

## NOTE ON TRAIN SERVICE TIMETABLE PLANNING

Transport and Works Act 1992

Transport and Works (Applications and Objections Procedure) (England and Wales)

Rules 2006

### 1. Introduction

- 1.1 On Wednesday 10th November 2010, Mr Conway, on behalf of ENGAGE (OBJ297), cross-examined Mr Barker and Mr Dare and asked a number of questions in relation to the proposed train service and how the timetable had been constructed. Mr Conway's questions centred on the suggestion that the journey times previously publicised by Chiltern Railways (58 minutes to Water Eaton Parkway and 66 minutes to Oxford (both from London Marylebone)) meant that the proposed line speed of up to 75mph between Water Eaton Parkway and Oxford cannot be justified.
- 1.2 This note seeks to respond, in more detail than was possible on 10<sup>th</sup> November 2010, to Mr Conway's questioning and sets out some of the background to the timetabling process for the benefit of the Inspector and responds to the matter reference as 6/2 on the Inspector's Document X/8/3.
- 1.3 This note is accompanied, in Appendix 1, by a diagram of the proposed layout of the railway on completion of Phase 1. This shows the relative location of junctions, stations and other features and will aid the understanding of the detail of this note.
- 1.4 (A separate series of diagrams is in preparation to show speed limits and junction locations relative to features external to the railway).

### 2. Franchise agreement with the DfT

- 2.1 The Deed of Amendment to the Franchise Agreement between Chiltern Railways and the Department for Transport, dated 6<sup>th</sup> January 2010 (CD/2.13), was drafted on the basis of the reconstructed railway between Bicester and Oxford providing for services proposed by Chiltern Railways and taking into account future use of the route by services arising as a result of the East West Rail Link project (including any freight traffic that might materialise as a result of the link between Oxford and Bletchley being restored to use). In order to facilitate the envisaged services, the Deed of Amendment to the Franchise Agreement requires a 70mph speed limit between Peartree Junction and Woodstock Road Junction and a 75mph limit between Woodstock Road Junction and the approach to Oxford station. A lower speed limit would thus result in a breach of the franchise agreement.

### 3. Railway speed limits and running times

- 3.1 The “maximum permissible speed” (sometimes referred to as the “line speed”) on a section of railway is, as the name suggests, the maximum speed at which trains are allowed to operate over a section of line. On occasions there may be different line speeds for different types of train, e.g. freight and passenger.
- 3.2 Line speed limits are an engineering decision, based on:
- The geometry of the line, and particularly junctions and curvature.
  - The type of signalling system used, the signal sighting distances and the required stopping distances for each category of train permitted to use the line.
  - The condition of the infrastructure (track, bridges, earthworks) and the maintenance regime to which it is subjected.
  - The speeds that can be attained by the fastest trains using the line, including non-stop services.
- 3.3 Line speeds have always been set by the railway authorities and are not subject to approval or control by the planning authority or other external bodies.
- 3.4 Line speeds are defined at a granularity of 5mph so, for example, if all of the relevant factors indicated a maximum speed of 88mph, it would be rounded down to 85mph.
- 3.5 Information regarding line speeds is communicated to train drivers by means of signage at points where line speeds change (similar to highway speed limit signage) and through operating publications (such as the “Sectional Appendix”, which uses a series of diagrams to describe certain characteristics, including line speed, of the railway). In addition, Chiltern Railways employs Automatic Train Protection (ATP)<sup>1</sup>, which advises drivers of any change of line speed ahead and, if necessary, intervenes to ensure that the train does not exceed the relevant speed.
- 3.6 It should be noted that when entering a section of line with a higher speed limit, the driver can only begin to accelerate when the last vehicle in the train has passed the speed limit sign; on a lengthy train this can take some time.
- 3.7 In order to avoid the risk of overwhelming drivers with information, it is desirable to limit the number of changes of line speed to that necessary for the safe operation of the railway.
- 3.8 The proposed line speeds for passenger trains, between Peartree Junction and Woodstock Road Junction (70mph), and between Woodstock Road Junction and the approach to Oxford station (75mph), take into account the factors described above.
- 3.9 The timetabled running time between any two stations is an operating and commercial decision. It is based on the performance (acceleration, maximum speed and braking) of the type of rolling stock used on that particular service, plus any standard recovery times, plus any other time inserted for commercial purposes – e.g. to enable a standard timetable pattern, even though some trains are capable of higher speeds than others. Timetabled running times are also rounded up to the nearest minute, this being the format of the public timetable.
- 3.10 The timetabled running time will thus normally be greater than that time taken to traverse the line at the line speed limit.

