives aimed at improving the economy, environment and society. These are the three tenets against which major transport infrastructure projects are assessed, and will continue to be assessed in future.

3.10. In its National Infrastructure Plan 2011, the Government presented its vision for the UK transport system:

- Transport infrastructure can play a vital role in driving economic growth by improving the links that help to move goods and people around and by supporting the balanced, dynamic and low-carbon economy that is essential for future prosperity.
- Local transport systems must enable suburban areas to grow. The transport network must support good value and rapid movement of goods around the country. The transport system must be efficient but also resilient and responsive to infrequent and unexpected pressures.

- Airports and ports are the gateways to international trade and the Government will work to improve the road and rail connectivity to major ports and airports.

3.11. These elements of the vision can be seen as being of direct relevance to the options considered, which aims to reduce congestion, improve links to Heathrow Airport and enable the growth of Slough.

Local transport priorities

3.12. There are clear linkages between the options considered and several of the policies within Slough's Local Development Framework (Core Strategy 2006 – 2026):

- Core Policy 5 governs the location of employment development within Slough. The A4 provides a strategic route to Slough Trading Estate and the Heart of Slough which have been identified as the primary locations for new employment, and existing congestion is seen as a barrier to growth;
- Core Policy 7 (Transport) seeks to improve road safety and air quality. The combination of a reduction in vehicle speeds, high quality resurfacing and the installation of traffic signals provided by the scheme will provide a higher level of safety at and around the junction. Through relieving congestion and reducing the stop-start nature of vehicles the scheme will have a beneficial impact on air quality; and
- Core Policy 10 states that development will only be allowed where there is sufficient existing, planned or committed (transport) infrastructure. Relieving congestion on the A355 will assist in providing a suitable transport system for which to realise the implementation of the Slough Trading Estate Masterplan.

Strategic Intervention Objectives

3.13. The strategic objectives take into consideration with National and Local transportation priorities discussed above and address problems described in chapter one. The objectives have been defined as follows:

1. Provide a high quality, safe, convenient and reliable alternative to the car and improve public perception of transport in Slough
2. Alleviate the severe congestion on the A4 corridor by allowing better flow of traffic
3. Minimise the impact of noise and air pollution and greenhouse gases on the A4 corridor
4. Support economic development in Slough and Heathrow and contribute to tackling deprivation

Assessment of Options against Strategic Intervention Objectives

3.14. As seen in Table 3.2 on the next page, all options are seen to address the strategic objectives with the exception of the do nothing option which failed to address key problems over a long-term. Light Rail, Guided Bus Transit and Non-guided Bus were seen to best address strategic objectives.

Table 3.2 Option Assessment against Strategic Intervention Objectives

Strategic objective	Do nothing	Heavy Rail	Light Rail	Guided Bus Transit	Non-guided Bus Transit
1) Provide a high quality, safe, convenient and reliable alternative to the car and improve public perception of transport in Slough	Would provide no significant changes to deliver a reliable alternative to car transport and hence the option would not achieve the objective and car likely to become more dominant over time.	Heavy rail would offer an alternative to car transport but the requirement for transport interchange to bus or other modes to access key areas would make use of the mode for many journeys sought to be addressed, unattractive vs car in many instances.	Light rail could be an effective and attractive alternative to car transport along the A4 corridor itself, but the requirement for transport interchange to bus or other modes to access key areas would make use of the mode for many journeys sought to be addressed, less convenient and attractive than car.	Guided Bus Transit would be a flexible alternative to car transport and would offer the opportunity for seamless "door-to-door" service operation for key journeys with a good degree of segregation from other traffic.	Non-guided Bus Transit would offer the most flexible alternative to car transport and would require minimum transport interchanges and improve public perception
Score	--	+	++	+++	+++
2) Alleviate the severe congestion on the A4 by allowing better flow of traffic	Traffic congestion and traffic flow on the A4 will continue to worsen.	Enhanced services on the existing heavy rail alignment would secure some small transfer of traffic from the A4 but will be unable to address many of the local traffic movements between priority trip generators and attractors. Alleviation of A4 congestion and traffic flow problems likely to be marginally positive.	Accommodating the light rail alignment and the need to provide light rail service priority along the A4 likely to create some adverse traffic impacts that may be more severe than benefits secured through mode shift from car, given need to still interchange to make many journeys in the area and level of forecast congestion issues at key junctions.	Scope to implement some very limited sections of dedicated guided bus alignment while still maintaining capacity and traffic flow on the A4 corridor, supported by complementary general traffic highway measures. Enhanced bus performance and complementary highway measures should in combination reduce congestion and enhance traffic flow along the A4	Implementation of non-guided bus transit will be less intrusive and potentially impactful on highway capacity and general traffic performance, supported by complementary general traffic highway measures. Enhanced bus performance and complementary highway measures should in combination reduce congestion and enhance traffic flow along the A4.
Score	--	+	--	++	++

