Heathrow Airtrack

# Transport and Works Act 1992

THE HEATHROW AIRTRACK ORDER

## ENVIRONMENTAL STATEMENT

## VOLUME 2
## EFFECTS AT LEVEL CROSSINGS

## 2009

# HEATHROW AIRTRACK

# ENVIRONMENTAL STATEMENT

# VOLUME 2

# EFFECTS AT ROAD LEVEL CROSSINGS

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# Heathrow Airtrack Environmental Statement

## Volume 2: Effects at Road Level Crossings

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# EXPLANATORY NOTE

This report on environmental effects at level crossings is a component of the Environmental Statement (ES) that has been prepared to accompany the Transport and Works Act Order Application for Heathrow Airtrack ('Airtrack'), the new railway linking Heathrow's Terminal 5 and the suburban rail network to the south and west of the airport. The ES reports the findings of an Environmental Impact Assessment (EIA) of the Scheme and has been prepared in accordance with the Transport and Works Act Application Rules[1].

This volume to the ES has been prepared by Temple Group Limited for Heathrow Airports Limited (HAL). It is Volume 2 of 7 volumes, as listed below. In so far as it addresses traffic issues it is also supportive of *ES Volume 7, Transport Assessment*.

| | |
|---|---|
| Volume 1 | **ES Main Report**, which reports the findings of the EIA |
| Volume 2 | **Effects at Road Level Crossings**, which describes the findings of a study of the effects of Airtrack at level crossings |
| Volume 3 | **Plans**, which provides photomontages and a set of A3 plans illustrating the design |
| Volume 4 | **Scope and Methodology Report**, which sets out the coverage of the EIA and the methods used to assess each environmental topic |
| Volume 5 | **General Appendices**, which includes a range of supporting information |
| Volume 6 | **Transport Assessment**, which sets out the findings of the transport impact assessment |
| Volume 7 | **Flood Risk and Drainage**, which includes a Flood Risk Assessment and Drainage Strategy |

A **Non-Technical Summary** of the ES has also been prepared.

It is important to note that the TWA Order, if granted by the Secretary of State, does not confer powers to operate the Airtrack service on the existing rail network. Use of the train pathways on this existing network is a matter for Network Rail and the train operating company (currently South West Trains). However, the effects of Airtrack's use of these pathways are included in the ES in order to provide full coverage of the environmental effects of the Scheme.

[1] TW (Applications and Objections Procedure)(England and Wales) Rules 2006 (SI2006/1466)

# ABBREVIATIONS

| | |
|---|---|
| AADT | Average Annual Daily Traffic (total volume of vehicle traffic of a highway or road for a year divided by 365 days) |
| AOD | Above Ordnance Datum – basically height above sea level |
| AQMA | Air Quality Management Area |
| COPA | Control of Pollution Act 1974 |
| DMRB | Design Manual for Roads and Bridges |
| DfT | Department for Transport |
| EIA | Environmental Impact Assessment |
| ES | Environmental Statement |
| EWC | European Waste Catalogue |
| HAL | Heathrow Airport Limited |
| HEx | Heathrow Express trains |
| HDV | Heavy duty vehicle |
| $L_{Aeq}$ | The level of a hypothetical steady sound, which over a measurement period contains the same sound energy as a fluctuating sound. Formally adopted by the UK Government as an indicator of the likely degree of long-term average public annoyance |
| LAQM | Local Air Quality Management |
| LAQM.TG | Local Air Quality Management Technical Guidance |
| $L_{den}$ | $L_{den}$ is the 24-hr $L_{Aeq}$ calculated for an annual period, but with a 5 dB weighting for evening and a 10 dB weighting for night |
| NAEI | National Atmospheric Emissions Inventory |
| NAQO | National air quality objective |
| $NO_2$ | Nitrogen dioxide |
| $NO_X$ | Nitrogen oxides |
| NRTF | National Road Traffic Forecasting |
| ONS | Office for National Statistics |
| $PM_{10}$ | Particles measuring 10µm or less |
| SBC | Spelthorne Borough Council |
| SCC | Surrey County Council |
| SRA | Strategic Rail Authority |
| SWT | South West Trains |
| T5 | Heathrow Airport Terminal Five |
| TfL | Transport for London |
| Tph | Trains per hour |

# 1. INTRODUCTION

## 1.1. Overview

1.1.1. Although there are no railway works for Airtrack in their vicinity, Airtrack services will pass across a total of fifteen road level crossings. A schematic of the Airtrack service area, locations of connected stations and affected level crossings is provided in **Figure 1.1**. A study of the potential effects of Airtrack trains on the operation of these level crossings has been undertaken. This adds to the coverage of environmental effects addressed in *ES Volume 1* for the built elements of the scheme. By way of context, were existing services to be increased to use the paths that Airtrack plans to use, this could be achieved without the need for additional powers.

1.1.2. The key effects of the additional trains will result from changes in 'barrier down time' at each of the level crossings. Barrier down time is described both in terms of the duration of each barrier down episode and as a proportion of an average daytime hour when the barrier is closed. The assessment of barrier down time has been produced using a model developed by Network Rail based on the current SWT timetable (pre-Airtrack) and a development Airtrack timetable (post-Airtrack).

1.1.3. The environmental effects of changes in barrier down time will almost all stem from their impact on traffic movement at the crossings, some of which already experience traffic queues and congestion when the crossing is closed to traffic. The direct effects comprise additional delays for users of the crossings including drivers and vehicle passengers, cyclists and pedestrians. Related to these direct effects will be indirect effects on the operation of the local highway network where:

- additional delays at level crossings and resulting queues have implications for the free flow of traffic and the safe and efficient operation of nearby junctions; and
- drivers opt to use alternative routes to avoid delay so imposing new pressures on other parts of the network.

1.1.4. These direct and indirect traffic and access effects will potentially affect businesses, local shops, and community services, inconveniencing those requiring timely access to such facilities (such as schools), and compromising the efficient operation of commercial operations where their use is discouraged by access problems. Importantly, they could potentially affect time-critical traffic movements, such as access to, or by emergency services.

1.1.5. Equally, changes in traffic behaviour and characteristics at crossings and on local roads may affect local air quality.

## 1.2. Scoped out Environmental Issues

### General

1.2.1. As stated above, environmental effects at level crossings all stem from the impacts on the movement of vehicles across them. For this reason, no assessment on environmental resources (ecology, water, contamination and archaeology) is considered relevant. Arguably, more frequent or longer traffic queues could affect the townscape or landscape character of affected areas, especially where these have particular historical or cultural resources. These could in turn affect the visual amenity of people along the affected routes. But, since traffic is already a component of the baseline environment, any such changes are not considered likely to result in any significant additional impact.

### Noise and Vibration

1.2.2. Impacts from noise in respect of changes in the number and frequency of trains due to Airtrack, has been addressed in *ES Volume 1, Chapter 13*. Noise and vibration will also derive from vehicles at the level crossings. Changes to level crossing barrier closure times may result in:

- increased delays to traffic at level crossings and associated road network with consequent changes in traffic characteristic resulting in changes in noise levels;
- a reduction in the average speed of traffic passing through the level crossing; and
- diversion of traffic onto alternative routes with increased traffic flows giving rise to increased noise levels.

1.2.3. The impacts in terms of both delays at level crossings and diversions onto alternative routes are addressed for each level crossing. However, there are no instances (cases) where the change in flow on alternative routes is expected to increase by 25% as a result of increased barrier down-time, which is the DMRB trigger for even a minor noise impact and therefore no significant noise effect is likely. Correspondingly, although noise levels may change as a consequence of changes in traffic characteristics at level crossings, these changes are not in themselves likely to be significant.

1.2.4. Noise measurements at a sample crossing (Thorpe Road, Staines) to compare the noise of slow moving, stationary and stop-start traffic with free-flowing traffic have been carried out and suggest that the noise from slow moving or stationary traffic i.e. “barrier down” is marginally lower compared with the “barrier up” scenario with free flowing traffic. Noise is not, therefore, considered further here.

## 1.3. Consultation

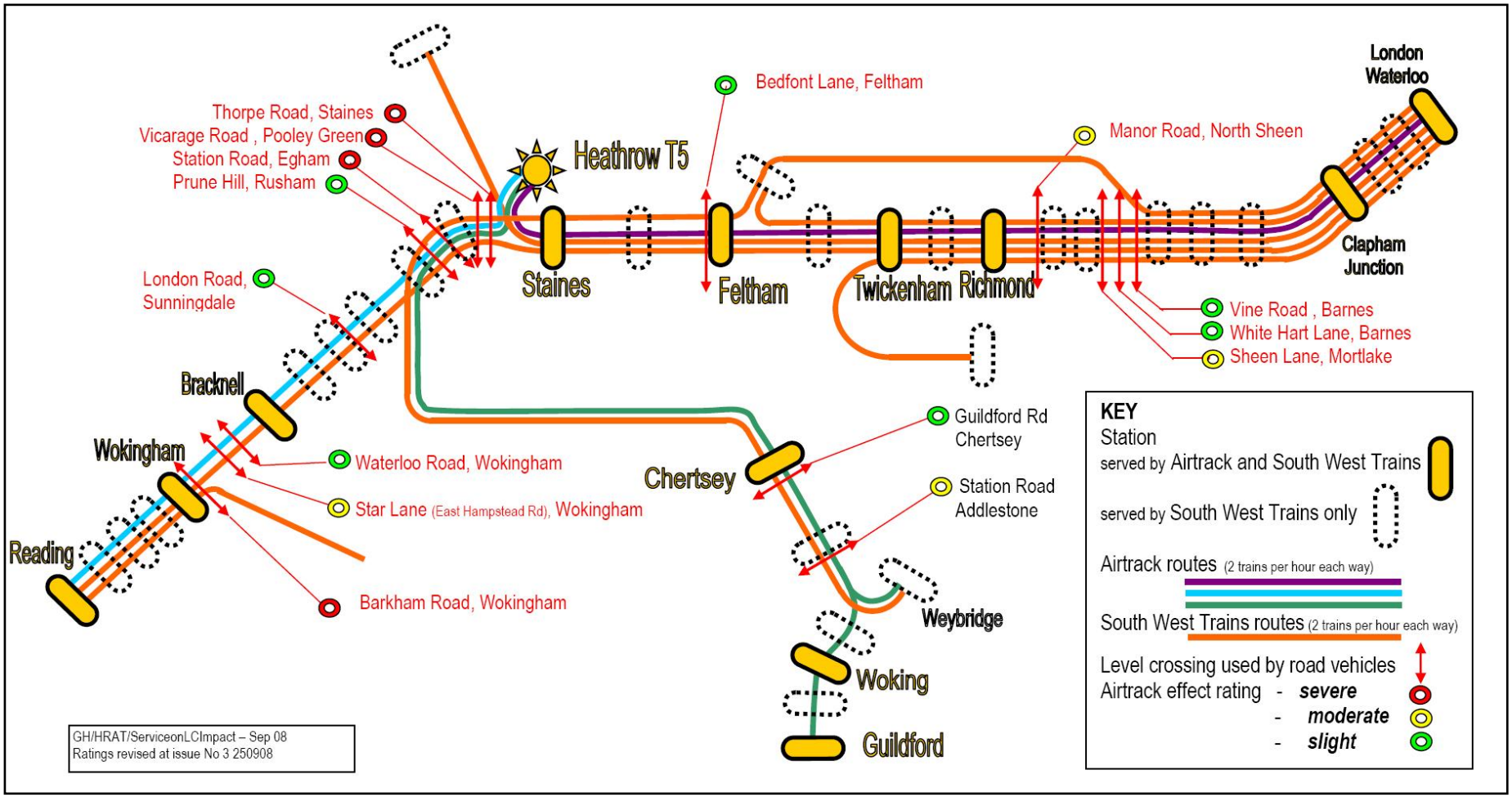
1.3.1. Consultation has been a fundamental part of the development of the Scheme to date and has also, specifically, been undertaken in relation to the EIA. HAL and its project team have undertaken a range of consultation with local interest groups, affected parties and statutory and non-statutory consultees on an individual basis. In addition two rounds of public consultation were undertaken. This is described in *ES Volume 1, s.1.4.*

1.3.2. The second round of public consultation, between October and December 2008, expanded the consultation to provide people near the route, but away from the main work centres with information, particularly about level crossings and expected changes to the operation of these.