#### **4. Train planning and timetabling terminology**

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<sup>1</sup> A brief overview of the ATP system is given at paragraphs 6.16 to 6.18 of CRCL/P/6/A.

### ***Concept of a "standard hour"***

- 4.1 The construction of a timetable often starts with the formulation of a "standard hour" timetable. The "standard hour" is a repeating pattern of train times whereby trains are scheduled to run at the same minutes past each hour. It is representative of the service that would operate in the majority of hours of the operating day. The remainder of the timetable is then built around this repeating pattern. A "standard hour" is often used for the iteration of train service reliability modelling and the development of infrastructure specifications.
- 4.2 In the case of the proposed Marylebone – Oxford service, it is intended that a standard hour service will operate throughout the day, apart from early morning and late evening.

### ***Recovery time and allowances***

- 4.3 Additional time is often inserted into timetables for operating reasons (for example, to ensure trains arrive at junctions at the correct time to avoid conflict with other services) and to account for foreseeable delays (such as speed restrictions due to planned engineering works). A number of terms are used to describe the various types of allowance but they are commonly collectively described as "recovery time" or "recovery allowance".

### ***Turnaround time***

- 4.4 The "turnaround" is the time between trains arriving at and departing from a terminus. Minimum turnarounds are usually specified by Network Rail and these take account of the characteristics of the route and the services using it as well as the type of rolling stock to be used. The robust minimum for an interurban route such as London-Oxford is regarded as 20% of end-to-end journey time, which, for a 66 minute journey time, equates to around 13 minutes. The turnaround allows for train cleaning, the driver changing ends<sup>2</sup> and as a buffer to prevent late arrival affecting the return journey<sup>3</sup>.

### ***Dwell time***

- 4.5 Dwell time is the time a train spends at an intermediate station. Minimum dwell times are often specified by Network Rail and these take account of the same factors that influence turnaround time. They also take account of the numbers of passengers likely to be boarding and alighting at a particular station. In the case of Water Eaton Parkway, 1 minute is an appropriate dwell time given that this will be the busiest station on the route.

### ***Sectional Running Time (SRT)***

- 4.6 The sectional running time is the time taken for a train of a particular type to travel between two points; it does not include any recovery allowances or similar. Different SRTs are used for stopping and non-stopping services.

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<sup>2</sup> i.e. shutting down one cab, walking to the other end of the train, "opening up" (i.e. switching on) the other cab and carrying out the necessary safety and other checks.

<sup>3</sup> This is distinct from the "performance allowance" which is intended to accommodate delays that might reasonably be expected to routinely occur. The turnaround provides a buffer against unexpected delays.

**5. Proposed Marylebone – Oxford timetable**

5.1 Timetable development to date has been based around the standard hour shown below.

5.2 The timetable allows, in the Oxford-bound direction, for 7 minutes of which 2 minutes are recovery time for the (approximately) 3½ miles from Water Eaton Parkway to Oxford. In the London-bound direction 6 minutes are allowed of which 1 minute is recovery time. The 5 minutes of running time equates to an average speed of 42mph. This is consistent with a train attaining a maximum speed of 75mph, albeit briefly, taking account of:

- the time taken to accelerate and brake,
- the proposed 25mph speed restriction on the final approach to Oxford station
- the cautious approach that drivers are required to adopt on the approach to the terminal platforms at Oxford.

