

# Bathampton Rail-Based Park and Ride Options

Consideration of OTB Proposal

October 2015

Bath and North East Somerset Council



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# Contents

<b>Chapter</b>	<b>Title</b>	<b>Page</b>
	Executive Summary	i
<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	The Concept of an Integrated Facility	1
1.2	Developing Scheme Options	3
<b>2</b>	<b>Delivery of a Rail-Based Option</b>	<b>5</b>
2.1	Location	5
2.1.1	New Station Platforms	6
2.1.2	Route Capacity	7
2.1.3	Constraints	7
<b>3</b>	<b>Developing a Business Case</b>	<b>11</b>
3.1	Dialogue with DfT	11
3.2	The Need for a Strong Business Case	11
3.3	Construction Costs	11
3.4	Revenue	12
<b>4</b>	<b>Conclusions</b>	<b>14</b>
4.1	Option Selection	14
4.2	Deliverability Problems	14
4.3	Business Case Deficiencies	14

# Executive Summary

The Bathampton proposal for a new rail-based Park and Ride scheme to the east of Bath at Bathampton Junction has been presented for consideration by OTB Engineering UK LLP. This has been considered in some detail through a technical analysis by Mott MacDonald and in dialogue with Network Rail as they provide and maintain all rail infrastructure.

The proposal depends on implementing major changes to the rail network in the area of Bathampton Junction, including relocating the junction itself and realigning the Trowbridge Line and the embankment carrying the line.

The recent upgrade of the Great Western Main Line has made no provision for the proposed Park and Ride facility. The retention of the historic Mill Lane Bridge means that the junction cannot be relocated and hence the car park cannot be located on the land vacated, whilst the location of a new transformer will add significant costs to any project.

This report concludes that the scheme as proposed, being dependent on moving the junction, is unlikely to be delivered and is compounded by practical difficulties of locating station platforms and vehicular access to the site. Consequently construction costs would be very high. Variants have been considered including other reconfigurations of the railway alignments and platforms, but all have adverse impacts on the efficient operation of the railway at this crucial location.

Road access to the proposed site would be facilitated by a new access beneath the Great Western Main Line, connecting to the A4 dual carriageway Bathampton Junction. This is a significant engineering challenge in terms of both the impact of construction on the railway and linking to the A4 in accordance with Highways England's standards. Space for a new roundabout junction is limited and this would encroach onto the meadows. Extending this access as part of a new link road between the A4 and A36 is subject to continuing investigation but indications are that a scheme alignment in this location would not be deliverable in terms of its vertical alignment and environmental impacts.

The Bathampton proposal makes unsubstantiated assumptions about the revenue from car parking and adopts the view that the scheme would have a

positive business case. However, there is no robust basis for the revenue projections and our analysis indicates that capital costs have been underestimated and are likely to rise substantially given that the Great Western Main Line works have been put in place necessitating even more re-engineering. Achieving a positive business case is therefore considered to be unrealistic.

# 1 Introduction

## 1.1 The Concept of an Integrated Facility

A Bathampton proposal was submitted by OTB to develop new infrastructure to the east of Bath that would combine a Park and Ride facility served by a new rail station, the road access for which could serve as the starting point for a new road link to overcome the deficiencies of the road network in the area. The proposal was documented in a report issued in February 2013<sup>1</sup> following an earlier document produced by D Baker<sup>2</sup>. The scheme neatly addresses a number of recognized transport problems and accordingly was considered in more detail alongside other possibilities.

A review has been undertaken<sup>3</sup> of possible Park and Ride sites to the east of Bath which included 'Site H' – the OTB proposed site – as shown in Figures 1.1 and 1.2. This illustrates how the scheme requires the relocation of the railway. The review considered all the site options on a comparative basis and noted the following in its Summary Table 10.1:

- **Highway access** – 'Substantial and expensive bridge works needed to insert large structures under the [Great Western Main Line] and A4 Batheaston Bypass' and 'Access to Bathampton Farm is severed by the removal of the level crossing.'
- **Rail engineering** – 'Substantial track alterations to re-align the Westbury line and track switches at Bathampton Junction. Associated signalling works and the provision of a new station needed. Service reliant on the delivery of the Greater Bristol Metro and existing service using the Westbury line. Spare capacity on the latter services in the weekday peak periods is assumed; which is unlikely to be the case. Re-alignment of the Westbury line would require acquisition and demolition of a residential property on Tying Road (The Skillings).' [The adjacent builders' yard would also be affected.]
- **Flood risk** – 'Bathampton Farm and east edge of site affected by flooding (Flood Zone 3). Bunding/protection works proposed are in this zone. Potential need for compensation.'
- **Landscape** – 'Designations: AONB, Green Belt, Forest of Avon' and 'Floodplain meadows limit potential to provide landscape and visual mitigation planting on eastern side. Additional impacts outside indicative site boundary likely from access road infrastructure.'
- **Biodiversity** – 'A strip of land within the site south of the Westbury railway line is designated as a SSSI (Hampton Rocks Cutting SSSI) for its geological interest. A wider area (between the railway curve and Tying Road) is designated as an SNCI.'