1.3.3. In addition, consultation has been undertaken with local authorities and emergency services in relation to effects at level crossings, including:

- London Borough of Hounslow.
- London Borough of Richmond upon Thames.
- Royal Borough of Windsor and Maidenhead.
- Runnymede Borough Council.
- Spelthorne Borough Council.
- Surrey County Council.
- Surrey Police Service.
- Surrey Fire Service.
- Surrey Ambulance Service.

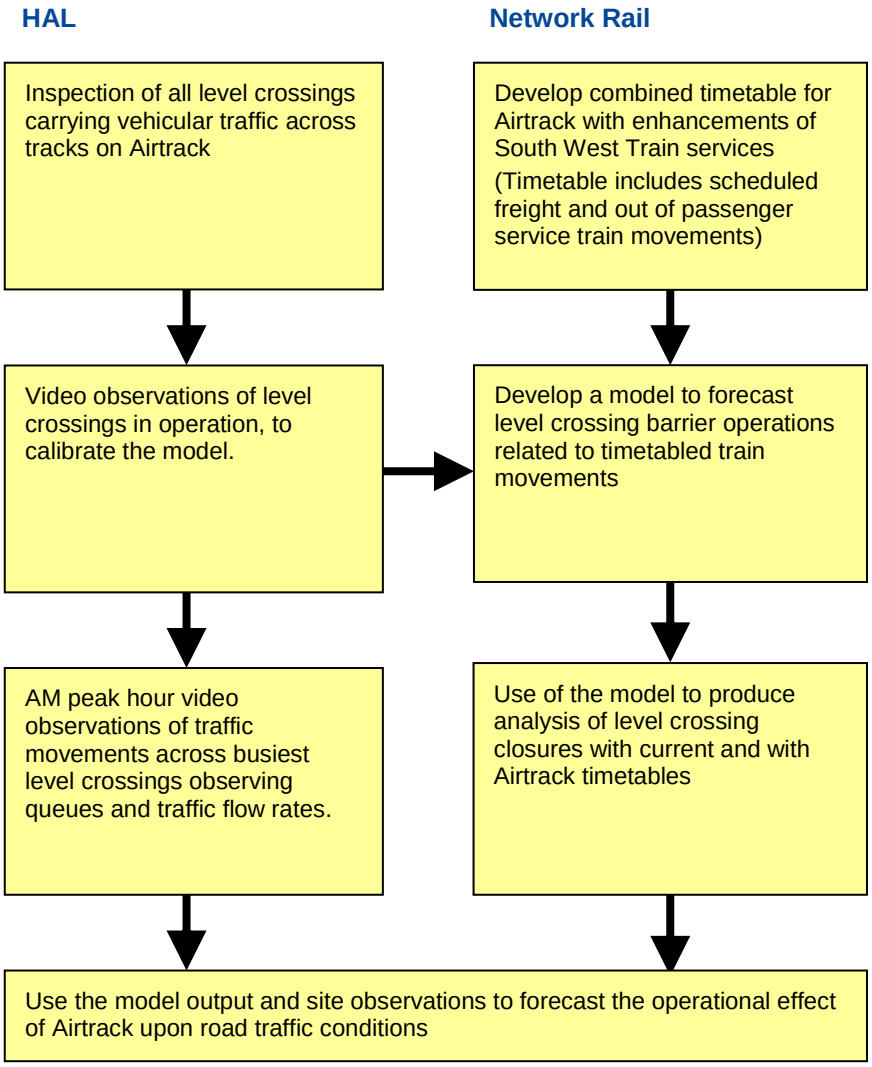
## Figure 1.1 Schematic of Network Affected by Airtrack



# 2. ASSESSMENT METHOD OVERVIEW

## 2.1. Barrier Downtime Effects

2.1.1. The assessment of impacts on barrier downtime used a Network Rail model, which, having been calibrated through site observations in mid 2008, was used to establish average barrier down time per hour over the period between 07:00 and 19:00. This information was coupled with an analysis of typical local traffic conditions on roads in the vicinity of the level crossings. The process is summarised below.




2.1.2. The following assumptions have been made in undertaking this assessment:

- All trains run according to schedule, as defined in the South West Trains timetable.
- Barriers will not reopen if, after the first train, the next train is expected within 30 seconds at a manually controlled barrier and within 10 seconds at an automatic barrier.
- The sample of observed time parameters from the HAL video surveys, when averaged, is generally representative of normal operations. It must be appreciated, however, that the sequence of barrier closure is initiated by the signalman in the course of his normal signalling duties and can be subject to variations.

2.1.3. In Spring 2009 additional survey work was carried out at the following level crossings to establish the traffic pattern response to level crossing barrier operations through an entire 12 – hour day (07:00 to 19:00):

- Thorpe Road, Staines;
- Vicarage Road, Pooley Green;
- Station Road Egham;
- Prune Hill, Rusham;
- Station Road, Addlestone; and
- London Road, Sunningdale.

2.1.4. There was also a desire to carry out similar surveys at White Hart Lane, Sheen Lane and Manor Road but this was not possible because there was a major utility works programme taking place up to the time of finalisation of this document which was causing road closures in this locality and diverting traffic away from normal railway crossings.

2.1.5. The 2009 survey provided a broader base of observed level crossing barrier timings enabling refinement of the forecast model. Throughout this report reference is made to 2008 or 2009 survey data as appropriate. It is intended to carry out 12 – hour surveys at the Barnes to Richmond level crossings in the second half of 2009 as soon as normal traffic patterns have re-established after completion of the sewer works programme.

## 2.2. Barrier and Traffic Effects

2.2.1. The significance or otherwise of effects in terms of traffic delay at level crossings is determined as follows, with any effect that is either **moderate or severe** deemed **significant.**

2.2.2. A severe effect will be where **all** of the following impacts occur:

- change in barrier open time of more than 30%;
- barrier downtime exceeds 50% of an average daytime hour; and
- traffic congestion and delay are likely to be noticeably exacerbated.

2.2.3. A moderate effect will be any effect not qualifying as severe where **two or more** of the following impacts occur:

- change in barrier open time of 16-30%;
- barrier downtime exceeds 50% of an average daytime hour; and
- traffic congestion and delay are likely to be noticeably exacerbated.

2.2.4. A slight effect will be any effect not qualifying as severe or moderate where **one or more** of the following impacts occur:

- change in barrier open time of 6-15%;
- barrier downtime exceeds 50% of an average daytime hour; and
- traffic congestion and delay are likely to be noticeably exacerbated.

2.2.5. Any effect less than this is deemed to be negligible.

## 2.3. Community Effects

2.3.1. The assessment focused on access to key facilities and services used on a daily basis by the local communities around those crossings with decreased barrier open time of 15% or more. Any loss of barrier open time less than this is not considered significant in terms of access and so is not considered further in terms of community impacts. Key facilities were differentiated as being of high, medium or low sensitivity on the basis of:

- their assumed relative importance to the community they serve; i.e. whether the facility is expected to be used by or provided to all, many, some or few within the community; and

- their relative dependency on timely access, with facilities categorised as primary, secondary and tertiary as shown in **Table 2-1**.

**Table 2-1 Classification of Relative Importance of Community Receptors**

| | |
|---|---|
| Primary | Those for which timely access is critical; these comprise emergency services including hospitals, health clinics and surgeries, and train stations |
| Secondary | Those for which timely access is highly desirable; these comprise:<br>• nurseries, schools and colleges;<br>• residential homes and care facilities;<br>• religious meeting places;<br>• scheduled entertainment venues e.g. cinemas and theatres |
| Tertiary | Those for which timely access is not essential; these include:<br>• shops;<br>• council offices;<br>• sports and recreational spaces, centres and facilities;<br>• social clubs; and,<br>• formal and other public open space. |

2.3.2. Generally, services of tertiary sensitivity have not been assessed unless they form part of an assemblage of other such facilities the combined importance of which is acknowledged.

2.3.3. The magnitude of impact on each facility was determined on the basis of the barrier open time impacts (as described previously) and the degree of severance that is considered likely. Potential severance was determined through map study and site survey rather than through any specific information on levels of use of the different facilities. Where alternatives are evident on either side of a crossing, potential severance is considered to be less.

2.3.4. The significance of effects is a product of both service sensitivity and the magnitude of impact. This was determined on the basis of professional judgement using the information described above, since no standard criteria that might otherwise be used are known to exist.

## 2.4. Highway Network Effects

2.4.1. Highway network effects have been assessed for each area, within which one or more level crossings will be affected by the Airtrack service. As well as taking account of the barrier and traffic effects, it has also considered:

- likely journey distance for each crossing - whether traffic is likely to be local (for which an alternative route would not be feasible) or of longer distance; and
- the availability of alternative routes which might be selected in order to avoid increased delays at crossings.

2.4.2. The assessment has used a qualitative approach based on observations of traffic movements in the area, coupled with the traffic count information used for the assessment of barrier and traffic effects.

## 2.5. Air Quality Effects

### Sources of Impact

2.5.1. The assessment addresses the impacts of principal pollutants associated with road traffic emissions that are of most concern to human health, namely nitrogen dioxide ($NO_2$) and fine particles less than ten microns in diameter ($PM_{10}$).

2.5.2. Guidance within the Highways Agency's (2007) Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA 207/07, states that roads with a potential for local air quality impacts are those that, *inter alia*, experience:

- changes in annual average daily traffic (AADT) flows of 1000 or more; or
- daily average speed changes of 10km/hr or more; or

- peak hour speed changes of 20km/hr or more.

2.5.3. Changes in barrier down-time may result in changes in average vehicle speed and consequently in local air quality effects. They will not, however, result in additional traffic.

2.5.4. Vehicle emissions vary according to vehicle speed with higher emissions associated with the higher and lower vehicle speeds. Higher vehicle emissions are also prevalent with congested driving conditions and with the stop-start conditions that occur at level crossings. The assessment has therefore focused on the impacts of changes in barrier open time on vehicle speed.

2.5.5. No account has been taken for driver behaviour within this assessment. It is likely that some drivers will switch off their engines while waiting at closed barriers and this would reduce potential increases in pollutants expected from slow moving and idling vehicles. However, it is assumed for this assessment that all engines remain idling

## Screening Stage 1: DMRB Emission Factored Criteria

2.5.6. Since changes in barrier down time will result in changes in vehicle speed rather than in changes in AADT flows, it is not appropriate to apply the DMRB 1000 AADT criteria directly to the level crossing scenario. Instead the assessment has considered changes in traffic movements based upon an emission *factored* 1000 AADT flow criterion as per DMRB. This has been used as a first stage, since representative vehicle speed data was not available for all 15 of the crossings and it was considered that it could provide a good indication of those crossings where a potential air quality effect was most likely to occur.