Strategic objective	Do nothing	Heavy Rail	Light Rail	Guided Bus Transit	Non-guided Bus Transit
3) Minimise the impact of noise and air pollution and greenhouse gases on the A4 corridor	Air quality in parts of the corridor is poor and is likely to get worse with additional congestion over the long-term with no significant change.	Mode shift offered by Rail is expected to marginally improve noise and air pollution and greenhouse gases along the A4 corridor relative to the Do Minimum situation	Mode shift offered by Light Rail is expected to marginally improve noise and air pollution and greenhouse gases along the A4 corridor relative to the Do Minimum situation but impact on traffic flow may more than offset this.	Mode shift generated by Guided Bus Transit services and complementary enhanced highway network improvements is expected to improve noise and air pollution and greenhouse gases along the A4 corridor relative to the Do Minimum situation	Mode shift generated by Non-Guided Bus Transit services and complementary enhanced highway network improvements is expected to improve noise and air pollution and greenhouse gases along the A4 corridor relative to the Do Minimum situation
Score	**--**	**+**	**-**	**++**	**++**
4) Support economic development in Slough and Heathrow and contribute to tackling deprivation	Negligible support for economic development and tackling of deprivation. Increased congestion and exacerbation of problems in corridor likely to constrain growth.	Enhanced rail services and improved rail connectivity via enhanced bus links will support economic development	Light rail transport impacts more offset improved PT accessibility benefits to Heathrow.	The Guided Bus Transit would provide significant accessibility to the A4 corridor and related development and employment locations, while complementary highway measures will additionally enhance highway accessibility.	The Non-Guided Bus Transit would provide significant accessibility to the A4 corridor and related development and employment locations, while complementary highway measures will additionally enhance highway accessibility.
Score	**-**	**+**	**Neutral**	**++**	**++**

Thames Valley Berkshire LEP – Strategic Economic Plan priorities

3.15. In March 2014, the Thames Valley Berkshire LEP submitted their Strategic Economic Plan (SEP). Within the six year period covered by the SEP (2015/16 to 2020/21), there are several considerable employment developments that are planned on the Slough Trading Estate, which sits within the Heart of Slough.

3.16. The development amounts to 108,000m^2 of office space along with ancillary retail, food and accommodation. In addition, 2,920 residential units are programmed over the same time period. The SEP document outlines the case for the necessary investment to infrastructure, enterprise and employment that is required for the Thames Valley Berkshire region's economy to continue its successful upward trajectory. This section compares how the five options for transport enhancement would complement the economic priorities of the LEP sub region.

3.17. Six *packages* for infrastructure investment have been identified within the SEP with the following strategic priorities:

- Unlocking housing development
- Enhancing urban connectivity
- Encouraging vibrant town centres
- Foundations for future growth
- Enhancing the strategic transport network
- Enterprise, innovation and business growth programme

3.18. Table 3.3 compares how the five options considered will enhance the delivery of benefits related to each of the infrastructure packages and aid the SEP's business and education programmes across Slough.

Table 3.3 Strategic Economic Plan infrastructure priorities

LEP Strategic Economic Plan	Do nothing	Heavy Rail	Light Rail	Guided Bus Transit	Non-guided Bus Transit
Unlocking housing development	**Neutral**	+	++	+++	+++
Enhancing urban connectivity	-	**Neutral**	**Neutral**	++	++
Encouraging vibrant town centres	-	**Neutral**	**Neutral**	++	++
Foundations for future growth	**Neutral**	+	+	++	++
Enhancing the strategic transport network	-	+	-	++	++
Enterprise, innovation and business growth programme	-	+	+	+	+
Skills education and employment	**Neutral**	+	+	+	+

3.19. As seen in Table 2.3 above, the Guided Bus Transit and Non-guided Bus Transit were best seen to align with strategic priorities of the LEP. Heavy Rail and Light Rail offered a marginal benefit in capacity enhancement but with limited transport enhancements outside the A4 corridor. The do nothing option would not address the existing and forecast levels of congestion in Slough which could hamper the ambitious employment and residential development required to fulfil the sustainable economic growth objectives of the TVB sub-region.

Option Deliverability Assessment

The Option Deliverability Assessment Framework

3.20. The focus of assessment was determining the potential deliverability of options, recognising that there are a number of factors/criteria influencing deliverability.

3.21. The criteria against which the concept options were assessed to provide an overall view on deliverability were:

- **Infrastructure Feasibility:** The degree of engineering challenge associated with delivery of the option
- **Operational Feasibility**: The degree of operational integration and delivery challenge associated with the option
- **Land Requirements:** The scale of property or land take likely to be required to deliver the intervention
- **Complexity of Delivery:** The complexity of delivery accounting aspects such as the need for onerous statutory planning procedures and complexity of delivery partners and stakeholder engagement involved
- **Environmental Impact:** The schemes potential to result in adverse environment impacts
- **Stakeholder Acceptance/Support:** The schemes likelihood of securing stakeholder acceptance and support
- **Cost:** The costs associated with delivering and operating the transport solution, that will reflect deliverability aspects outlined above
- **Affordability:** The affordability of the scheme in the context of the likely scale of funding to be sought relative to available funding sources, in this instance LEP major scheme funding.
- **Timescales for Delivery:** The time horizon over which the transport scheme could be delivered, that will reflect deliverability aspects outlined above

3.22. The options under consideration, excluding the Do Minimum where deliverability is a given, were ranked 1-4 against each of the criteria, with 1 reflecting best deliverability performance / least deliverability risk.