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<sup>1</sup> OTB Engineering UK LLP in association with Servant Transport Consultants and MDS Transmodal Ltd (25 February 2013) *Bathampton Station Park and Ride Scheme: GRIP Stages 1 & 2 (equivalent) Report*

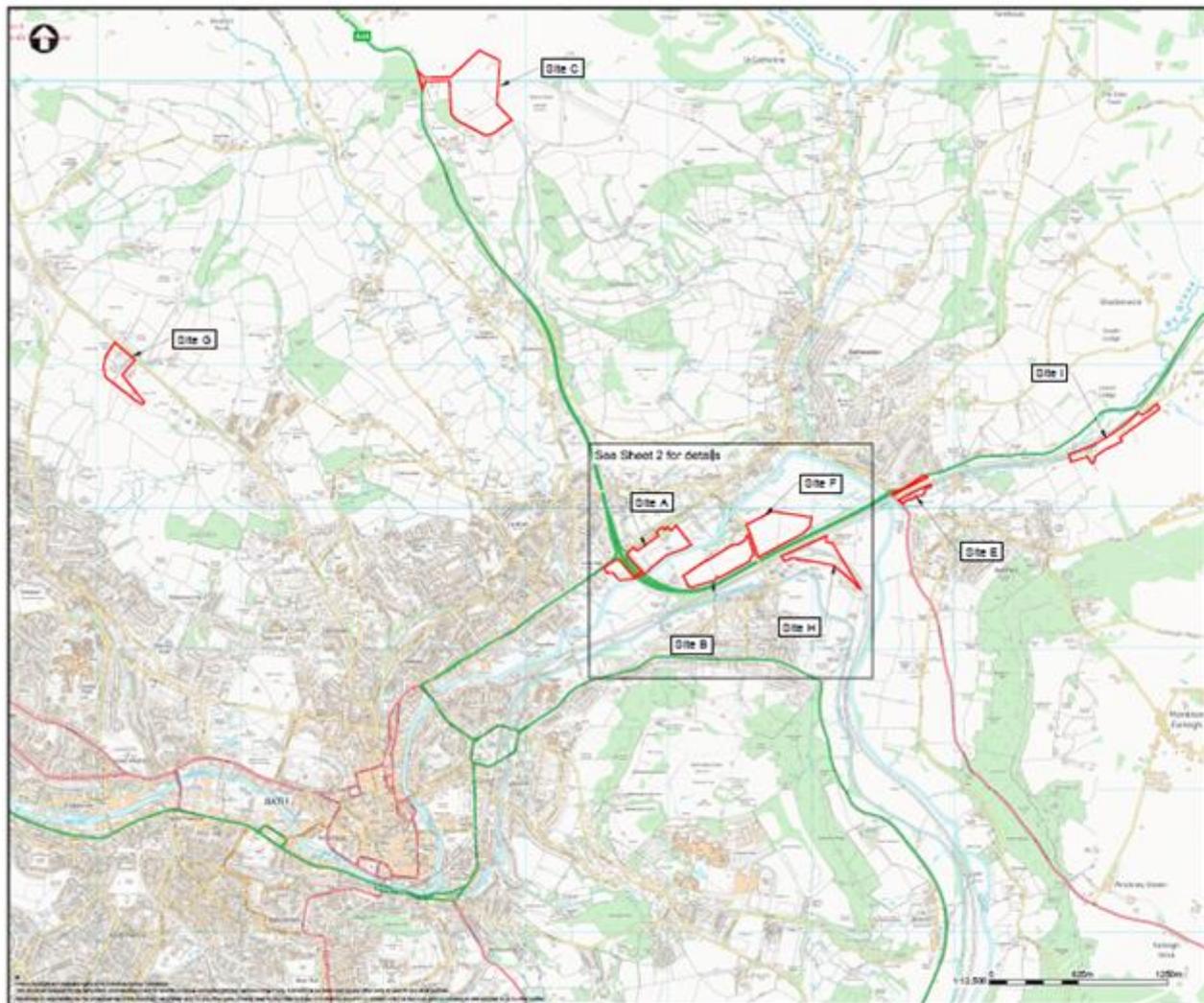
<sup>2</sup> Dorian Baker (6 February 2012) *Bathampton Parkway* (proposal).

<sup>3</sup> Halcrow (May 2013) *Site options: high level review – Bath eastern Park and Ride sites*.

- **Potential business case** – ‘Low. The highway and rail engineering works will make this site very expensive to deliver. Considered it doubtful that a good business case with a sound Benefit Cost Ratio (BCR) could be achieved.’