### Table 2-2 Traffic Movements at Level Crossings (Predicted from Recent Traffic Surveys)

| Level Crossing<br>Survey data gathered in 2008 unless otherwise stated | Two-way | | Current barrier down time (per ave daytime hr) | | Forecast barrier down time with Airtrack (per ave daytime hr) | | Number of stationary vehicles when barrier down (per day) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Current measured hourly flow | Predicted AADT | Minutes | % over hour | Minutes | % over hour | Current | Forecast | Difference |
| Vine Road, Barnes | 110 | 1520 | 00:41:40 | 70.0% | 00:40:40 | 68.3% | 1064 | 1038 | -26 |
| White Hart Lane, Barnes | 276 | 4900 | 00:40:20 | 67.2% | 00:41:00 | 68.3% | 3293 | 3347 | 54 |
| **Sheen Lane, Mortlake** | 682 | 8700 | 00:33:00 | 55.0% | 00:39:00 | 65.0% | 4785 | 5655 | 870 |
| **Manor Road, North Sheen** | 744 | 9600 | 00:32:40 | 54.3% | 00:39:00 | 65.0% | 5213 | 6240 | 1027 |
| Bedfont Lane, Feltham | 392* | 3300* | 00:36:00 | 60.0% | 00:37:00 | 61.7% | 1980 | 2036 | 56 |
| **Thorpe Road, Staines (Mar 2009)** | 836 | 8765 | 00:20:00 | 33.0% | 00:32:55 | 55.0% | 3048 | 4936 | 1888 |
| **Vicarage Road, Egham (Mar 2009)** | 942 | 11330 | 00:27:15 | 45.0% | 00:38:25 | 64.0% | 4849 | 6912 | 2063 |
| **Station Road, Egham (Mar 2009)** | 629 | 6430 | 00:20:40 | 34.0% | 00:33:30 | 56.3% | 2145 | 3491 | 1345 |
| Prune Hill, Rusham (Mar 2009) | 393 | 2800 | 00:08:30 | 17.2% | 00:12:25 | 23.3% | 482 | 652 | 171 |
| Guilford Road, Chertsey | 63 | 670 | 00:19:00 | 31.7% | 00:18:00 | 30.0% | 212 | 201 | -11 |
| **Station Road, Addlestone (Mar 2009)** | 952 | 11450 | 00:13:15 | 23.8% | 00:19:25 | 35.0% | 2725 | 4008 | 1283 |
| **London Road, Sunningdale (Mar 2009)** | 1332 | 16260 | 00:14:20 | 21.7% | 00:19:55 | 28.3% | 3528 | 4602 | 1074 |
| Waterloo Road, Wokingham | 186 | 3100 | 00:03:50 | 6.4% | 00:07:00 | 11.7% | 198 | 363 | 164 |
| **Easthampstead Rd, Wokingham** | 558 | 9300 | 00:13:05 | 21.8% | 00:23:50 | 39.7% | 2027 | 3692 | 1665 |
| **Barkham Road, Wokingham** | 547 | 7200 | 00:20:45 | 34.6% | 00:32:50 | 54.7% | 2491 | 3938 | 1447 |

* Note Bedfont Lane is one way southbound only

Identifies level crossings that have been identified from Screening Stage 1 (emission factored 1000 AADT DMRB Criteria) as having the potential to result in a significant air quality impact.

2.5.7. The equivalent emission factored 1000 AADT flow criterion for potential air quality impacts has been based on the equivalent *numbers* of vehicles (96% LDVs/4% HDVs) travelling at 5kph[2] that would equate, in pollutant emission terms, to 1000 vehicles travelling at 35kph, which is an assumed traffic speed when the barrier is open, although in practice at some crossings, other determinants will mean that the speed is less than this. The DMRB calculations have utilised the latest emission factors ($NO_x$) and vehicle fleet composition projections sourced from the National Atmospheric Emissions Inventory.

2.5.8. This DMRB exercise gives an equivalent emission factored 1000 AADT flow criterion of ~500 vehicles, meaning that where it is predicted that, during a single day, more than 500 vehicles are stationary (or travelling less than 5km/hr) that would otherwise be moving, a significant air quality effect has the potential to occur.

2.5.9. **Table 2-2** above shows predicted traffic effects and identifies those level crossings at which there is the potential for a significant air quality effect based on the criteria within Screening Stage 1.

## Screening Stage 2: Average Peak and Daily Speed Data

2.5.10. Average speed data was available for five of the nine crossings at which a potential for a significant air quality effect was identified at Screening Stage 1. For these, the DMRB criteria of 20km/hr (peak) and 10km/hr (daily) were used to determine with greater certainty whether there is a potential for local air quality impacts. These five included the two most heavily trafficked crossings (Station Road Addlestone and London Road Sunningdale) and so were considered to provide a good indicator in general terms of the likelihood of significant air quality impacts. **Table 2-3** illustrates the predicted changes in average speeds at these level crossings.

**Table 2-3 Predicted Changes in Average Speed at Level Crossings**

| Level Crossing | Daily Average Speed (km/hr) | | | Peak Hour Speed (km/hr) | | |
|---|---|---|---|---|---|---|
| | Without Airtrack | With Airtrack | Change | Without Airtrack | With Airtrack | Change |
| **Sheen Lane, Mortlake** | Data not available (*see s.2.1.3*) | | | | | |
| **Manor Road, North Sheen** | Data not available (*see s.2.1.3*) | | | | | |
| **Thorpe Road, Staines** | 34 | 26 | **-8** | 27 | 16 | **-11** |
| **Vicarage Road, Egham** | 28 | 20 | **-8** | 16 | 9 | **-7** |
| **Station Road, Egham** | 32 | 30 | **-2** | 19 | 12 | **-7** |
| **Station Road, Addlestone** | 35 | 31 | **-4** | 35 | 31 | **-4** |
| **London Road, Sunningdale** | 38 | 34 | **-4** | 29 | 26 | **-3** |
| **Easthampstead Rd, Wokingham** | Data not available | | | | | |
| **Barkham Road, Wokingham** | Data not available | | | | | |

2.5.11. From this data it is evident that predicted changes in daily average speeds (**Table 2-3**) are approaching, but do not meet the DMRB criterion of 10km/hr. Changes in average peak hour speed are all well below the 20km/hr criterion.

2.5.12. Nonetheless it was considered prudent to model air quality impacts at the three crossings that were closest to breaching the DMRB speed change thresholds. The level crossing scenarios at Thorpe Road, Vicarage Road and Station Road (Egham) were, therefore, subject to more detailed air quality modelling to further consider likely effects of the additional crossings closures.

## Screening Stage 3: Detailed Dispersion Model

2.5.13. This stage involves predicting the changes in pollutant concentrations at the level crossings with the highest daily average speed changes due to Airtrack. It involved undertaking detailed

[2]In the absence of an emission rate for idling vehicles, 5kph is recommended (Defra (2009) Local Air Quality Management. Technical Guidance LAQM. TG (09) and National Atmospheric Emissions Inventory)

dispersion modelling at these locations in order to predict changes in $NO_2$ and $PM_{10}$ concentrations, both without and with the Scheme.

2.5.14. It was carried out using the advanced atmospheric dispersion model, Breeze Roads[3], which incorporates a method for estimating queue lengths and the contribution of emissions from idling vehicles.

2.5.15. The outputs from the model include predicted concentrations at given distances from the emissions source, which in this case is queuing traffic.

2.5.16. The significance of any predicted changes in pollutant concentrations has then been compared with criteria within DfT's Transport Analysis Guidance[4], which states that the change is considered significant if:

- The proposal leads to an increase in annual mean $PM_{10}$ levels at 20m from the road centre of at least 1µg/$m^3$;
- The proposal leads to an increase in annual mean $NO_2$ levels at 20m from the road centre of at least 2µg/$m^3$ and where concentrations are above the AQS $NO_2$ objective of 40µg/$m^3$.

2.5.17. The outcome of this third stage assessment is discussed in *Chapter 4* for each of the respective three crossings (Thorpe Road, Vicarage Road and Station Road in Egham) for which it was undertaken. However, in each case, predicted concentrations of both $NO_2$ and $PM_{10}$ were an order of magnitude below these significance thresholds. These crossings are amongst the worst in terms of traffic volume and would therefore be expected to be the worst in terms of air quality impact due to Airtrack. On this basis, it is highly unlikely that any air quality impacts will occur at these or any of the other crossings affected by the Scheme.

2.5.18. Further details on the detailed dispersion modelling are contained in **Annex A** to this Volume of the ES.

[3] BREEZE ROADS at www.breeze-software.com

[4] Department for Transport (2004) Transport Analysis Guidance (TAG) – Local Air Quality Sub-Objective TAG Unit 3.3.3.

# 3. RICHMOND

## 3.1. Introduction

3.1.1. In the London Borough of Richmond upon Thames, there are four level crossings that will be affected by Airtrack: on Vine Road and White Hart Lane in Barnes, on Sheen Lane in Mortlake and on Manor Road in North Sheen. These are illustrated in **Figure 3.1**.

## 3.2. Vine Road, Barnes

### Baseline Context for the Crossing

3.2.1. Vine Road is a quiet and narrow residential road leading to Barnes Common. Traffic flows are light, with observed[5] flows of 36 vehicles per hour (vph) northbound and 55vph southbound. Another level crossing on Vine Road, over the Barnes-Hounslow-Feltham loop line, is located 80m north of this one. Affecting different rail lines, the two crossings are independently controlled, so expectations of an open road are already quite low.

3.2.2. Vine Road connects A205 Upper Richmond Road to Station Road north of the railway. Station Road is also a narrow road and traffic is reduced to a single lane due to Barnes station user's parked cars. It is therefore not an attractive short cut between A205 and A306.

3.2.3. The A306 road bridge, less than 400m to the east, provides an alternative that avoids this crossing. The junction of A306 with A205 does not allow right-turning traffic from north to west. Instead this movement is required to turn left along Queens Ride and make a signal-controlled U-turn about 100m to the east. This diversion penalty is unlikely to be bad enough to cause drivers to seek the slow and usually obstructed Vine Road alternative.

3.2.4. No bus services have been identified that use Vine Road.

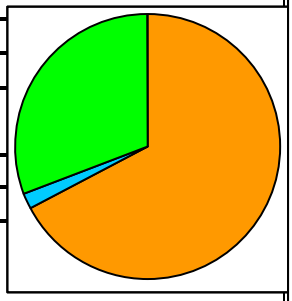
3.2.5. Sixteen in service passenger trains pass the crossing every hour during the day (eight in each direction), resulting in 9-10 closures and a total downtime of over 40 minutes in an average daytime hour.

### Barrier and Traffic Effects

3.2.6. The barrier assessment results for Vine Road, Barnes are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:42:00 | 9.6 |
| Post Airtrack | 0:41:00 | 9.7 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 70% |
| Extra Airtrack closure | -2% |
| Barrier open with Airtrack | 32% |
| Barrier open time lost | -5% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open | Maximum traffic / hour / per direction | Observed 2008 traffic per direction off peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 9.7 | 117 | 20 | 378 | 55 | 15% |

3.2.7. The revised timetable brought about by Airtrack's two additional trains per hour will optimise the two-way train crossings resulting in a reduced closure time per average daytime hour of 2% (an increase of 5% in overall barrier open time over an hour). This equates to about one minute less closure time per hour.

[5] Traffic observed at 13:00 on a weekday in September 2008

3.2.8. Although this barrier is already closed during the day for longer periods than it is open, the road capacity is able to accommodate the fairly low demand. Traffic released after a crossing closure will continue to dissipate to normal free-flow conditions well within the first minute of barrier open time, and well before the barrier is likely to close again.

3.2.9. Airtrack will bring about a marginal improvement, although this benefit is only slight, and is not significant.

### Community Effects

3.2.10. The marginal increase in barrier up time and its associated effects on access is considered highly unlikely to have any significant effects on community facilities and services.

### Air Quality Effects

3.2.11. Changes in barrier down time are predicted to result in an equivalent emission factored '1000 AADT flow' criterion of -26, meaning that during the day 26 fewer vehicles are likely to be stationary than would be in the absence of Airtrack. This level crossing has therefore been scoped out at Screening Stage 1 and is considered negligible in terms of air quality impacts, despite its situation within a designated air quality management area.

## 3.3. White Hart Lane, Barnes

### Baseline Context for the Crossing

3.3.1. White Hart Lane is a predominantly residential road with some small retail businesses, linking Upper Richmond Road to Mortlake High Street. It serves mainly as a local access route for linking housing north and south of the railway. The crossing is particularly well used by pedestrians due to the proximity of schools to the north. Footways are of limited width and become heavily congested at school start and end times with resulting vehicle conflicts when the barriers reopen.