Option Deliverability Assessment Results

3.23. Table 3.4 presents the deliverability assessment results. The Non-Guided Bus Transit is shown to offer the best deliverability and performance and presents the lowest deliverability risk. The option is most feasible, least costly, likely to be affordable in the context of funding availability and is least complex and contentious to implement and operate.

3.24. The Guided Bus Transit is the next best performing but presents a more costly and less affordable solution, will be more complex and time consuming to deliver and also presents greater scope for stakeholder objection. The Heavy Rail option is likely to be complex to deliver due to the delivery partner relationships involved and timescales for delivery are likely to be longer as a consequence. Light Rail would be a particularly challenging option to deliver and the cost in particular would be greatest and almost certainly make the scheme unaffordable.

Table 3.4 Option Deliverability Assessment

Evaluation Criteria	Heavy Rail	Light Rail	Guided Bus Transit	Non-guided Bus Transit
Infrastructure Feasibility	Road and Rail infrastructure measures required though unlikely to be too challenging	Complex highway integration issues make engineering feasibility challenging – interface with statutory utilities likely to be significant. Dedicated depot/stabling facility would need to be provided.	Dedicated road corridor dev	Minimum development requirement
Ranking	***2***	***4***	***2***	***1***
Operational Feasibility	Need to secure operational buy-in and commitment from train and bus operators. Timetabling interface on rail potentially particularly challenging.	Need to establish a new Light Rail operating entity and likely to be operational interface challenges with bus operators. Very significant highway operational interfaces likely to be problematic. Potentially significant highway operational issues during construction.	Operational networks an evolution of current – some operational risk around interface of guided busway sections and general traffic.	Operational networks are an evolution of existing – some operational risk around interface of bus priority measures with general traffic.
Ranking	***3***	***4***	***2***	***1***
Property / Land take requirements	Potentially minimal land-take issues	Potentially very significant property and land take requirements accounting for space for stops and depot/stabling/maintenance facilities.	Some potential land-take required to accommodate carriageway widening and implementation of busway sections.	Some small scale property / land take required to accommodate bus priority and junction enhancement to maintain general traffic capacity alongside bus transit measures
Ranking	***1***	***4***	***3***	***2***
Environmental impact	Unlikely to be any significant adverse environmental impacts	Complexity and scale of construction, property / land take and traffic interface issues mean there is potential for significant adverse environmental impacts	Unlikely to be any significant adverse environmental impacts though busway section construction introduces some risk	Unlikely to be any significant adverse environmental impacts
Ranking	***1***	***4***	***3***	***1***
Complexity of delivery	Number of delivery partners and potential complex associated contractual arrangements/agreements to be established.	Highly complex with major project statutory planning powers needing to be secured and a new operating entity to established	Relatively low complexity – guided busway sections should be deliverable within LA highway powers – utilises existing operating entities	Minimal complexity to execute – requires use of existing powers and utilises existing operating entities.
Ranking	***3***	***4***	***2***	***1***

Evaluation Criteria	Heavy Rail	Light Rail	Guided Bus Transit	Non-guided Bus Transit
Stakeholder acceptance / support	Train operator and rail industry support may prove problematic given operational feasibility uncertainties.	Significant construction, property/land take and operational feasibility issues likely to generate significant stakeholder challenge.	Introduction of busway sections and associated construction and traffic implications have potential to generate some stakeholder issues	Unlikely to generate any stakeholder resistance of great significance – type of scheme design easily adaptable to mitigate risk
Ranking	***2***	***4***	***2***	***1***
Cost	Cost of delivery range broad from over £10m to potentially less than £5m	Cost of delivery likely to significantly exceed £50m	Cost of delivery likely to exceed £10m	Cost of delivery likely to be less than £10m and potentially less than £5m
Ranking	***2***	***4***	***2***	***1***
Affordability	Likely to be affordable if business case can be made	Unaffordable and no funding avenue of scale required appears to be available	Potentially affordable if business case can be made	Likely to be affordable if business case can be made
Ranking	***3***	***4***	***2***	***1***
Timescale for delivery	Complexity of delivery and delivery partner interfaces means that timescale for delivery likely to be at least 3 years and potentially longer	Complex project in all respects – delivery timescale beyond 5 years or more	Should be deliverable within 2 to 3 years if funding available	Should be deliverable within 2 years if funding available
Ranking	***3***	***4***	***2***	***1***
Overall Rank	**Option presents potentially reasonable deliverability but with a high degree of uncertainty**	**Option presents very poor deliverability and is very high risk in this respect**	**Option presents reasonable deliverability**	**Overall best option for deliverability – straightforward and low risk, cost and timescale risk**

Strategic Option Appraisal - Conclusions

3.25. The Strategic Options Appraisal provided a sound basis for identification of a preferred scheme option for development and full business case analysis. The appraisal concluded:

- **Do Minimum** - Without the introduction of any new proposed measures, congestion along the A4 in Slough will remain and become exacerbated by future traffic growth serving to further discourage new development and investment in the Slough Trading Estate and the Heart of Slough.