Marylebone	dep.	12:00	12:30
<i>engineering allowance</i>		[2]	[2]
Water Eaton Parkway	arr.	12:58	13:28
	dep.	12:59	13:29
<i>engineering allowance</i>		[1]	[1]
<i>performance allowance</i>		[1]	[1]
Oxford	arr.	13:06	13:36
<i>turnaround</i>		(14)	(14)
Oxford	dep.	13:20	13:50
<i>engineering allowance</i>		[1]	[1]
Water Eaton Parkway	arr.	13:26	13:56
	dep.	13:27	13:57
<i>engineering allowance</i>		[2]	[2]
<i>performance allowance</i>		[1]	[1]
Marylebone	arr.	14:26	14:56

**6. The need for a robust timetable**

6.1 Railway performance is measured by the “Public Performance Measure” (PPM) which quantifies punctuality and reliability, for all services 7 days a week. Chiltern Railways’ franchise agreement with the DfT requires a PPM of 93.75%. In addition Chiltern’s “Joint Performance Improvement Plan” agreement with Network Rail obliges a PPM of 96.0% by 2014, which in turn forms part of Network Rail’s agreements with the

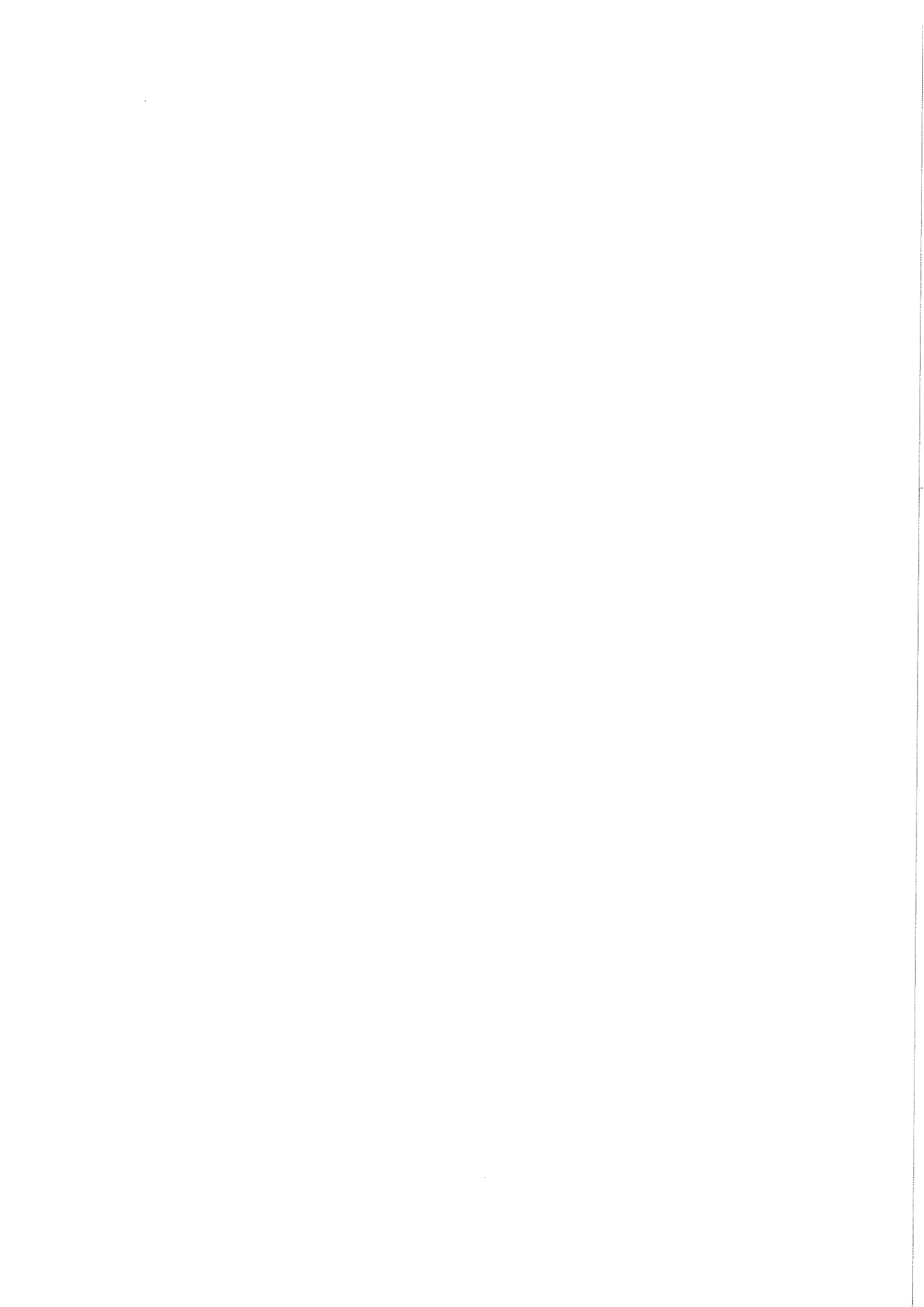
Department for Transport and the Office of Rail Regulation. Chiltern's PPM for 2009-10 was 95.2% compared to an industry average of 91.5%.