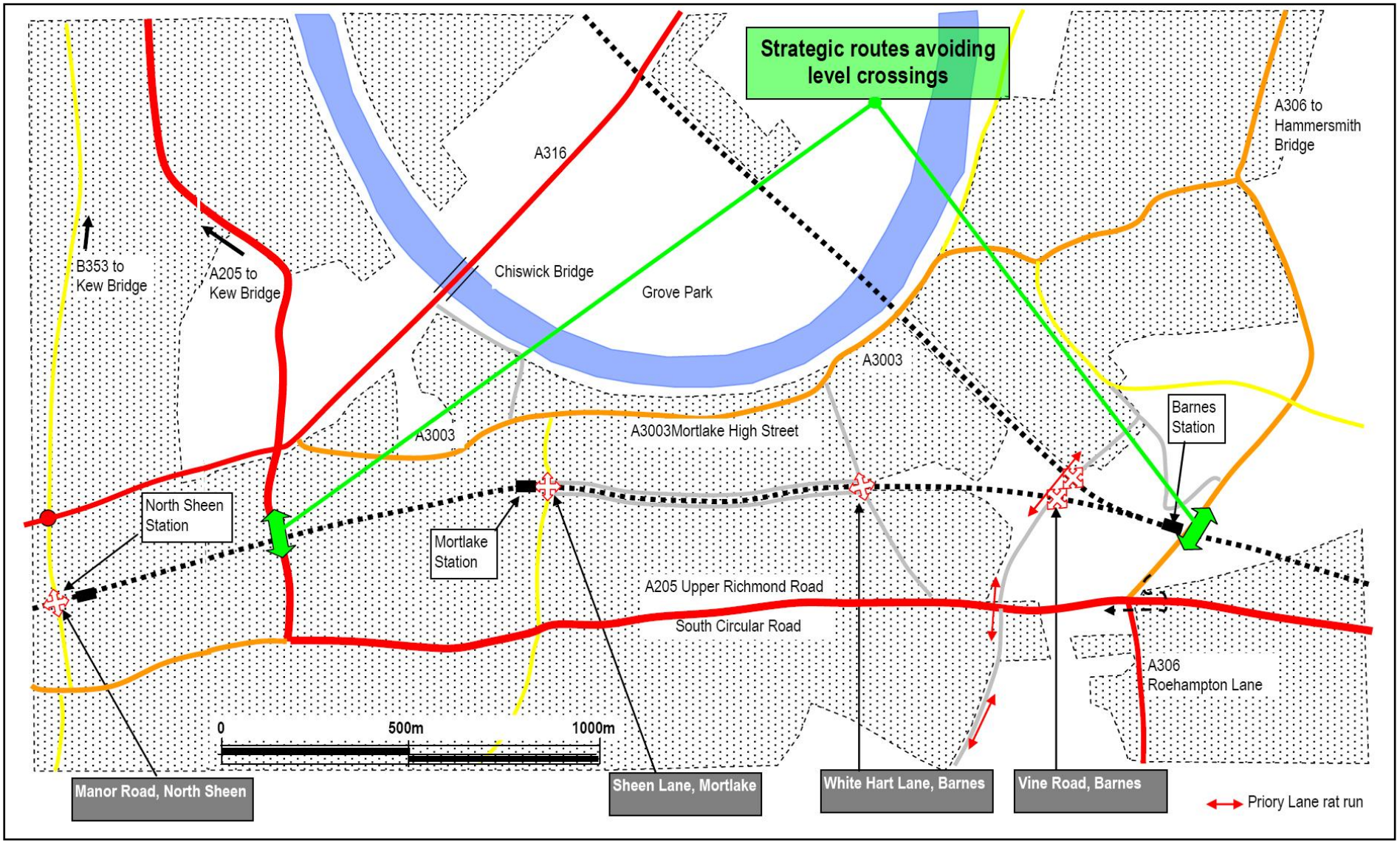
3.3.2. No bus services have been identified that use White Hart Lane

3.3.3. **Figure 3.1** illustrates that, for trips with a local origin or destination, the alternative route to a railway bridge involves a lengthy diversion. The road may, therefore, offer some potential to provide a 'rat run' towards the Thames bridges. Traffic flows are considered to be light, with observed[6] flows of 87vph northbound and 138vph southbound.

3.3.4. Sixteen in service passenger trains pass the crossing every hour during the day (eight in each direction), resulting in some 9 to 10 closures and a total downtime of over 40 minutes in an average daytime hour. Queues build up in both directions during barrier closures, which can become long during peak traffic periods.

[6] Traffic observed at 14:00 on a weekday in September 2008. Enhanced data collection has been frustrated in 2009 by extensive sewer works

**Figure 3.1 Level Crossings in Mortlake, Barnes and North Sheen**

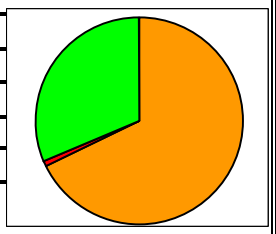


### Barrier and Traffic Effects

3.3.5. The barrier assessment results for White Hart Lane, Barnes are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:40:20 | 10.4 |
| Post Airtrack | 0:41:10 | 9.5 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 67% |
| Extra Airtrack closure | 1% |
| Barrier open with Airtrac | 31% |
| Barrier open time lost | 4% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open | Maximum traffic / hour / per direction | Observed 2008 traffic per direction off peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 9.5 | 117 | 24 | 445 | 138 | 31% |

3.3.6. The revised timetable brought about by Airtrack's two additional trains per hour will result in barrier closure a further 1% of the time per average daytime hour (a decrease of 4% in overall barrier open time over an hour). This equates to less than one minute more closure time per hour.

3.3.7. Although this barrier is closed during the day for longer periods than it is open, the road capacity is able to accommodate the fairly low demand. Traffic released after a crossing closure will generally continue to dissipate to normal free-flow conditions well within the first minute of barrier open time, and well before the barrier is likely to close again.

3.3.8. The marginally greater closure time brought about by Airtrack will have a slight adverse and non-significant effect on traffic at this location.

### Community Effects

3.3.9. The marginal loss of barrier up time and its associated effects on access is considered highly unlikely to have any significant incremental effects on community facilities and services.

### Air Quality Effects

3.3.10. Changes in barrier down time are predicted to result in an equivalent emission factored 1000 AADT flow criterion of +54, meaning that during the day 54 more vehicles are likely to be stationary than would be in the absence of Airtrack. This level crossing has therefore been scoped out at Screening Stage 1 and is considered negligible in terms of air quality impacts, despite its situation within a designated air quality management area.

## 3.4. Sheen Lane, Mortlake

### Baseline Context for the Crossing

3.4.1. Sheen Lane (B351) is a locally important road, lined with commercial properties, that runs through the centre of Mortlake. It is a popular cycling route for commuting and provides access to Mortlake station, which is located immediately west of the level crossing.

3.4.2. The concentration of business accesses, pedestrian and cycle movements causes a relatively low flow rate after the barriers reopen. Traffic flows[7] were in the order of 341vph northbound and 241vph southbound. The junction with Lower Richmond Road (A3003) about 150m north of the railway crossing provides a locally important route west towards Chiswick Bridge, but this does not appear to cause traffic to back up across the railway line.

[7] Traffic observed at 08:00 on a weekday in September 2008. Enhanced data collection has been frustrated in 2009 by extensive sewer works

3.4.3. There are three pedestrian overbridges in the vicinity of the road crossing, namely:

- at Mortlake station, on Sheen Lane, located at the eastern platform limit;
- about 450m west of the road crossing, linking Kingsway to the north with The Byway to the south; and
- about 250m east of the crossing by Mullins Path, linking North Worple Way and South Worple Way.

3.4.4. Observations at Sheen Lane indicate that few pedestrians choose to use the footbridge, preferring instead to wait at the barrier. Those bridge users observed were identifiably time-sensitive commuters either accessing the station to catch a train or carrying a bicycle to reduce delay to their journey to work.

3.4.5. Sheen Lane is used by bus service 969 between Roehampton and Whitton. This is a limited service and operates infrequently.

3.4.6. **Figure 3.1** illustrates that the A205 bridge crosses the railway some 700m west of Sheen Lane. Traffic not going to or coming from Mortlake can therefore avoid the level crossing by using the A205 South Circular Road (Clifford Avenue). Trips with a local purpose might, however, find the diversion to the bridge excessive.

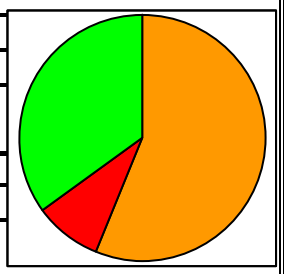
3.4.7. Sixteen in service passenger trains pass the crossing every hour during the day (eight in each direction), resulting in some 12 closures and a total downtime of almost 34 minutes in an average daytime hour. This causes long queues to build up in both directions during barrier closures.

## Barrier and Traffic Effects

3.4.8. The barrier assessment results for Sheen Lane, Mortlake are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:33:40 | 12.3 |
| Post Airtrack | 0:39:11 | 10.9 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 56% |
| Extra Airtrack closure | 9% |
| Barrier open with Airtrack | 35% |
| Barrier open time lost | 21% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction AM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 10.9 | 115 | 22 | 460 | 341 | 74% |

3.4.9. Airtrack will add two trains per hour per direction to the current eight. The revised timetable will bring about 11% fewer barrier closures but for about 60 seconds longer per average daytime hour. This will result in a closed barrier almost two thirds of the time during an average hour, or a 21% loss of barrier open time over an hour. This equates to almost seven minutes more closure time per hour.

3.4.10. As a result, traffic queues that build up during a closure may not dissipate to a normal free flow situation before the next closure occurs. Off peak traffic will be delayed for longer but for slightly fewer closures per hour. Airtrack is therefore predicted to have a **moderate adverse** and therefore **significant effect** on traffic at this location.

## Community Effects

3.4.11. Community facilities located around the Sheen Lane crossing are shown in **Figure 3.2**.

3.4.12. Of these, the facilities of primary sensitivity are:

- Barnes Hospital on South Worple Way;
- Sheen Lane Health Centre; and
- Mortlake rail station.

3.4.13. The station is accessible from both north and south of the line so access is not restricted other than by queuing traffic. Access to the hospital located south of the railway is more limited, with no adequate alternative routes other than White Hart Lane, which also has a level crossing. The hospital helps people with mental health problems and does not have an A&E function, making timely access less critical than a normal acute hospital. The Sheen Lane Health Centre is generally for appointment visits, although emergency access will be needed on occasions.

3.4.14. Of the facilities of secondary sensitivity within 1km of the crossing, there are primary schools on both sides of the crossing, including Kew Riverside Primary School, although St Mary Magdelen's Catholic School north of the crossing would not be a feasible alternative for some, since it serves primarily the Catholic community. East Sheen primary school on Upper Richmond Road south of the crossing has a wider intake, as does Sheen Mount Junior Mixed & Infants School on West Temple Sheen. Sheen School is a secondary school on Hertford Road, south of the crossing.

3.4.15. Individuals accessing a range of local community services in the local area will be inconvenienced by the additional delays at the Sheen Lane crossing. With generally good alternative pedestrian crossings on Sheen Lane, as well as at locations to its west and east, access to local facilities and services will not be greatly reduced and effects will mostly be slight. However, reduced access to Barnes Hospital and the Sheen Lane Health Centre will inconvenience users who may need timely access to these facilities and who may not be able to use pedestrian routes. The increased barrier down time at Sheen Lane will therefore result in a **moderate adverse** and **significant effect** for users of these services in particular.