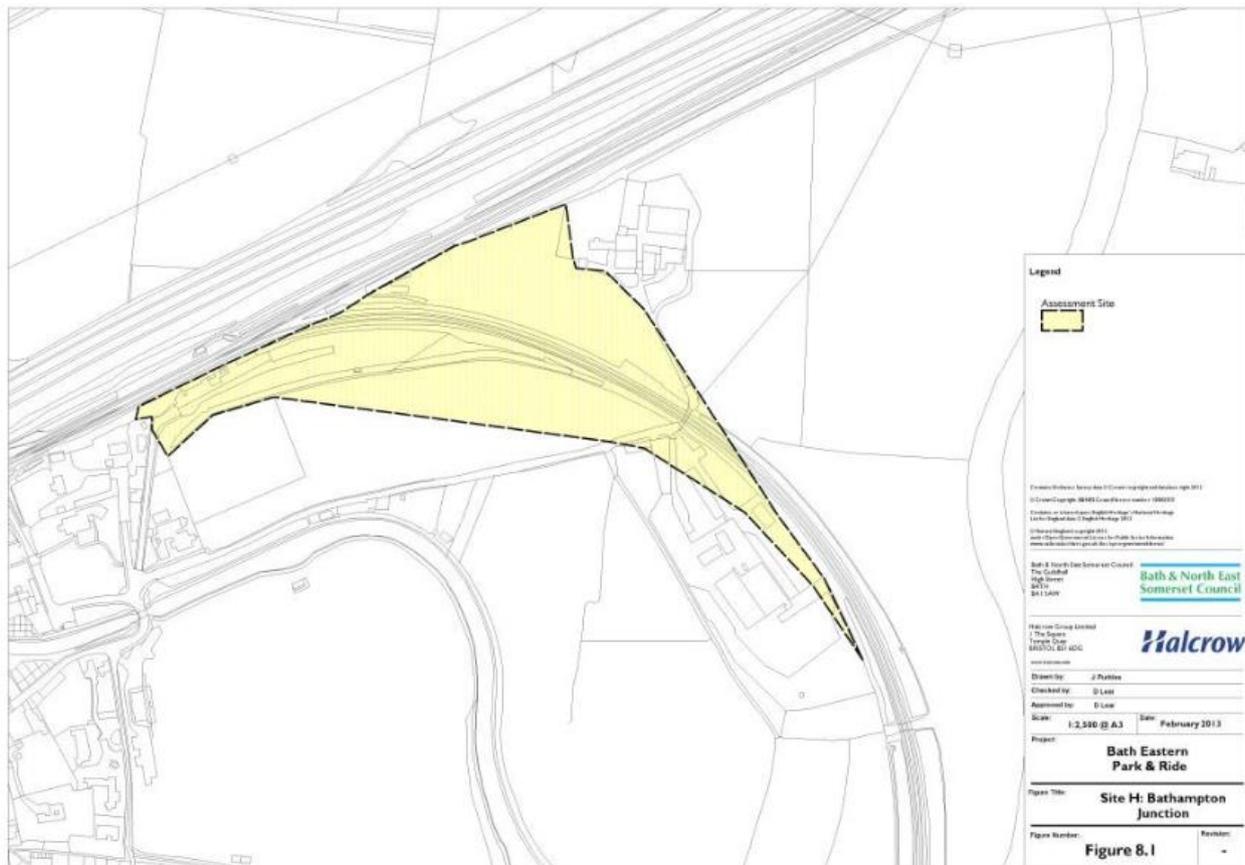
The Halcrow report of 2013 highlighted a number of practical issues that would need to be addressed and have subsequently been considered in more detail. .

Figure 9.1: Potential Park and Ride Sites Considered



Source: Mott MacDonald from Halcrow (2013).

Figure 1.2: Potential Park and Ride Site H



Source: Halcrow (2013)

## 1.2 Developing Scheme Options

To be considered for Government funding, all major transport schemes need to be developed in a structured and transparent way. This needs to be undertaken in accordance with the Department for Transport's guidance, WebTAG (Transport Analysis Guidance, extensive web-based guidance regarded as being sufficiently comprehensive and robust to ensure that appropriate evidence is presented against which schemes can be considered). WebTAG sets out the sequential stages that should be applied when considering proposals of this type. Initially, the problems to be addressed should be identified from which a long list of options can be determined. Once this long list has been refined to a short list, a preferred solution can be identified through a process of comparison and analysis. It should be noted that the OTB proposal was presented as a solution but not in the context of well-defined problems or as one of a number

of options; it could not therefore be considered by DfT for funding in the usual way in the absence of consideration of other possibilities.

Steps 1 to 4 of the WebTAG option development process includes:

- (1) Understand the current and (2) future context and conditions in the study area;
- (3) Establish the need for intervention;
- (4a) Identify intervention-specific objectives to address the identified need; and
- (4b) Define geographical area for intervention to address

A transport strategy was developed for Bath – ‘Getting Around Bath’ which endorsed the role of a Park and Ride site to the east of the city and provided the context in which transport proposals could be considered. In developing the options for improving access to the east of Bath, a series of problems was addressed with a set of defined objectives in accordance with WebTAG.