- **Heavy Rail** – although the existing rail line runs parallel to the A4, approximately 500m to the north, any branch line extension or new station would not address the issues in the corridor of interest. Heavy rail does not meet the demands of local residents and workers wishing to make the short journeys along the route. The deliverability assessment suggests reasonable potential deliverability but with a high degree of uncertainty over delivery partner buy-in, cost and timescale for delivery. Not recommended for further appraisal.

- **Light Rail** - This mode of transport w not considered for detailed analysis on the grounds of obvious feasibility, property/land-take and cost grounds. It is not a flexible mode of transport as it cannot leave the rail to provide door to door service. The amount of land take required would have serious implications of other modes of transport. Significant road space would be lost to facilitate the infrastructure leading to increased congestion. Option presents poor deliverability - very costly, poor affordability and could not be delivered within reasonable timescale. Not recommended for further appraisal.

- **Guided Bus Transit** – This option, though presenting reasonable deliverability offers little additional benefit over and above Non-Guided Bus Transit but introduces significant additional costs, including maintenance. Although it provides a segregated transport corridor for bus services allowing operation of regular reliable services with reduced influence from traffic congestion, it is unlikely to provided significant benefit over and above Non-guided Bus Transit. Option is less flexible in terms of adaptation post implementation too.

- **Non-Guided Bus Transit** – This was considered the only preferred option as it would provide the necessary accessibility improvements to the key destinations (Slough Trading Estate, town centre and Heathrow airport) along the A4 corridor. The option recognises that the corridor features significant interaction between buses and general traffic and as such any adverse impact to general traffic needed to be avoided otherwise a business case could not be made (car disbenefits would outweigh PT benefits). The standard engineering measures proposed in the preferred scheme design recognise that land adjacent to the corridor is heavily developed (and will be more so in future) and the costs associated with large amounts of land purchase would put any business case at risk.

3.26. The non-guided bus transit option is therefore to be taken forward to the next stage of option assessment which is split between:

- Highway design optioneering (Chapter 4); and

- Alterations to bus services to make use of the infrastructure improvements (Chapter 5).

4. Highway design optioneering

Introduction

4.1. The consideration of strategic options contained in Chapter 2 of this report, provided clear evidence to suggest that the optimum scheme type should involve standard bus priority measures. This has been taken forward into the optioneering process to define a preferred scheme.

4.2. Through optioneering, the preferred scheme should be one that does the most to meet the overall scheme objectives whilst retaining a level of affordability and feasibility which will support the Business Case for funding.

4.3. In identifying options consideration has been given to:

- Pedestrian and cycle desire lines;
- Access to property;
- Statutory undertaker equipment;
- Land ownership; and
- Existing highway and traffic signal infrastructure.

Western section

4.4. The Western section being considered for the scheme is formed of a 1.7km long section of the A4 Bath Road between Dover Road/ Cippenham Lane in the west to the A355 Farnham Road/ Tuns Lane in the east.

4.5. The A4 Bath Road in this section is predominantly two lanes in each direction, with some localised widening to three lanes at signalised junctions with the A355, Ipswich Road and Dover Road. To the north, there is a segregated service road running parallel to the main carriageway between Dover Road and Galvin Road which provides access to various commercial loading frontages. Similarly, a service road runs in a parallel form to the south of the A4, albeit not continuously.

4.6. There are, at present, no bus priority measures along the western section of the route. All buses mix in general traffic lanes and are served by stops located within lay-bys.

4.7. At peak times, the western section of the scheme is heavily congested in both directions, the lack of stacking space at the signalised junctions results in blocking back along the A4.

4.8. With this knowledge of the existing layout, several over-arching options were considered for providing standard bus rapid-transport to the western section:

Signal improvements

4.9. As a first consideration, a do-minimum scheme has been proposed which does not include any significant changes to the highway layout there-by significantly reducing the level of funding required. Instead, a this option would rely on changes to traffic signal equipment, notably conversion of the existing signal controllers from fixed-time to MOVA operation.

4.10. Whilst there would be clear gains to traffic capacity as a result of the upgrade of signal upgrades, some level of congestion on this busy section (notably eastbound) would undoubtedly remain. As all buses would remain mixed in with general traffic, services would still be subject to delay caused by the congestion.

Advantages	Disadvantages or residual impact
• Reduction in congestion and associated air quality impacts; • Least cost – no land take required, no loss of trees or need to remove stats	• Buses retained in general traffic and subject to delay; • Bus priority measures limited to within signal control.

A4 Bath Road bus lane

4.11. Building up from the signal improvement option; the conversion of an existing traffic lane in each direction to a bus lane would provide the priority required for buses along the A4.

4.12. However, as discussed, at peak times the level of congestion on this section of the A4 results from an existing lack of traffic capacity at junctions and on links. Halving this effective capacity would result in an unacceptable additional impact to general traffic, which would either be forced into one lane, extending journey times and increasing emissions from stationary vehicles, or it would force vehicles to find alternate less preferred routes, such as residential streets.

4.13. Due to these clear disadvantages, this option was not considered past the initial concept stage.

Widen A4 Bath Road carriageway

4.14. Consideration has been given to providing bus lanes in both along the A4 Bath Road. In order to provide 4m wide bus lanes would require a minimum land take of 8m.

4.15. This option would allow for unimpeded bus access along sections of the route. However, at several junctions there is the need for vehicles to turn left in order to access the side roads which run into the Trading Estate. This would require bus lanes to be terminated in the approach to junctions and therefore prevent continuous movement.