- 6.2 Failure to meet the required PPM figure would result in a breach of contract, with financial penalties and the possible loss of the franchise. Poor punctuality also has adverse impacts on passengers (who will be concerned with arrival times at intermediate stations as well as at the final destination), and upon the efficient use of train crews, rolling stock and line capacity.
- 6.3 It is therefore essential that the infrastructure and speed limits on the Oxford line permit the operation of a "robust" timetable that has sufficient margins for out-of-course events to enable these PPM requirements to be met.

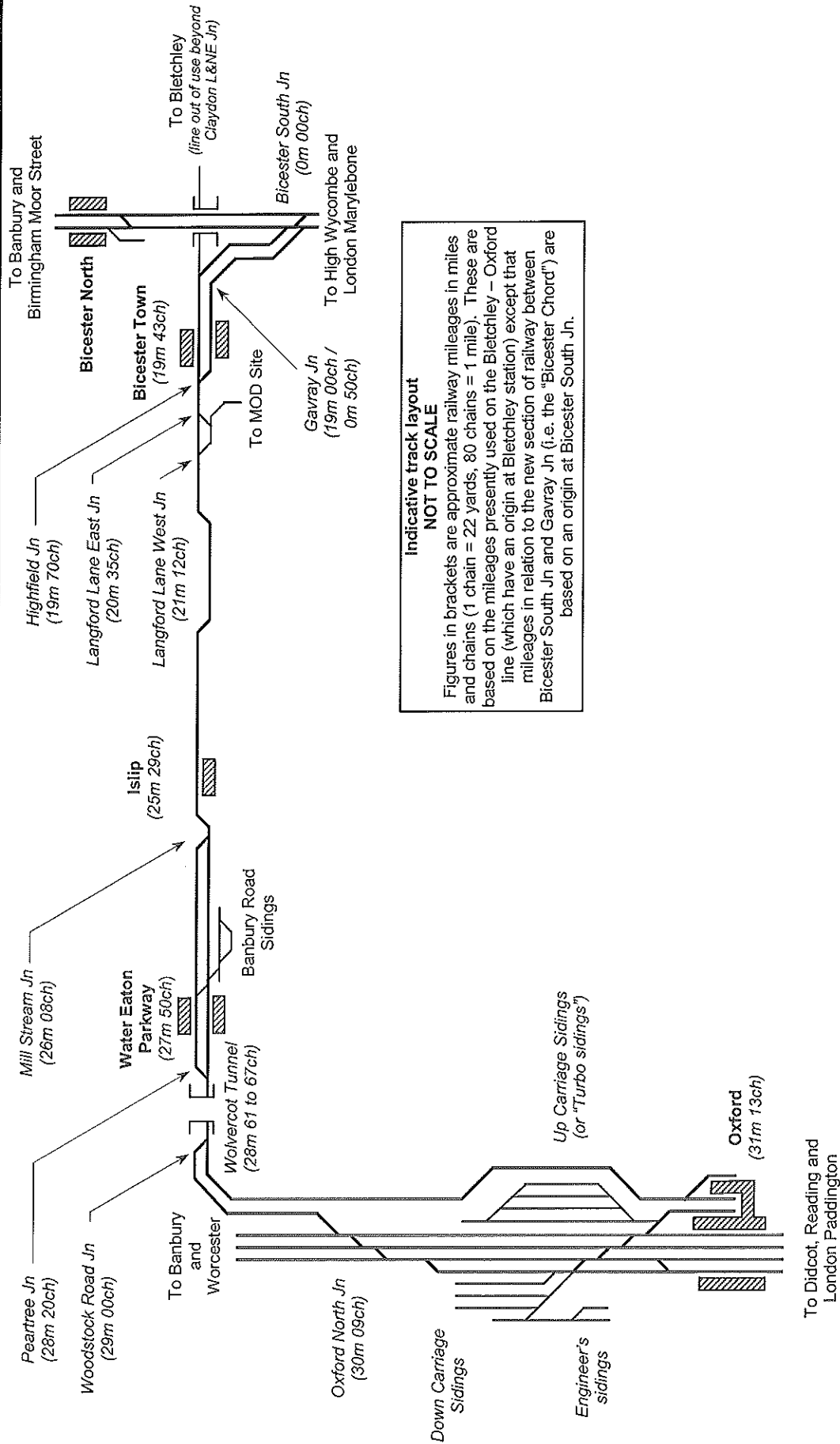
## **7. Timetabling constraints**

- 7.1 In the case of the proposed Marylebone – Oxford service, the following constraints influence the timetable:
- (i) Departure and arrival times at Marylebone are driven by the overall timetable structure for the Marylebone-High Wycombe-Bicester-Birmingham Moor Street line; this is particularly important at Neasden Junction (where the Marylebone-Aylesbury line diverges) and at Bicester South Junction (where the Oxford line joins Chiltern's main line to and from Birmingham). Because of this, the eventual timetable may differ from that shown, although the interval between trains will be the same.
  - (ii) The rolling stock used on the Oxford trains needs to inter-work with that used for the London-Birmingham services (e.g. a train from Oxford to London may then depart from London to Birmingham),