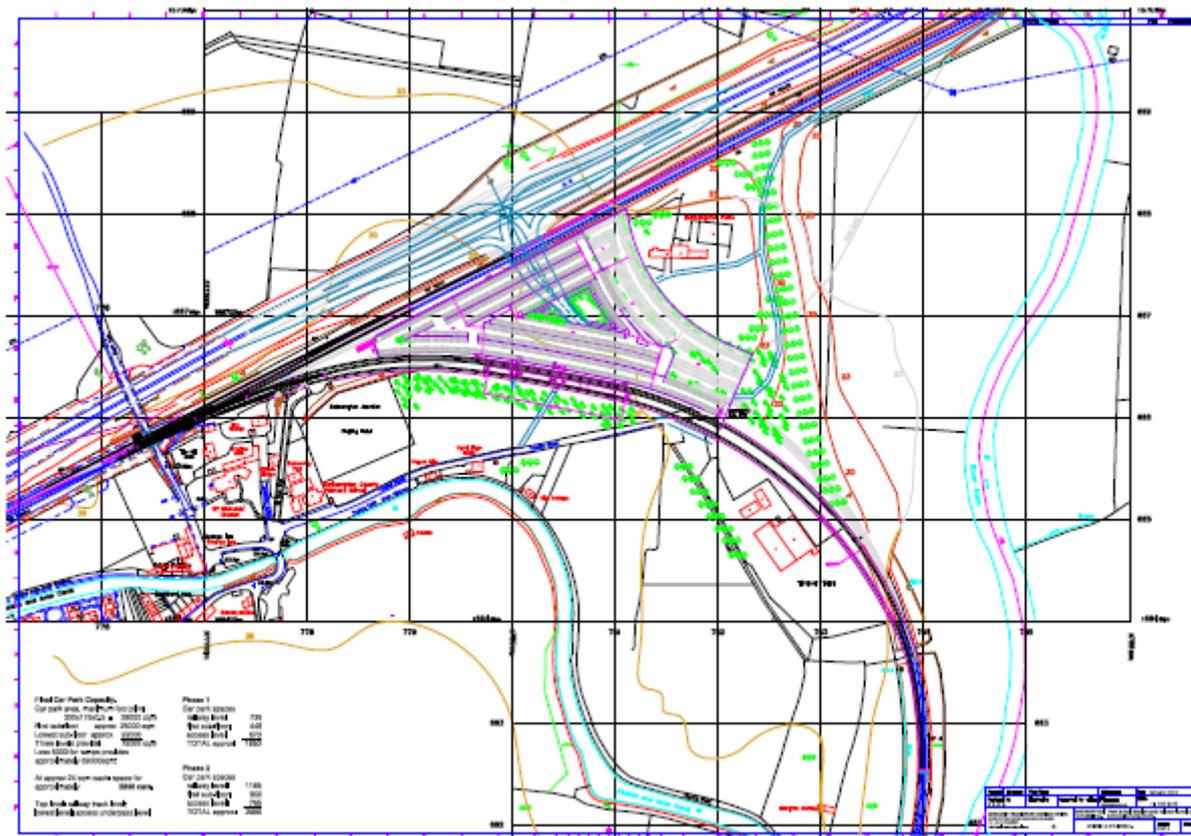
Should a scheme not require Government funding, then statutory consents will still be required. In the event that private finance is available, then any investors will be expecting a robust business case based on the principles set out in WebTAG to safeguard their investment. There is no indication at this stage of any sources of private finance for this scheme.

## 2 Delivery of a Rail-Based Option

### 2.1 Location

The location of the OTB proposal at Bathampton Junction suggests that rail services using the Trowbridge Line (Bath Spa to Westbury route) would serve the new facility. This would enable Park and Ride users to access a range of services to access Bath Spa, Oldfield Park and services beyond to Keynsham and Bristol. However, the Bathampton facility has been shown to require major reconstruction of the rail alignment in the area including the relocation of Bathampton Junction where the Trowbridge line diverges and the realignment of the curve on the Trowbridge Line (see Figure 2.1). This would necessitate moving Bathampton Junction to the west and hence reconstruction of Mill Lane bridge which has not formed part of the recent main line electrification works. The OTB proposal aims to accord with Network Rail's GRIP (Guide to Railway Investment Project) process Stages 1 and 2 in identifying the scope and indicative business case for a scheme but fails to take into account the prospects for deliverability at this location; it relies on space being freed up by the relocation of the junction. While the concept may not rely on relocating the junction, it does require a suitable space to construct a car park (on the site of the Bathampton Farm buildings if the junction remains in its present location) and the challenge remains of providing station platforms to Network Rail's requirements.

Figure 2.1: Proposed Location of Interchange Facility



Source: OTB Engineering UK LLP in association with servant Transport Consultants and MDS Transmodal (2013).

### 2.1.1 New Station Platforms

Firstly, in the event that a stopping service on the main line is envisaged to serve the Park and Ride facility, GWML trains would require a substantial platform (up to 250m) and travellers making journeys who do not make use of an additional stop would incur a delay. This ‘Parkway’ type scheme is very different to a local Park and Ride service and would necessitate a much larger facility. Similarly, local services on the main line would be disadvantaged by an additional time penalty. Occupying the line for a station stop would incur delays to a wide range of main line services which Network Rail regard as being unacceptable.