4.16. Preliminary investigations into statutory undertakers equipment (stats) have been undertaken by the design team and have found that a considerable amount of water, gas, electric and telecommunication equipments is located in the land adjacent to the A4 Bath Road carriageway. Much of this equipment would need to be relocated in the event of highway widening, thereby increasing the complexity and, crucially, the cost of a widening option.

4.17. Alongside the carriageway in both directions, there are currently a large number of mature trees which line the road, some 50 trees along the eastbound carriageway and 30 along the westbound carriageway. The vast majority of these trees, or their root systems, fall within the necessary 4m widening line required for the inclusion of a bus lane. Coordinating the necessary planning, approvals required would add considerable time and risk to the scheme programmes, whilst actual relocation would produce a significant cost.

4.18. Between Galvin Road and Salt Hill Avenue in the eastbound direction, the widening of the carriageway would require the compulsory purchase of a strip of private lane, along with some conversion of existing council owned land. In any scheme taken forwards, priority for buses here is seen as essential to by-pass the most congested section of the route (leading up to the A355 junction).

4.19. At the start of the westbound carriageway, there is limited scope for widening immediately west of the A355 junction up to the junction with Cranbourne Road. In this location, the segregation between the A4 and the service road is too narrow to accommodate an additional lane on the A4. Furthermore, between Wellcroft Road and Twinches Lane, there are several sections of echelon parking which would need to be removed.

4.20. Whilst carriageway widening would be economically unfeasible for the whole route, it should be considered in localised areas around junctions where additional bus or general traffic lanes would increase stacking capacity.

Advantages	Disadvantages or residual impact
• Bus priority for sections between junctions; • Probable highest journey time savings; • Provides bus lane in busiest section of route.	• Highest cost option due to trees, stats and highways civil engineering works; • Planning risk around trees would increase programme for construction; • Buses still constrained at junctions due to left-turning vehicles; • Would lengthen pedestrian crossings, taking spare capacity out of the signal timings; • CPO required in places; • Greatest environmental impact; • Loss of parking.

Use of service roads

4.21. The service roads which run parallel to the A4 provide a further option for providing bus priority in the western section. However, the form and conditions of the two roads differs significantly and should therefore be considered individually.

Westbound

4.22. As explained previously, the service road parallel to the westbound carriageway does not provide continuous access along the whole route. The junctions with Twinches Lane and Cippenham Lane involve off-set priority control, whilst the Westgate Retail Park severs the service road completely.

4.23. There are several opportunities to park on both sides of the service road, making it difficult to navigate through and potentially slowing down traffic as a result. If these on-street parking areas are removed, local retail businesses and other shop owners could potentially lose business as a result of no parking for customers. The road is in constant use by shoppers and delivery vehicles for the retail properties, which could cause congestion from these deliveries and retail pickups. This would potentially slow down any buses navigating through this service road.

4.24. This evidence suggests than any journey time savings for buses would be minimal, and may, given certain circumstances actually be extended when compared to using the existing routing.

Advantages	Disadvantages or residual impact
• Limited impact on trees; • Reduced interaction with other general traffic and congestion; • Significantly lower cost than widening; Minimises or reduces emissions.	• Requires significant changes at entry and exit junctions; • Need to yield at give-ways; • Would require weaving back onto A4 or significant construction and land take to complete continuous route; • Loss of significant amounts of retail parking.

Eastbound

4.25. The service road to the north of the A4 runs in a relatively direct manner continuously from Dover Road through to Galvin Road, only requiring diversion from a straight road in the vicinity of the petrol station to the east of Leigh Road. This would allow for comparable cruise times to those on the A4 itself, but without delays caused by peak time congestion.

4.26. The use of the service road would reduce the impact on the trees lining the carriageway and would also minimise the level of utility equipment relocations.

4.27. However, there is at present no means of entering or exiting the service road at the Dover Road junction, nor at the eastern end:

- To provide means of access for eastbound buses, the Dover Road junction (which is currently restricted with the use of bollards) will need to be reopened and controlled as 'Bus Access Only';
- To enable buses access back onto the A4, a parcel of land will need to be purchased by SBC, on which a bus lane could be constructed. Discussions have already been held over the availability of the land.

4.28. Whilst most of the service road has parking restrictions, there are several on-street bays which are used by visitors to the Trading Estate. These bays would have the potential to restrict bus movement along the service road and should be considered for removal.

Advantages	Disadvantages or residual impact
• Limited impact on trees; • Reduced interaction with other general traffic and congestion; • Significantly lower cost than widening; • Minimises or reduces emissions.	• CPO required to bring vehicles back onto A4; • Need to yield at give-ways. • Loss of some parking;

4.29. A variant of this option would be to widen the service roads to include a full bus lane. However, the issues noted above for the A4 widening option would also apply, and therefore the excessive costs associated with the relocation of trees and stats, and the civil engineering works would make this unfeasible.

Recommendation

4.30. The evidence suggests that the options considered provide advantages of a varying degree, albeit some at a far greater financial cost.

4.31. Whilst the relatively simple adjustments to traffic signal equipment would be expected to reduce congestion, it is unlikely that they could provide the level of benefit required to significantly improve bus journey times and reliability. Because of the low cost of this option, it should be considered as part of a package of measures.