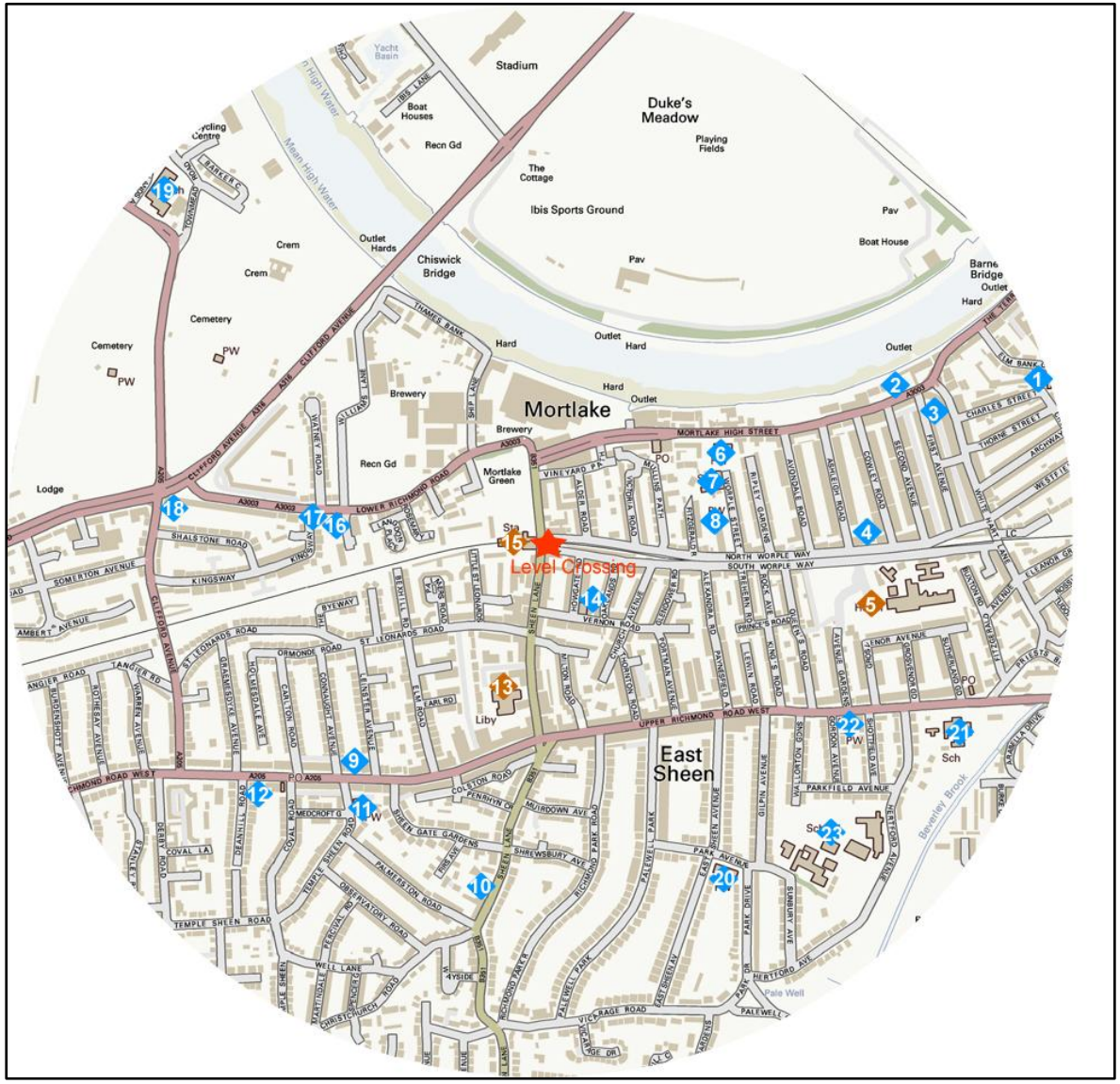
## Air Quality Effects

3.4.16. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic movements at the level crossing and surrounding roads. This equates to an estimated flow pattern change of some 870 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds the equivalent emission factored criterion of 500 AADT within Screening Stage 1.

3.4.17. The crossing at Sheen Lane was subject to road works at the time surveys were being undertaken. Therefore it was not surveyed since it was considered unlikely to exhibit typical traffic conditions.

3.4.18. In the absence of average speed data, it was not possible to address this location at Screening Stage 2 or progress to the detailed Stage 3 modelling assessment. However, based on the results of the Stage 2 and Stage 3 assessments for crossings at Egham, which are likely to result in a larger number of slower moving vehicles due to Airtrack than would occur here, any air quality impacts at Sheen Lane are likely to be negligible, despite its situation within a designated air quality management area.

## Figure 3.2 Community Facilities around Sheen Lane Level Crossing




Key

1. St Michael and All Angels Church (and community centre)
2. The Old Powerstation Youth Centre
3. White Hart Clinic (Physio)
4. The Practice at Mortlake (Dentist)
5. Barnes Hospital
6. St Mary the Virgin Church
7. St Mary Magdelen's Catholic Primary School
8. St Mary Magdelen's Church (and Montessori Nursery school)
9. Working Mums Nursery and Pre-school Education
10. Tower House School
11. East Sheen Baptist Church
12. Deanhill Surgery
13. Sheen Lane Health Centre
14. East Sheen United Reformed Church
15. Mortlake Railway Station
16. London Borough of Richmond upon Thames Training and Development Centre
17. Working Mums Day Care and Pre-school Centre
18. Mortlake Community Association
19. Kew Riverside Primary School
20. All Saints Church
21. East Sheen Primary School
22. Elim Pentecostal Church
23. Shene School

NB - Primary facilities are marked in orange and secondary facilities are marked in blue

## 3.5. Manor Road, North Sheen

### Baseline Context for the Crossing

3.5.1. Manor Road (B353) is a strategic north/south route passing east of Richmond towards Kew Bridge. It is mostly lined with residential properties but, north of the crossing, food and retail warehousing fronts both sides of the road. Further north, 250m from the crossing, the road intersects with the A316 at the Manor Circus roundabout.

3.5.2. Traffic flows[8] were in the order of 308vph northbound and 372vph southbound. Junction capacity to the north and south is good and no queues were observed across the railway when the crossing is open. North Sheen station is about 160m east of the level crossing accessed by a footpath running along the northern railway boundary. The Manor Road footpaths are heavily used both by commuters and for Marshgate Primary School and Holy Trinity CE Primary School to the south and Darrell Primary School on the north, which are in close proximity to the crossing.

3.5.3. Alternative routes comprise bridges at Richmond station, 1km to the west, and A205 Clifford Avenue, 850m to the east. Although these routes avoid this level crossing, heavy peak traffic on both of them would deter their use. In addition, Manor Road has the attraction of avoiding Richmond town centre.

3.5.4. A footbridge between Sheendale Road and St Mary's Grove provides a pedestrian link over the railway, some 300m west of the road crossing. In addition, Network Rail has recently announced its intention to construct a new footbridge linking the west side footways across the level crossing.

3.5.5. Bus services R70 and 493 use the route across the Manor Road level crossing. These are frequent services that connect Richmond to south and west London and serve North Sheen Railway Station.

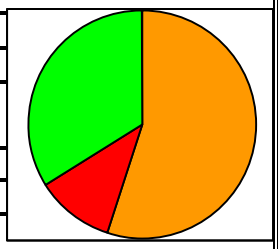
3.5.6. Sixteen in service passenger trains pass the crossing every hour during the day (eight in each direction), resulting in some 10 closures and a total downtime of over 32 minutes in an average daytime hour. This causes long queues to build up in both directions during barrier closures.

### Barrier and Traffic Effects

3.5.7. The barrier assessment results for Manor Road, North Sheen are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:32:40 | 9.9 |
| Post Airtrack | 0:39:30 | 10.3 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 55% |
| Post Airtrack change | 11% |
| Barrier open with Airtrack | 34% |
| Barrier open time lost | 25% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction AM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 10.3 | 119 | 24 | 490 | 372 | 76% |

3.5.8. Airtrack will add two trains per hour per direction to the current eight. The revised timetable will bring about 4% more barrier closures over the current situation with each closure lasting about 32 seconds longer. This will result in a closed barrier some two thirds of the time during an average

[8] Traffic observed at 08:00 on a weekday in September 2008. Enhanced data collection has been frustrated in 2009 by extensive sewer works

hour, or a 25% loss of barrier open time compared to the existing situation. This equates to seven minutes more closure time per hour.

3.5.9. As a result, traffic queues that build up during a closure may not dissipate to a normal free flow situation before the next closure occurs. Off peak traffic will be delayed for longer and for slightly more closures per hour. Airtrack is therefore predicted to have a **moderate adverse** and therefore **significant effect** on traffic at this location, particularly when the impacts on the two bus services are taken into account.

## Community Effects

3.5.10. Community facilities located around the Manor Road crossing are shown in **Figure 3.3**.

3.5.11. Of these, the facilities of primary sensitivity are:

- Richmond fire station on Lower Richmond Road;
- North Sheen rail station;
- Richmond rail station; and
- Richmond ambulance station.

3.5.12. The fire station is located off the A316, north of the crossing and it is assumed that fire services would make use of the overbridge on A205 Clifford Avenue to gain access south of the railway. The ambulance service no doubt also avoids the risk of the barrier closure by using Clifford Avenue.

3.5.13. When the barrier is down, the station is currently accessible only from the north side of the line. People needing to catch a train and coming from the south of the crossing would be adversely affected by increased barrier down time were Network Rail not committed to providing a new footbridge.

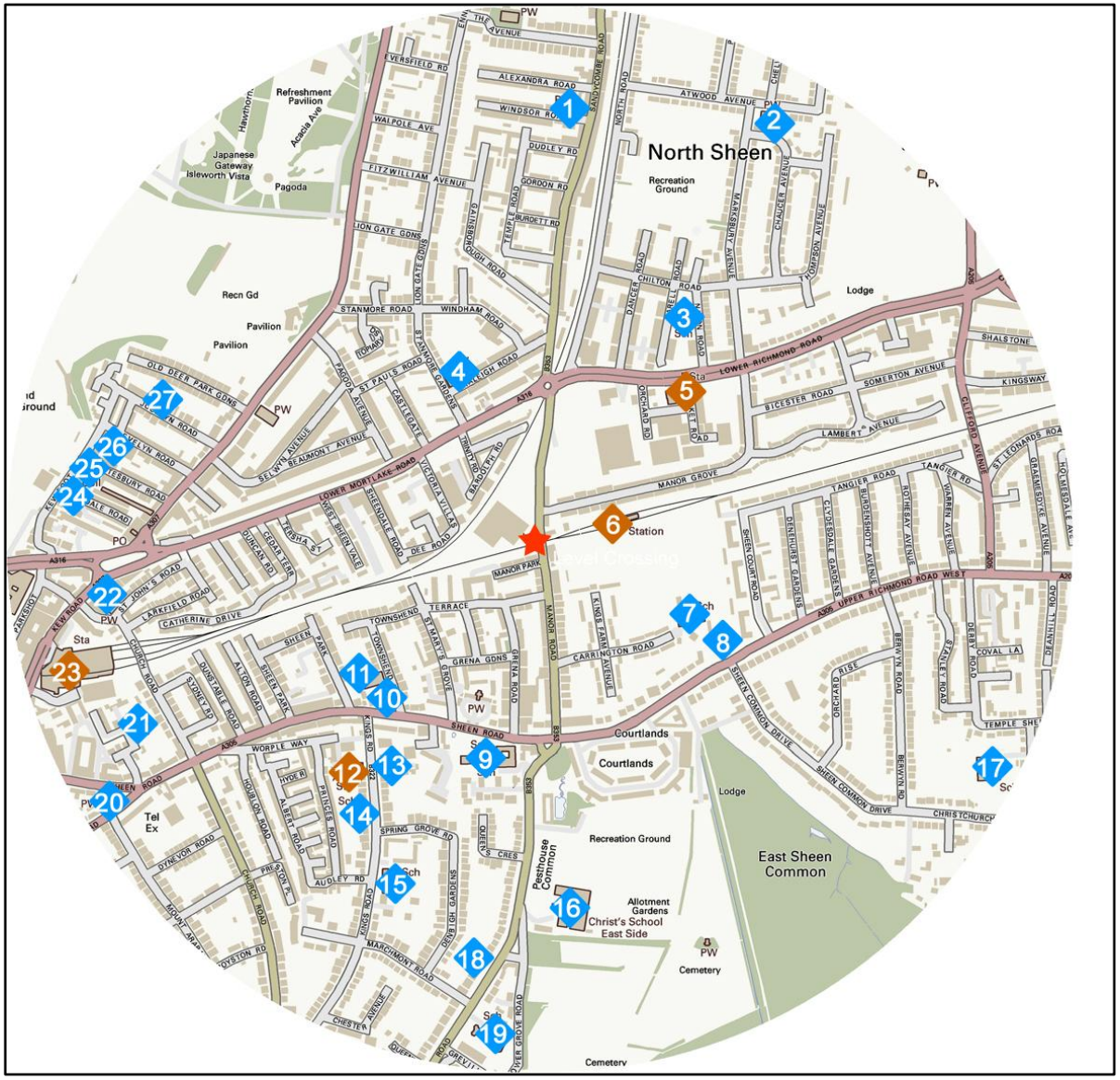
3.5.14. Facilities of secondary sensitivity within 1km of the crossing comprise a number of primary schools located both north and south of the crossing. The secondary schools lie to the south of the crossing and not within 1km to the north.