Secondly, Trowbridge Line trains would not benefit from an additional stop as many currently operate at or near capacity – there would not be space for additional users. Should extra rolling stock become available, it is unlikely that there would be sufficient incentive for a train operator to add a stop and incur delays for other users. It is also likely that additional capacity will be consumed by the latent demand of people not travelling currently because the trains are overcrowded; the growth in demand for rail travel over the past ten years or so has been unprecedented and there are no indications that this will decline.

Thirdly, in 2019 a new MetroWest service from Bristol will terminate at Bathampton Junction in the existing Up loop before returning to Bath Spa. This provides an opportunity to link a Park and Ride facility that could make use of this service if a suitable platform could be constructed; this is the preferred option as it is both affordable and deliverable. The OTB proposal could not utilise this new service unless a new spur is provided further to the east which creates difficulties associated with additional trackwork and signalling, to access the spur, (including approach speeds, curvature and cant although these can be addressed by a slow speed approach) and creating an embankment for all or part of its length (possibly integrated with a car park structure).

A particular problem is that Network Rail requires platforms that are on straight sections of track generally without gradients. This enables train doors to be aligned closely to platforms on the level (also, cant is used on curves so the train floor would not be level with the platform). The existing alignment does not allow platforms to be constructed as there is no straight section on the Trowbridge Line curve. In addition, the reconstruction associated with the GWML upgrade exacerbates the gradients as the track has recently been lowered in the vicinity of Bathampton Junction. To create a straight section of track would require a major reconstruction of the curve, a very expensive exercise which would require a significant length of embankment and track to be realigned. Network Rail may allow some variance on its standards in some circumstances if there is sufficient justification although this is the exception rather than the rule.

### 2.1.2 Route Capacity

As indicated above, stopping trains on busy routes create constraints in the timetable that have repercussions for a considerable distance and hinder the efficient operation of the network. Bathampton Junction is a critical location where accommodating all train movements is constrained and additional demands would be problematical. The operational timetable has been considered in detail by Mott MacDonald and found to be very constrained at this location due to the conflicting movements at the junction, particularly with new, faster trains in service on the main line. Route capacity is also influenced by signalling capacity and safe operation is paramount.

### 2.1.3 Constraints

Realigning the Trowbridge Line curve to create a length of straight track against which platforms could be constructed would require the shifting of Bathampton Junction 200m to the west. The electrification works for the GWML upgrade have not included this. In addition, there are two major constraints affecting the location of the junction:

- **Mill Lane Bridge** is a listed structure of historic importance. The GWML upgrade has retained this structure but lowered the track to allow space for the overhead power lines. To move the junction, the

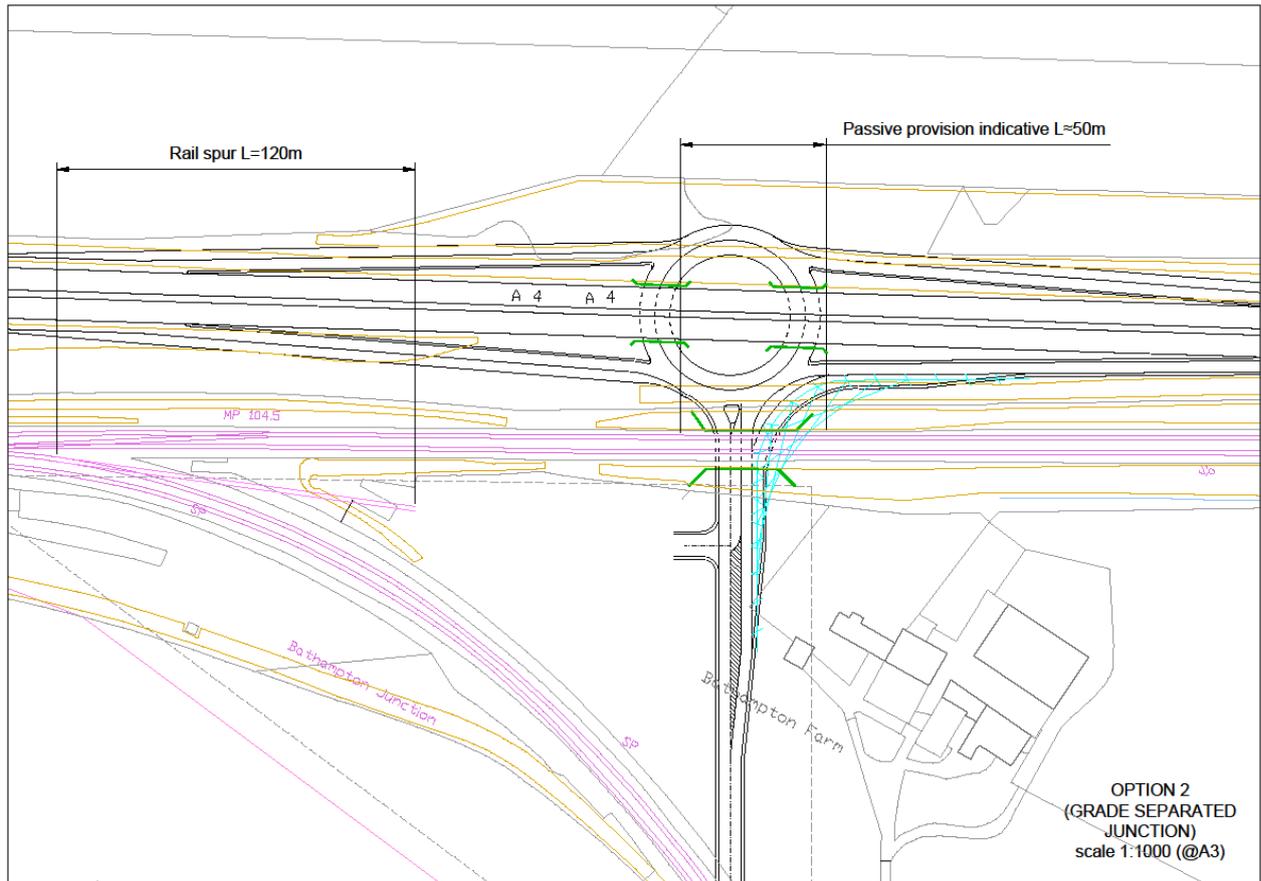
bridge would need to be reconstructed to overcome the constraints presented by its supporting structure; and