4.32. Carriageway widening to accommodate a bus lane would be the highest cost option, due to the significant civil engineering requirements (additional carriageway, kerbing, footways etc) as well as the necessary relocation of statutory undertakers equipment and mature trees. However, in certain locations, such as in the vicinity of junctions, the benefits of localised widening could be sufficient to offset the costs.

4.33. For eastbound bus routes, the use of the service lane to the north of the A4 is likely to provide significant benefits in peak times, as an alternative to remaining on the congested A4 Bath Road and should be considered the preferred option. However, to achieve this effectively would require land take at the eastern end of the service road to provide access back onto the A4. However, due to the complexity of the route, utilising the service road south of the A4 for westbound buses is unlikely to provide the same level of benefits.

Central section

4.34. The Central section being considered for the scheme is formed of a 3.7km long section of the A4 Wellington Street/ London Road between Slough town Centre in the west and the junction with High Street Langley/ Ditton Road in the east.

4.35. In the westbound direction, there are several isolated bus lanes, however these are disjointed and fail to provide a continuous method of giving buses priority. A small section of bus lane in the eastbound direction is provided on the approach to the A4 junction with High Street Langley.

4.36. Between Brunel Way and Dolphin Road the A4 has two to three lanes in both directions; however for the remainder of the route through to High Street Langley there is one lane in each direction, with a wide central reserve to accommodate right turners at various junctions.

4.37. As with the western section, several high level options have been considered.

Signal improvements

4.38. Upgrading all the existing junctions to MOVA control (aside from those being updated as part of the Better Area Bus Fund) will provide some congestion relief benefits for vehicle sin both directions. However, this positive impact is likely to be less than necessary to significantly improve bus journey times.

4.39. As with the Western section it should be considered as part of a package of measures.

Advantages	Disadvantages or residual impact
• Reduction in congestion and associated air quality impacts; • Least cost – no land take required, no loss of trees or need to remove stats	• Buses retained in general traffic and subject to delay; • Bus priority measures limited to within signal control.

Provide bus lanes in existing carriageway

4.40. A fractured bus lane already exists in the westbound direction providing some bus priority. Filling in the remaining sections between the junctions with Ditton Road and Upton Court Road version of traffic lanes would further reduce conflict with general traffic.

4.41. Eastbound, there is less opportunity to provide full bus lanes. Whilst sections of the wide central reservation could be converted for general traffic, vehicles wishing to right-turn at various junctions would hinder straight ahead movements.

Advantages	Disadvantages or residual impact
• Increased bus priority in westbound direction; • Can be achieved within existing carriageway.	• Reducing lane capacity for general traffic will substantially increase overall congestion; • Negative impact on air quality.

Widen for bus lanes

4.42. Between Brunel Street and Upton Court Road, widening of the carriageway to accommodate a bus lane would result in significant land purchase costs owing to the built up nature of the area. However, localised widening to support greater stacking capacity on the approach to junctions may produce a similar effect.

4.43. Eastbound, between Upton Court Road and High Street Langley, the A4 is predominantly bounded to the north by a grass verge, and park-land providing, all of which is within SBC highway land. This provides an opportunity to widen the carriageway to accommodate a full bus lane

4.44. This would however, be the highest cost option. There are a number of trees close to the carriageway which would need to be removed or relocated. In addition, although preliminary investigations into utilities equipment have been undertaken, the full extent of necessary diversions is not known.

Advantages	Disadvantages or residual impact
• Reduction in congestion and associated air quality impacts; • Full bus priority for eastbound routes between Upton Ct Rd and High Street Langley.	• Buses retained in general traffic and subject to delay; • Highest cost option; • Environmental impacts from removing/relocating trees; • Risks associated with stats equipment.

Recommendation

4.45. As in the western section, the upgrade of signal equipment is a low cost measures which will improve the general flow of traffic along the A4 and should be used as the base for a package of further measures.

4.46. Whilst in the eastbound direction, converting existing carriageway to bus lanes would likely have a negative impact on overall capacity and congestion; westbound there are opportunities to fill in some of the gaps in the existing bus lane facilities.

4.47. To enable faster bus journeys in the eastbound direction, it would seem more appropriate to create a package of measures to include localised junction treatments to the west of Upton Court Road junction (where land ownership issues prevent full lane widening); whilst to the east of the junction, carriageway widening could accommodate a full bus lane down to the High Street Langley junction.

5. Bus network specification

Do Minimum

5.1. For the Do Minimum, it is assumed that the package of measures currently being delivered as part of 'Better Bus' is completed. This includes:

- SCOOT at signals on A355 Farnham Road;
- Signals upgrades at certain junctions off the A4 in Langley;
- Upgrading junctions along the A4 to MOVA at Langley Road, Langley High Street and Upton Court Road;
- Widening eastbound A4 to 2 lanes (general traffic) at Brands Hill; and
- Bus lanes southbound A355 Farnham Road (junction at Three Tuns) and eastbound A4 London Road (junction at Upton Court Road).