3.5.15. There are a number of places of worship both north and south of the crossing, although it is recognised that these would not necessarily serve as alternatives.

3.5.16. Delays at the Manor Road crossing will result in inconvenience to users of local services. Users of Christ's Secondary School will be particularly affected, since it is the main secondary school in the area, with a catchment that extends to the north of the crossing. However, there are generally alternative community facilities available both sides of the crossing, as well as alternative means of access either by road over Clifford Avenue bridge (A205), or by foot, using the pedestrian bridge between Dee Road and St Mary's Grove.

3.5.17. Although community effects are judged generally to be not significant, the worsened access from the south for station users and ambulance services is adjudged to result in a **severe adverse** and therefore **significant effect**. However, when Network Rail constructs the new footbridge at this location (as it intends), the issue for station users at least will be addressed and the effect will be mitigated.

## Figure 3.3 Community Facilities around Manor Road Level Crossing




Key

1. Kew Baptist Church
2. The Barn Church
3. Darrell Primary School
4. Raleigh Road United Church
5. Richmond Fire Station
6. North Sheen Railway Station
7. Holy Trinity C of E Primary School
8. Holy Trinity Church
9. Marshgate Primary School
10. Seymour House Medical Practice
11. Holy Trinity Church
12. Richmond Ambulance Station
13. Kings Road Nursery
14. Kings House Junior School
15. Kings House School
16. Christ's School
17. Sheen Mount Primary School
18. Queens Medical Centre
19. St Elizabeth's Catholic Primary School
20. First Church of Christ Scientist Richmond
21. Richmond Synagogue
22. St John the Divine
23. Richmond Railway Station
24. Richmond Adult Education Centre
25. Falcons Preparatory School for Boys
26. NHS Richmond Rehabilitation Centre
27. Ebenezer Strict Baptist Chapel

NB - Primary facilities are marked in orange and secondary facilities are marked in blue

### Air Quality Effects

3.5.18. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic movements at this level crossing and surrounding roads. This equates to an estimated flow pattern change of some 1,027 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds the equivalent emission factored criterion of 500 vehicles per day within Screening Stage 1.

3.5.19. As with Sheen Lane, the crossing at Manor Road was subject to road works at the time surveys were being undertaken. Therefore it was not surveyed since it was considered unlikely to exhibit typical traffic conditions.

3.5.20. In the absence of average daily speed data, it was not possible to address this location at Screening Stage 2 or progress to the detailed Stage 3 modelling assessment. However, based on the results of the Stage 2 and Stage 3 assessments for crossings at Egham, which are likely to result in a larger number of slow moving vehicles due to Airtrack than would occur here, any air quality impacts at Manor Road are likely to be negligible, despite its situation within a designated air quality management area.

## 3.6. Effects on the Highway Network

3.6.1. The four level crossings in the Richmond area, between Barnes and Richmond, each have a different strategic use based on their location, function and connection to the wider road network.

- Vine Road serves very local traffic and is not well used, with access constrained by parked cars. It is within 400m of the A306 rail overbridge by Barnes station.
- White Hart Lane occupies a dense residential location between A205 and A3003. It serves mostly local traffic accessing local shops and schools in particular (including large numbers of pedestrians) and linking residential areas north and south of the railway.
- Sheen Lane is an important local road serving Mortlake and containing shops and other commercial uses, as well as Mortlake station. It links A205 with A3003 but does not provide a direct route to Chiswick Bridge.
- Manor Road has residential uses south of the railway with medium-sized retail centres to the north and provides access to North Sheen Station. It also has a more important strategic function than the other crossings attracting longer distance through traffic on a south to north axis from areas such as Surbiton, Kingston avoiding Richmond town centre to cross Kew Bridge en route to west London.

3.6.2. Strategic traffic through the area is concentrated on the A205 South Circular Road, with routes determined by the limited availability of bridges across the River Thames, which forms a barrier to north-south movements. The A205 bridges the railway via Clifford Avenue midway between Sheen Lane and Manor Road, which are each over 500m from it. The A205 is the key inner-London orbital road and is therefore heavily trafficked throughout the day.

3.6.3. Three of the crossings in Richmond substantially fulfil predominantly local needs, so reasonable alternatives do not exist. A proportion of the traffic on Manor Road is likely to be using it for longer journeys outside the local area. Some of these may consider diversion to alternatives (particularly the A205) in response to increased barrier down-time on Manor Road. However, given the level of congestion on the A205, this is not an attractive alternative. Any traffic choosing to divert to the A205 is likely to have a negligible effect on flows on this very busy road.

## 3.7. Possible Solutions in Richmond

3.7.1. There is believed to be no scope to introduce bridge crossings in place of the level crossings, owing to the major local impacts this would entail. The introduction of automatic barriers in place of the current manually controlled crossings would not be acceptable to Network Rail.

3.7.2. Possible options to address existing and future traffic delays at crossings in the area include optimising the performance of level crossing closures. This would require strategic changes in barrier operations by Network Rail.

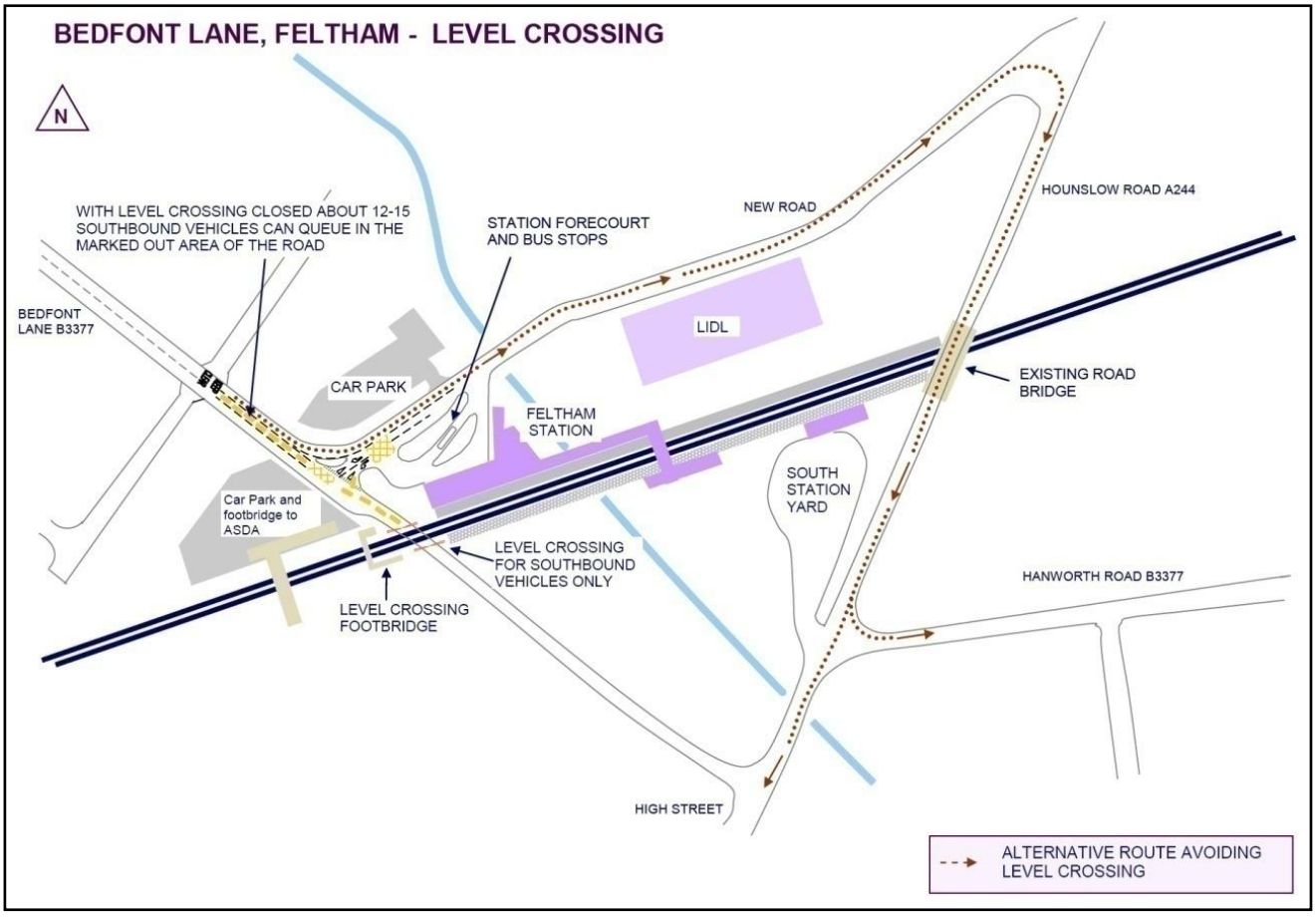
3.7.3. As noted previously, Network Rail is planning to re-introduce a footbridge on Manor Road. Introduction of a footbridge at White Hart Lane would also help to alleviate delays to local pedestrian movement in the area.

# 4. FELTHAM

## 4.1. Introduction

4.1.1. In the London Borough of Hounslow, there is only one level crossing that will be affected by Airtrack: on Bedfont Lane in Feltham.

**Figure 4.1 Level Crossing in Feltham**




## 4.2. Bedfont Lane, Feltham

### Baseline Context for the Crossing

4.2.1. Bedfont Lane (B3377) links East Bedfont with Feltham. The road operates one-way southbound from the New Road Junction to High Street across the level crossing. The level crossing is adjacent to the western end of Feltham station platforms.

4.2.2. Traffic flows[9] were in the order of 196vph southbound. A reasonably short 550m local diversion along New Road provides alternative access to the A244 High Street, although continued southbound travel on this road requires a sharp right turn onto Hounslow Road to bridge the railway just east of Feltham Station. This route, in the reverse direction, is the only available option for northbound traffic. A footbridge is available for pedestrians with a second new footbridge for the ASDA store customers from a car park north of the railway.

4.2.3. One bus service, the H25, is known to use the level crossing. This service has a varying frequency throughout the day. It serves Feltham Station and connects the industrial estate at Hanworth to the nearest London Underground station at Hatton Cross.

4.2.4. Twelve in service passenger trains pass the crossing every hour during the day (six in each direction), resulting in some seven closures and a total downtime of some 36 minutes in an

[9] Traffic observed at 15:30 on a weekday in September 2008

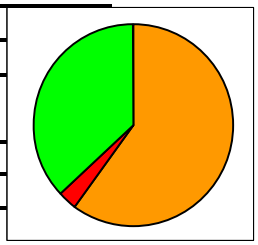
average daytime hour. The road layout provides stacking space for about 15 vehicles to queue when the barrier closes but, given the short local diversion to the adjacent bridge, traffic can and does divert easily to avoid hold-up and queues do not tend to be long. However, in peak periods the storage capacity of the southbound traffic queuing at a level crossing closure can become overwhelmed. Traffic queuing out of the designated road space can block other traffic wishing to make the left turn onto New Road.