- An **electrical transformer** required for the electrified main line is to be located adjacent to Bathampton Junction. This is a substantial structure for which a number of locations were considered by Network Rail. The decision to locate it at Bathampton Junction reflected Network Rail's requirement to locate it in the most suitable place to meet current and future needs.

Should it not be possible to relocate Bathampton Junction, the possibility of accommodating platforms and the proposed car park in between the GWML and Trowbridge Line would require the demolition of Bathampton Farm, a property of heritage significance.

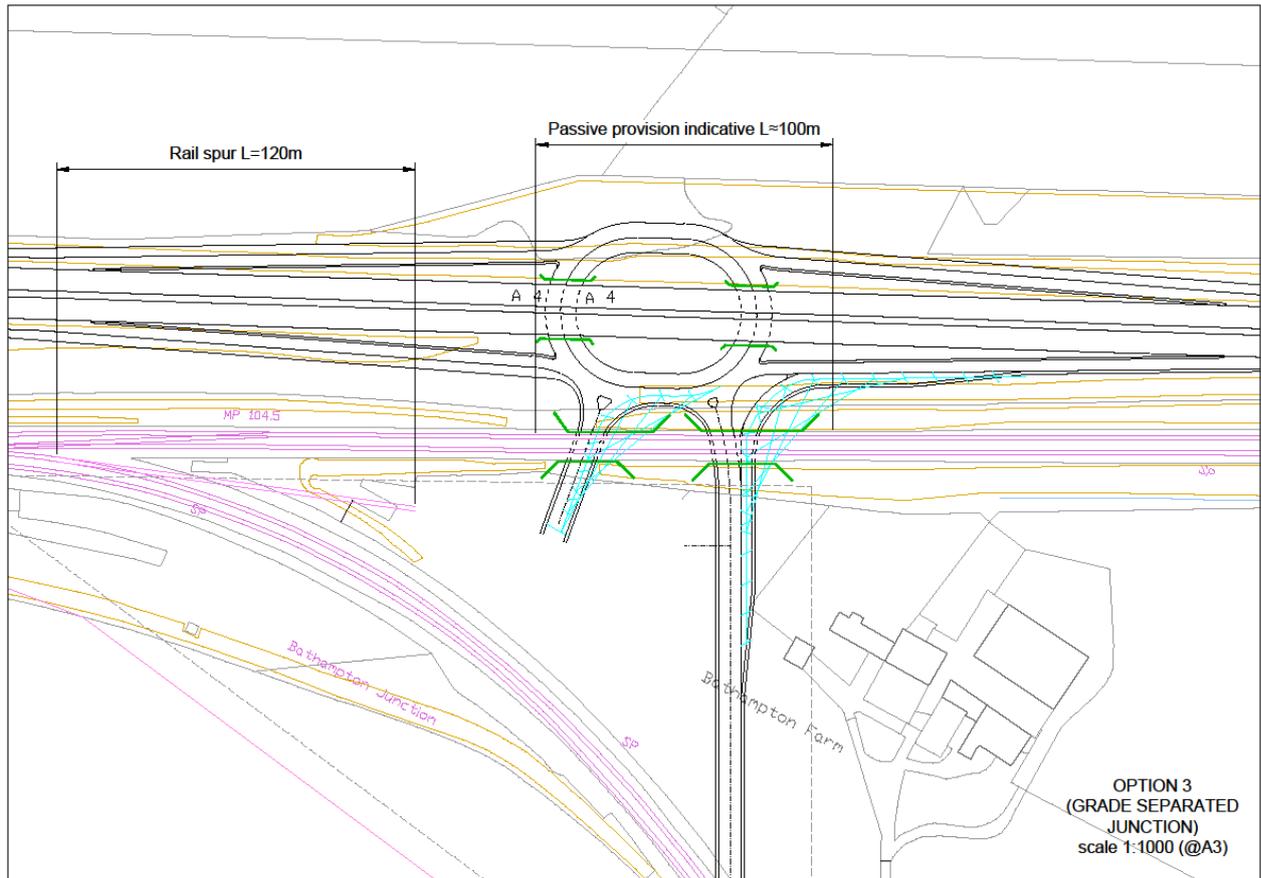
need to include a road link from the site to the A4 Bathampton Bypass is also challenging because it would require at least one substantial structure to be provided beneath the GWML. The alignment of the A4 dual carriageway and the vertical profile of the road in relation to the railway embankment indicate that designing and delivering slip roads would present significant challenges, particularly if the access were to be designed to Highways Agency standards should a new A4 to A36 link on this alignment be constructed subsequently. While accesses could be constructed, they will need to take into account the location of railway structures and would involve construction of new bridges for insertion beneath the railway. As the OTB proposals notes, adequate vertical clearance would be required for double deck buses to serve a Park and Ride site in the first instance (or for rail replacement services if required) and standard clearance for a public highway in addition to constructing gradients in accordance with Highways England specifications, especially if this access were to eventually become part of the road network. Mott MacDonald has considered the highway access options and indicated that substantial engineering work would be required (see Figures 2.2 and 2.3 as examples) . New slip roads to the A4 may also require a shift in the alignment of the dual carriageway. The proposal envisages a multi-storey car park structure, the top of which would be at the level of the main line railway embankment which requires some excavation to achieve.