Do Something

5.2. The definition of the Do Something is still under development but at present is understood to include:

- Bus lane A4 eastbound from a point opposite Twinches Lane to Three Tuns Junction;
- Bus priority in both directions in the Trading Estate;
- (Possible) Short section of bus lane eastbound A4 at the Ledgers Road junction;
- Continuous bus lane eastbound A4 between Upton Court Road and Langley High Street;
- Bus lane westbound A4 on the approach to Upton Court Road junction;
- Widening at the A4 / Uxbridge Road junction eastbound; and
- Upgrading further junctions along the A4 to MOVA including Montem Lane, Ledgers Road, Tesco and Uxbridge Road.

5.3. A feature of bus operations in Slough is that frequencies reduce at peak in the face of longer scheduled journey times but the same resource allocation as at off-peak. This is reflected in the model. For instance, routes 75 and 76 each operate on a 30 minute headway at off-peak times combining to provide a 15 minute headway over common sections. Frequencies reduce and become irregular at peak so that (for instance) westbound departures from the Bus Station towards the Trading Estate are at 07:51, 08:09, 08:27, 08:44, 09:00.

5.4. For 'Better Bus', we agreed with First in Berkshire that any time savings arising from lower journey times and improved punctuality would be ploughed into improving the frequency on the services affected. We have not seen any plans in detail but at the time of the preparation of the bid First estimated that this would result in an increase of 11,700 bus miles per year on route 78, a 5% increase. The measures would be primarily on bus routes 58 and 78 but other services (notably route 77) would also benefit.

5.5. We have assumed that the same approach would be taken here with the services which benefit from MRT, except in the case of routes 75 and 76 for which we have developed a step-change in frequency based on the latent demand for these services.

Routes 75 and 76

Proposition

5.6. Routes 75 (Heathrow Central – Slough – Maidenhead) and 76 (Heathrow Central – Slough – Cippenham) provide the public bus link between Slough rail station, the town centre and the A4 frontages of the Trading Estate. As stated above, the combined headway is 15 minutes but this

increases at peak. This reduction in frequency and the irregularity described above reduces the ability of the service to provide an acceptable link for commuters on the Trading Estate and elsewhere.

5.7. We have taken the view that a frequency increase to a bus every 10 minutes at peak (a 'turn up and go' frequency) is required to fulfil the key role in bus / rail interchange at Slough. This is achieved in small part by recycling time savings into the timetable but more significantly in allocating additional resource.

5.8. The most efficient way to do this is to introduce another service (coded in the model as MRT). This operates between Heathrow Airport, Langley and the Trading Estate (Dover Road) every 30 minutes, and would combine with routes 75 and 76 to provide a combined 10 minute headway over the common section (Heathrow Airport – Dover Road).

Alternative

5.9. We have considered whether the MRT should operate via A4 London Road. This would provide a quicker journey time between the Trading Estate, Slough town centre and Heathrow Airport. Our view is that it should not because:

- If an even 10 minute headway is provided on the Trading Estate, then diverting every third bus to the A4 results in a lumpy '10 / 20 / 10 / 20' headway in Langley. This would be damaging to the bus market in Langley which in our experience is the major source of current demand on these routes;
- The resulting service proposition between the Trading Estate and Heathrow Airport is not particularly attractive – with only a 1 in 3 chance that at the time the passenger wishes to travel a 'fast' service is available; and
- Demand along the A4 London Road is relatively weak (route 77 is one of only two routes in Slough in receipt of daytime support). An additional service could undermine route 77 whilst not attracting very much intermediate demand.

Evaluation: Operating Cost

5.10. The current vehicle requirement on routes 75 and 76 is 10.

5.11. The service proposal above requires an additional 5 buses at peak; 4 at off-peak. Over the combined '75/76/MRT' operating cycle (incorporating the peak period) 16 minutes need to be saved if a regular 10 minute headway with this level of resource is to be provided.

5.12. The additional cost (in round terms) is estimated at £610,000 per annum.

Evaluation: Patronage and Revenue

5.13. The proposition is based on the replacement of existing shuttle buses to Bath Road frontages with the enhanced route 75/76. During recent observations around 400 2-way passengers / day were observed boarding shuttle bus services at Slough station. This gives around 800 1-way passengers / day.

5.14. Just under half the employees of the Bath Road frontages are estimated to have access to shuttle buses. We therefore believe that there is a significant opportunity to enhance the overall market for bus travel between Slough station and the Trading Estate.

5.15. We assume that shuttle services cease with MRT, and that the overall market grows by around 50% with MRT in place to around 1,200 1-way passenger journeys / day. With the annual Slough PlusBus fare of £480 (the cheapest available) this gives an annual revenue yield of around £300,000.

5.16. We would also expect growth along the route 75/76 corridor as a whole. Demand in Langley is observed to be strong and we feel should respond positively to an increase in frequency, while demand for travel to Heathrow is observed to be strong and such an increase in frequency would be in line with Heathrow Airport Ltd's Surface Access Strategy.

5.17. Demand west of the Trading Estate is weaker, however, and simply to increase the frequency of routes 75 and 76 to provide a combined 10-minute headway (so running every 20 minutes to Maidenhead and every 20 minutes to Cippenham) would saddle the service with substantial additional cost. Coding an additional service east of Dover Road minimises additional operating resource.