  - (iii) There are two single line sections - between milepost Highfield Junction (southwest of Bicester at mileage 19m 70ch) and Millstream Junction (southwest of Islip at mileage 26m 08ch); and between milepost Peartree Junction (north of Wolvercote at mileage 28m 20ch) and Oxford station (at mileage 31m 13ch). These sections cannot be used by trains travelling in opposite directions at the same time, and a robust timetable requires a sufficient margin between a train leaving the single line, and another train entering it.
  - (iv) The 25mph speed restriction between mileage 30m 65ch and Oxford station.
  - (v) The need to accommodate freight trains and future EWR services, particularly at Woodstock Road Junction, where these will enter/leave the Bicester line.
  - (vi) The need to be able to "flex" the timetable to meet future circumstances. This is both industry good practice and a contractual requirement in train operators' track access agreements with Network Rail.
- 7.2 These constraints each limit, to a lesser or greater extent, the times at which trains arrive and depart certain stations and the timing of one train relative to another.
- 7.3 These factors have been taken into account in developing the proposed train service timetable and the infrastructure scope of the Order scheme.

*Stephen Barker / Allan Dare*  
*19<sup>th</sup> November 2010*



# CRCL/INQ/28 - Appendix 1: Proposed Phase 1 Track Layout



**Indicative track layout  
NOT TO SCALE**

Figures in brackets are approximate railway mileages in miles and chains (1 chain = 22 yards, 80 chains = 1 mile). These are based on the mileages presently used on the Bletchley - Oxford line (which have an origin at Bletchley station) except that mileages in relation to the new section of railway between Bicester South Jn and Gavray Jn (i.e. the "Bicester Chord") are based on an origin at Bicester South Jn.

— Lines used by passenger trains      — Sidings and freight lines      ▨ Station platform