Figure 2.2: Indicative Access From A4 (Single Bridge Beneath Great Western Main Line)



Source: Mott MacDonald.

Figure 2.3: Indicative Access From A4 (Two Bridges Beneath Great Western Main Line)



Source: Mott MacDonald.

A further consideration is that planning permission has been granted for a residential development next to the Trowbridge Line curve which could impede any realignment.

## 3 Developing a Business Case

### 3.1 Dialogue with DfT

We understand that meetings have been held with DfT to establish the proposal in principle. However, more detailed analysis has shown that the OTB scheme as envisaged requires adaptation to include platforms to Network Rail's specification which in turn requires reconstruction of the Trowbridge Line curve and the relocation of Bathampton Junction, the latter also being required to provide the site for car park. a view endorsed by Network Rail.

### 3.2 The Need for a Strong Business Case

A robust business case will be required if DfT funding is to be obtained. This will need to be demonstrated by an approved modelling process and with an appraisal undertaken in accordance with WebTAG. A Park and Ride facility needs to demonstrate that it will attract an appropriate number of users. The OTB proposal assumes that 3,000 daily users will pay to park at the facility although this demand is not substantiated in any way. A key determinant of the number of users will be the Park and Ride service that they aim to use, in the case of the OTB proposal as little as one train per hour.

In the unlikely event that DfT funding is not required, then a business case in some form will still be required to demonstrate the financial returns to investors including a robust analysis of costs, revenues and risks.

In contrast, other sites serving the A4 corridor (bus-based with one offering the possibility of an additional train service) could attract approximately 1,400 daily vehicles initially, attracted by a frequent Park and Ride service to the city centre. This forecast has been calculated from the updated transport model for the area rather than being determined by a hypothetical income stream. The apparent over-estimation of revenue and under-estimation of costs in the OTB proposal suggests that a positive business case would be elusive.

### 3.3 Construction Costs

Scheme costs are an important consideration for comparison with its monetised benefits. For a Park and Ride scheme to demonstrate good value for money, benefits should outweigh costs when calculated in accordance with WebTAG. For the OTB proposal, it is clear that construction costs would be very substantial including road access with a bridge through the main line embankment, a multi-storey car park and new rail platforms. The cost of a large multi-layer 'semi-underground' structure in a flood plain alone is considerable (although the proposal claims the car park structure would avoid the flood plain, the access arrangements would not). The OTB proposal expects construction costs to be in the order of £47 million for a 1,850 parking space scheme including new road access changes to the rail infrastructure and new platforms. Initial indications are that these costs are grossly underestimated even taking into account the

additional 35% that the OTB proposal suggests to cover contingency, fees and land acquisition costs. OTB indicate that a further £9 million plus fees and contingencies would be required to add 1,000 parking spaces.

### 3.4 Revenue

The proposal bases revenue on the parking rates for city centre car parks. However, Park and Ride in Bath and elsewhere is priced at a lower rate than parking at the destination so that the differential attracts users (which helps to overcome the penalty incurred by changing mode). It is stated that according to one rail service franchise bidder quoted by OTB, '3600 passengers per day is not a large number'<sup>4</sup> which is indeed the case for supporting a new rail station although it is a large number to assume for Park and Ride users. The assumption is that a four minute train journey would be attractive although this compares with a ten minute journey to the city centre by Park and Ride bus. Thus revenue, with unsubstantiated demand and high prices, is likely to have been exaggerated considerably. There is also a suggestion by OTB (p.57) that a bus-based Park and Ride could not be expanded should demand increase; initial layout designs by Mott MacDonald indicate that adequate space would in fact be available at some of the other sites being considered.