### Barrier and Traffic Effects

4.2.5. The barrier assessment results at Bedfont Lane, Feltham are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:36:00 | 7 |
| Post Airtrack | 0:37:35 | 10 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 60% |
| Extra Airtrack closure | 3% |
| Barrier open with Airtrack | 37% |
| Barrier open time lost | 7% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction Off peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 10 | 134 | 20 | 447 | 196 | 44% |

4.2.6. Airtrack will add two trains per hour per direction to the current six. The revised timetable will bring three more barrier closures per average daytime hour but they will generally each be over a minute shorter. Airtrack will result in 3% more barrier downtime, which equates to about a minute and half. The loss of barrier open time during an average hour is 7%.

4.2.7. Traffic released after a crossing closure will continue to dissipate to normal free-flow conditions very quickly and well before the barrier is likely to close again. Airtrack will therefore have a slight adverse and non-significant effect on traffic at this location.

### Community Effects

4.2.8. The crossing only functions in one direction and when closed drivers have the option to divert to the local alternative bridge route. The relatively small loss of barrier open time and its associated effects on access is considered unlikely to have any significant effects on community facilities and services.

### Air Quality Effects

4.2.9. Changes in barrier down time are predicted to result in an equivalent emission factored 1000 AADT flow criterion of +56, meaning that during the day, 56 more vehicles are likely to be stationary than would be in the absence of Airtrack. This will have negligible impact on air quality, despite its situation within a designated air quality management area, and was subsequently scoped out at Screening Stage 1 of the assessment.

## 4.3. Effects on the Highway Network

4.3.1. Bedfont Lane provides a southbound only link to the Hounslow Road, serving generally local traffic needs but it does provide a direct route to Heathrow Terminal 4. Northbound traffic from Feltham uses the Hounslow Rd A244, which also serves a more strategic role in west London. It is slow-moving with lots of disruptions to movement and high traffic levels.

4.3.2. With good alternatives available, longer delays at the barrier on Bedfont Lane due to Airtrack (which are already relatively small) are likely to result in a negligible change to traffic on the wider network.

## 4.4. Possible Solutions in Feltham

4.4.1. Northbound traffic from Feltham to East Bedfont already has to use the existing railway bridge east of the station. In peak periods the existence of the southbound level crossing tail back beyond the designated storage capacity can block other traffic seeking to turn left onto New Road. In these circumstances the highway network might well function more efficiently if the level crossing were closed. Some improvement in traffic turning capacity at the New Road/Hounslow Road junction would enhance this benefit.

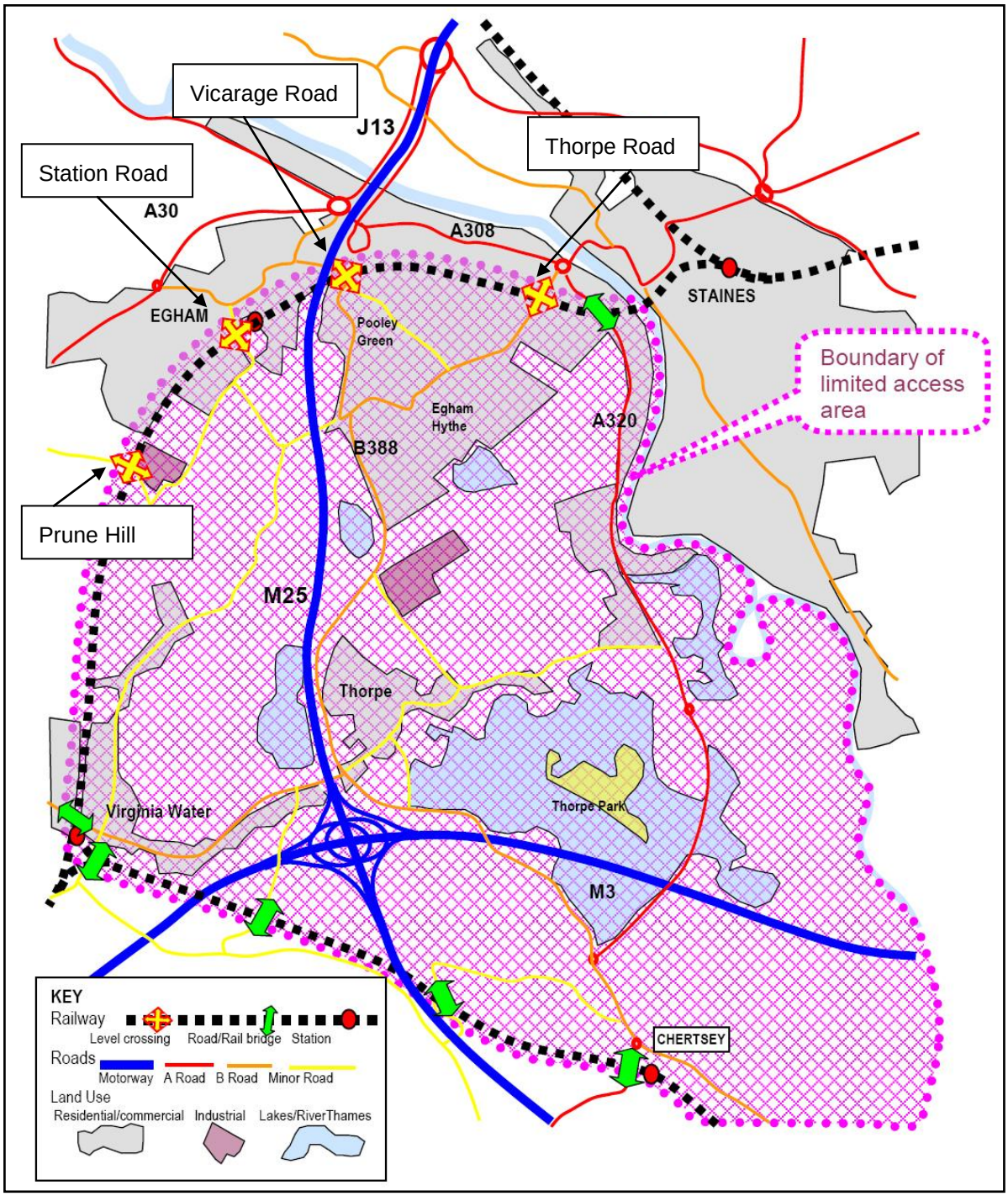
4.4.2. In the absence of such a radical change, strict enforcement of yellow-box protection of the junction of New Road with Bedfont Lane would help to maintain traffic movement during barrier closure periods. These are all matters for the local highway authority.

# 5. EGHAM

## 5.1. Introduction

5.1.1. In Egham, in the District of Runnymede, there are four level crossings that will be affected by Airtrack: on Thorpe Road in Egham Hythe, on Vicarage Road at Pooley Green and Station Road in central Egham and on Prune Hill at Rusham.

**Figure 5.1 Level Crossings in Egham**



## 5.2. Thorpe Road, Egham Hythe

### Baseline Context for the Crossing

5.2.1. Thorpe Road (B3776) links Egham Hythe to Staines. With Station Road and Vicarage Road, it is one of three closely spaced level crossings. The crossing is 200m from the A308 Causeway roundabout at the south side of the Staines bridge; this roundabout is very busy at peak times. Two schools are accessed directly from Thorpe Road adding to peak period movements.

5.2.2. An alternative route is available that avoids the crossing, comprising a 'rat-run' to Chertsey Road through a dense residential area. Its use is discouraged by cul-de-sacs and a circuitous route, as well as by the high levels of congestion on the Chertsey Road approach to the Causeway roundabout. Thorpe Road effectively, therefore, has no acceptable alternative route to avoid the level crossing.

5.2.3. Traffic flows[10] in the morning peak (08:00-09:00) were in the order of 416 vph northbound towards Staines (pedestrians 55) and 319 vph away from Staines (pedestrians 163). In the evening peak (17:00-18:00) the pattern is reversed with 308 vph towards Staines (pedestrians 36) and 411 vph away from Staines (pedestrians 53). The Causeway roundabout was observed to be heavily congested in the morning peak. With the crossing closed, the Thorpe Road southbound traffic queue was seen to extend as far as the roundabout. Equally, after the crossing reopens, the northbound traffic queue was seen to move forward to the roundabout but with the congestion causing the queue to extend across the open railway crossing.

5.2.4. Thorpe Road is used by bus services 71 (connecting Slough and Heathrow Airport Terminal 5 Station) and 441 (connecting Egham and Heathrow Airport). Bus service 71 is a frequent service running every 10 minutes. Bus service 441 runs every 30 minutes.

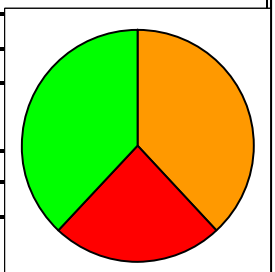
5.2.5. Eight in service passenger trains pass the crossing every hour during the day (four in each direction), resulting in some eight closures and a total downtime of some 23 minutes in an average daytime hour. This causes long queues to build up in both directions during barrier closures.

### Barrier and Traffic Effects

5.2.6. The barrier assessment results at Thorpe Road, Egham are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:22:50 | 7.8 |
| Post Airtrack | 0:37:00 | 10.5 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 38% |
| Extra Airtrack closure | 24% |
| Barrier open with Airtrack | 38% |
| Barrier open time lost | 38% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction AM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 10.5 | 131 | 24 | 550 | 418 | 76% |

5.2.7. Airtrack will double the number of passenger trains in each direction every hour, from four to eight, causing 24% more barrier closure, or a 38% loss of barrier open time, during an average daytime hour. This equates to almost 15 minutes more closure time per hour.

5.2.8. With the road already heavily congested during the AM peak, 12% less traffic will be able to cross the railway because the roundabout congestion will continue to back traffic up to the railway. Off

[10] Traffic observed at 07:00-19:00 on a weekday in March 2009.

peak traffic is more likely to be delayed by a barrier closure although after re-opening the queues should dissipate within one minute.

5.2.9. Overall, Airtrack is predicted to have a **severe adverse** and **significant effect** on traffic at this location, particularly when the impacts on the two bus services are taken into account.

## Community Effects

5.2.10. Community facilities located around the Thorpe Road crossing are shown in **Figure 5.2**.

5.2.11. Of these, the facilities of primary sensitivity are:

- Staines Police Station (just over 1km north-east of the level crossing); and
- Hythe Medical Centre (350m south of the level crossing).

5.2.12. Police vehicles wishing to access the south side of the level crossing can do so through an alternative route via Chertsey Lane (A320); this will result in an additional journey distance back onto Thorpe Road of less than 1km, but, as noted above, it follows an inconvenient route through a residential area. However, it is understood that police stations will generally not dispatch vehicles from the station, but would tend to radio vehicles already on patrol; therefore the effect on the police service is not significant.