5.18. Using industry standard bus service elasticity and our own knowledge of the bus market and fares in Slough (note that this information is strictly confidential) we estimate an annual revenue yield of around £320,000.

5.19. In summary, shuttle bus revenue = £300,000 + frequency increase = £320,000 = total additional revenue £620,000 against additional operating cost estimate of £610,000.

Delivery

5.20. This service enhancement may require some pump-priming over the first 2 – 3 years while patronage builds.

5.21. Clearly, the existing shuttle services need to cease operating. Currently, there is resistance to utilising public transport on the basis of:

- Planned and unplanned irregularity (which MRT addresses);
- Lack of awareness of the public transport options (this is being addressed as part of LSTF, though more work is needed); and
- Employees of different firms travelling together (this seems odd given that they catch the train together!).

5.22. It ought to be possible to make a financial case to current shuttle bus providers that it would cost less to subsidise free fares than it does to contract in services. And SBC could (if it chose) make life difficult for these services. It could deny them use of any bus priority measures (by making them available for registered local bus services only) and refuse to provide space at Slough rail station.

Routes 58 and 78

Proposition

5.23. The off-peak headway of each service is 30 minutes, combining to provide a 15 minute headway on the common section between Britwell, Slough and Langley (Trelawney Avenue). Again, at peak this headway is widened, and is represented in the model by a 36 minute headway for each route.

5.24. The BBAF measures should enable significant improvements to the journey time of both services and we assume a reduction in peak period headway from 36 to 33 minutes in the do minimum.

5.25. MRT brings further benefits and we assume a 30 minute headway service at peak on each service.

5.26. To achieve this with the current operating cycle (route 78 being interworked with routes 71 and 77), peak hour journey times need to reduce from 71 minutes at peak at present to 62 minutes.

Alternative

5.27. We have considered whether further frequency enhancements might be possible. Britwell and Farnham Road are observed to generate significant demand, and a frequency increase would be desirable. Demand to Trelawney Avenue in Langley is observed to be a little weaker (and east of Langley High Street sees in any case a frequency increase with routes 75 and 76). Further, route 58 combines with route 7 to provide an (almost) even 15 minute headway service between Slough and Uxbridge, and Iver Heath and Uxbridge. To increase the frequency on one service and not the other would result in a lumpy headway, and would not be expected to generate patronage.

5.28. The case for increasing the frequency of these services is therefore not clear. It would be possible to increase the frequency to every 10 minutes between Britwell and Slough Bus Station but unless this was projected on to Trelawney Avenue this would result in a lumpy '10 / 20 / 10 / 20' headway east of Slough Bus Station which we regard as undesirable. Further, the routes will probably see relatively little additional benefit from the MRT measures over and above that delivered by Better Bus. Whilst Britwell perhaps ought to see a higher frequency, this won't be delivered through MRT.

Route 81

5.29. Route 81 (Hounslow – Colnbrook – Slough) is operated by Transport for London. It runs every 10 minutes (Mondays – Fridays, schooldays); 11 minutes (Mondays – Fridays, school holidays) and 12 minutes (Mondays – Fridays off-peak). Route 81 will see improvements to journey times as a result of both BBAF and MRT measures, but TfL are more likely to plough these benefits into reducing resource rather than increasing the already high frequency. This is because (unlike the First routes) the resource required at peak is substantially greater than at off-peak, representing an inefficient use of resource.

5.30. For this reason we assume a 10 minute headway all-day – which for a peak hour model effectively means no change.

Route 77

5.31. Route 77 (Dedworth – Windsor – Slough – Terminal 5) is one of only two daytime services currently in receipt of subsidy from Slough Borough Council. Its basic off-peak frequency is every 30 minutes but again the headway widens at peak.

5.32. The service benefits from both BBAF and MRT measures. We therefore take account of these by narrowing the peak headway to every 33 minutes with BBAF and every 30 minutes with MRT.

6. Conclusions

6.1. This Option Assessment Report has examined various strategic options for resolving known issues in Slough; such as the vitality and attractiveness of the town centre as a place to work and shop; and on the transport network where the roads are congested resulting in poor air quality and unreliable public transport services.

6.2. The assessment covered 5 strategic options: Heavy rail; light rail; guided bus; non-guided bus; and a do nothing option. Theses options were initially compared using a framework of the study objectives, before consideration of a set of deliverability and feasibility indicators.

6.3. The non-guided bus option was considered the *only* preferred option as it would provide the necessary accessibility improvements to the key destinations (Slough Trading Estate, town centre and Heathrow airport) along the A4 corridor. The option recognises that the corridor features significant interaction between buses and general traffic and as such any adverse impact to general traffic needed to be avoided otherwise a business case could not be made (car disbenefits would outweigh PT benefits). The standard engineering measures required recognise that land adjacent to the corridor is heavily developed (and will be more so in future) and the costs associated with large amounts of land purchase would put any business case at risk.

6.4. With a preferred strategic option selected, various highway design options were assessed, each with a number of advantages and disadvantages. It was apparent, that owing to localised constraints along the route, no one specific option type could be applied throughout. Instead, a package of measures have been proposed, drawing on the benefits provided by signal improvements, highway widening and traffic management, and these were to be carried forward into the outline scheme designs used to support the business case.

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