OTB assumes that approximately 1,850 parking spaces would be provided initially, supplemented by a further 1,000 as a second phase. The revenue forecast assumes 80% occupancy of the car park but with some cars having more than one occupant, a total of 2,362 rail users per day equivalent to train fare revenue of £4,488 per day in addition to £11,141 per day revenue from car parking<sup>5</sup>. With a larger car park, 3,639 train users would generate daily revenue of £6,914 and parking revenue of £18,257, excluding any additional journeys to Bristol and other destinations beyond Bath Spa. This assumes that parking charges and train fare cost each user, on average, £6.61 (£6.91 with a larger car park) suggesting that Park and Ride would be an unattractive option. This represents a Park and Ride option that is much more costly to users than any bus-based scheme, particularly those for which there is no parking charge. For users parking for eight hours, the cost per user rises to £11.00. The forecasts for revenue could be regarded as unrealistic when compared with the other travel options available.

It should be expected that annual revenue exceeds annual operating costs for a business case to be plausible. The operating costs need to include the maintenance costs of the facility, enforcement of parking payments and the operation of the Park and Ride service, in this case a new rail station (for which a train operator would require revenue to exceed operating costs and to pay a leasing charge to Network Rail). For a parking operator to be involved, revenue would need to exceed the operating costs of the car park, particularly if it is expected that a contribution be made towards construction costs.

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<sup>4</sup> OTB (2013) paragraph 5.3.1.

<sup>5</sup> OTB (2013) section 13.6 (Tables 13.4 and 13.5).

The suggestion by OTB that the Council enters a Project Finance Initiative with a private partner opens the authority to demand risk while the private partner is dependent on the revenue generated, an unenviable position for a public authority.

## 4 Conclusions

### 4.1 Option Selection

A defined process requires the consideration of a number of options in response to a clear set of problems and objectives. The OTB proposal is a solution ostensibly addressing problems but failing to consider other possibilities in any detail. This becomes apparent when other Park and Ride options are considered, particularly if these incur much lower construction costs. As has been recognized, detaching a possible road scheme from the Park and Ride scheme is desirable in terms of alignment, impacts, planning processes and timescales.

### 4.2 Deliverability Problems

The OTB proposal is not considered to be deliverable by Network Rail. Even with amendment such as the creation of a straight section of railway on the Trowbridge Line curve, the engineering problems associated with the rail infrastructure elements of the scheme cannot be overcome reasonably (notably relocation of Bathampton Junction). In addition, the operational impact of the scheme is such that sufficient disruption to train services would be caused, Network Rail would be unlikely to support the scheme. Even if a rail-based facility could be provided based on established train services, there is unlikely to be sufficient capacity on Trowbridge Line trains to accommodate any additional future users.

The requirement to move Bathampton Junction to accommodate changes to the rail alignment is untenable given the retention of Mill Lane Bridge due to its supporting piers and the location of the new transformer. In any event, the hope expressed by OTB that a scheme would be sufficiently advanced for implementation in conjunction with the GWML upgrade has been superseded by the recent upgrade works. Regarding a new road link between the A4 and the A36, engineering feasibility work has been undertaken that demonstrates the very significant impacts of a road that commences from the suggested Park and Ride access. The topography, particularly the severe and prolonged gradient rising to the A36, presents major difficulties and it is very unlikely that a new road link would adopt this alignment; other options continue to be explored.

### 4.3 Business Case Deficiencies

The demand for the OTB Park and Ride scheme is unsubstantiated and is likely to have been over-estimated, as has the revenue forecast. For the stated construction costs, there is doubt over their reliability and hence the business case is unlikely to be sufficiently attractive to secure funding from DfT or any other agency. Creating an access to the A4 Bathampton Bypass alone would incur considerable problems and greater cost than that indicated.

In addition, now that GWML upgrade works are nearing completion, Network Rail is of the view that a scheme promoter would need to fund all works required to the railway to facilitate the scheme i.e. at much

greater cost than if they had been undertaken during the upgrade. This means that the actual construction cost would be very much higher than that already stated (especially if construction cost inflation is included). Mill Lane Bridge would remain however. Relocating the newly installed transformer alone would also present practical problems and significant cost, a move that would not be supported by Network Rail. In effect this means that the proposal cannot be delivered under any circumstances. Other possible locations for new platforms that are less disruptive have been investigated and one of the possible Park and Ride sites has the potential, in the longer term, to be linked to a new station.

The Halcrow report noted that ‘... we would question [the proposal’s] affordability and the overall business case given the very high capital cost involved. We would furthermore challenge the assertion that a [multi-storey car park] of this size and the adjoining interchange could be accommodated here without significant visual and landscape impact.’ (paragraph 11.1.6). In our view, not only are the quoted costs unlikely to contribute towards a convincing business case but the substantially increased costs associated with the scheme after the GWML upgrade would result in a strongly negative case.