5.2.13. Visitors to the Hythe medical centre from the north would be faced with increased delays.

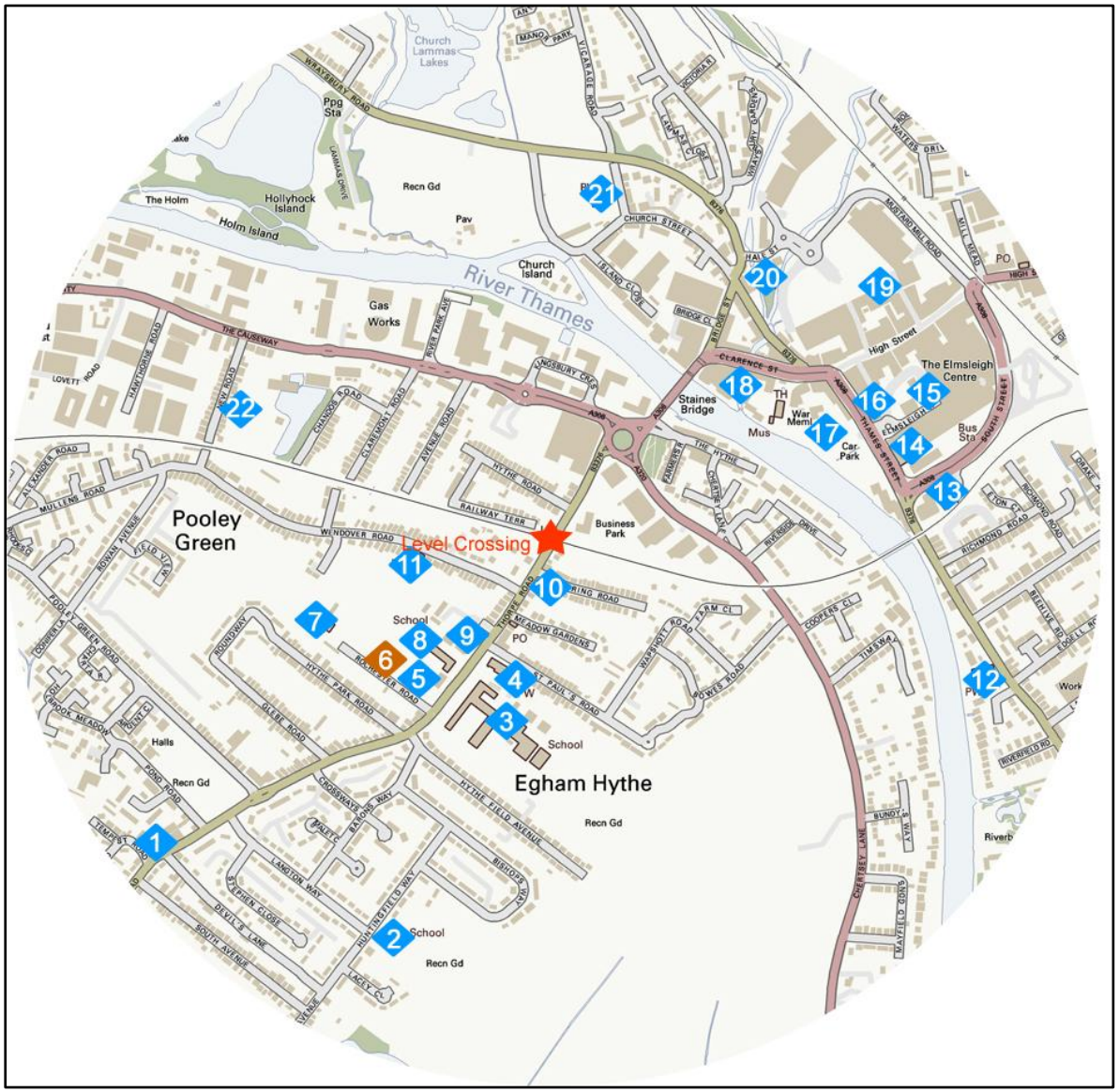
5.2.14. There are a variety of facilities of secondary sensitivity including places of worship, primary and secondary schools, community centres and a cinema. There are a number of places of worship both north and south of the level crossing, however, as previously described, these may not be viable alternatives.

5.2.15. The primary and secondary schools within 1km of the level crossing, such as Magna Carta and Thorpe Lea primary school, are situated to the south of the level crossing. School alternatives on the north side of the crossing are over 1km from the crossing. Moreover, there are no pedestrian crossings within 1km of the level crossing providing alternative access for children going to school.

5.2.16. Local facilities such as shops, post offices and recreation grounds and leisure facilities are situated on both sides of the level crossing, therefore providing alternatives.

5.2.17. Overall a **moderate adverse** and therefore **significant effect** on community facilities is considered likely, with impacts on access to schools, places of worship and the Hythe Medical Centre in particular, due to delays from loss of barrier open time.

## Figure 5.2 Community Facilities around Thorpe Road Level Crossing




Key

1. Hythe Fields Gospel Hall
2. Thorpe Lea Primary School
3. The Magna Carta School
4. St Pauls Church
5. The Hythe Centre (Community Centre and Hythe Community Church)
6. Hythe Medical Centre
7. St John of Rochester Catholic Church
8. The Hythe School/Hythe Primary School
9. Springtime Nursery School
10. Thorpe Dental Practice
11. Wendover Road Methodist Church
12. St Peters Church
13. Staines and District Synagogue
14. Staines Library
15. Masonic Centre
16. Staines Community Centre
17. Staines Methodist Church
18. Clarence Dental Practice
19. Vue Cinema
20. Staines Baptist Fellowship (and Two Rivers Montessori Nursery)
21. St Mary's Church
22. Runnymede Christian Fellowship Resource Centre

NB: Primary facilities are indicated in orange and secondary facilities in blue

## Air Quality Effects

5.2.18. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic flow speeds at the level crossing and approaching roads. This equates to an estimated flow pattern change of some 1,888 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds the equivalent emission factored criterion of 500 vehicles per day and was therefore progressed to Screening Stage 2.

Screening Stage 2 determined that Airtrack will result in a reduced daily average speed by 9km/hr. Although this is less than the 10km/hr DMRB trigger, the decision was made to perform detailed dispersion modelling at this location. The outcomes of these predictions are included within **Table 5-1** and **Table 5-2** below. The highlighted change for each table refers to the change which equates directly with the DfT TAG criterion at 20m from the pollution source; see *s.2.5.16*.

**Table 5-1 Thorpe Road NO2 Predictions**

| Distance (m) | 2009 Baseline $NO_2$ ($\mu g/m^3$) | 2015 Without Airtrack $NO_2$ ($\mu g/m^3$) | 2015 With Airtrack $NO_2$ ($\mu g/m^3$) | Change $NO_2$ ($\mu g/m^3$) |
|---|---|---|---|---|
| 0 | 28.74 | 23.14 | 23.41 | 0.27 |
| 10 | 28.71 | 23.12 | 23.34 | 0.23 |
| 20 | 28.38 | 22.86 | 23.07 | **0.21** |
| 30 | 28.37 | 22.85 | 23.06 | 0.21 |
| 40 | 28.66 | 23.09 | 23.29 | 0.20 |
| 50 | 28.65 | 23.08 | 23.27 | 0.19 |
| 60 | 28.62 | 23.06 | 23.24 | 0.18 |
| 70 | 28.58 | 23.04 | 23.21 | 0.18 |
| 80 | 28.21 | 22.75 | 22.92 | 0.17 |
| 90 | 28.18 | 22.72 | 22.88 | 0.16 |
| 100 | 28.47 | 22.95 | 23.09 | 0.13 |
| 110 | 28.44 | 22.94 | 23.04 | 0.11 |
| 120 | 28.10 | 22.66 | 22.75 | 0.09 |
| 130 | 28.41 | 22.91 | 22.98 | 0.08 |
| 140 | 28.39 | 22.90 | 22.96 | 0.07 |
| 150 | 28.07 | 22.63 | 22.69 | 0.05 |
| 160 | 28.38 | 22.88 | 22.93 | 0.05 |
| 170 | 28.37 | 22.88 | 22.91 | 0.04 |
| 180 | 28.04 | 22.61 | 22.64 | 0.03 |
| 190 | 28.34 | 22.85 | 22.88 | 0.03 |
| 200 | 28.29 | 22.81 | 22.84 | 0.03 |

**Table 5-2 Thorpe Road PM10 Predictions**

| Distance (m) | 2009 Baseline $PM_{10}$ (µg/m$^3$) | 2015 Without Airtrack $PM_{10}$ (µg/m$^3$) | 2015 With Airtrack $PM_{10}$ (µg/m$^3$) | Change $PM_{10}$ (µg/m$^3$) |
|---|---|---|---|---|
| 0 | 22.13 | 20.57 | 20.60 | 0.03 |
| 10 | 22.18 | 20.56 | 20.59 | 0.03 |
| 20 | 22.20 | 20.56 | 20.59 | **0.03** |
| 30 | 22.20 | 20.56 | 20.59 | 0.03 |
| 40 | 22.20 | 20.56 | 20.58 | 0.03 |
| 50 | 22.20 | 20.56 | 20.58 | 0.02 |
| 60 | 22.20 | 20.55 | 20.58 | 0.02 |
| 70 | 22.20 | 20.55 | 20.57 | 0.02 |
| 80 | 22.19 | 20.55 | 20.57 | 0.02 |
| 90 | 22.19 | 20.54 | 20.56 | 0.02 |
| 100 | 22.18 | 20.54 | 20.56 | 0.02 |
| 110 | 22.18 | 20.54 | 20.55 | 0.01 |
| 120 | 22.18 | 20.54 | 20.55 | 0.01 |
| 130 | 22.17 | 20.53 | 20.54 | 0.01 |
| 140 | 22.17 | 20.53 | 20.54 | 0.01 |
| 150 | 22.17 | 20.53 | 20.54 | 0.01 |
| 160 | 22.17 | 20.53 | 20.54 | 0.01 |
| 170 | 22.16 | 20.53 | 20.54 | 0.00 |
| 180 | 22.15 | 20.53 | 20.53 | 0.00 |
| 190 | 22.14 | 20.53 | 20.53 | 0.00 |
| 200 | 22.09 | 20.52 | 20.53 | 0.00 |

5.2.19. Based on the DfT TAG criteria within Screening Stage 3, the predicted changes in $PM_{10}$ and $NO_2$ concentrations at locations near the Thorpe Road crossing are substantially below those considered to represent a significant air quality impact (2µg/m$^3$ and 1µg/m$^3$ respectively). Consequently the impact of Airtrack is likely to be negligible in terms of air quality impacts.

## 5.3. Vicarage Road, Egham

### Baseline Context for the Crossing

5.3.1. Vicarage Road (B388) links Thorpe and Pooley Green to Egham. It is the busiest trafficked but has the lightest pedestrian movements of the three closely spaced level crossings, and is without a local alternative that avoids the railway. Until recently this level crossing was an automatic half barrier with short closure times, but was converted to a full CCTV manually controlled crossing in response to a major traffic accident in October 2000 when a stranded bus was struck by a train.

5.3.2. Vicarage Road is the main route northbound from Thorpe and Thorpe Lea towards Egham, the M25 Junction 13 and the integral Thames bridge crossing. The level crossing is 340m south-east of the Egham High Street roundabout. Egham town centre and its northern bypass experience peak period congestion, especial during morning peak periods.

5.3.3. In the morning peak hour (08:00 – 09:00) traffic flows[11] were in the order of 499vph (pedestrians 56) towards Egham and 410vph (pedestrians 33) away from Egham. In the evening peak (17:00 – 18:00) the traffic flow is greater being 627vph (pedestrians 39) away from Egham and 405vph (pedestrians 19) towards Egham.

5.3.4. Vicarage Road is used by bus services P3 (connecting St. Peters' Hospital and Enfield Green), 71 (connecting Slough and Heathrow Airport Terminal 5 Station) and 441 (connecting Egham and

[11] Traffic and pedestrians observed from 07:00 to 19:00 on a weekday in March 2009.

Heathrow Airport). Bus service 71 is a frequent service running every 10 minutes; Bus service 441 runs every 30 minutes; and service P3 runs seven times per day.

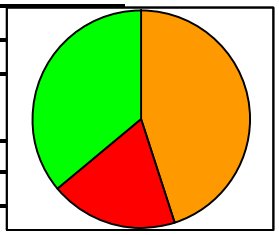
5.3.5. Eight in service passenger trains pass the crossing every hour during the day (four in each direction), resulting in some six closures and a total downtime of some 27 minutes in an average daytime hour. During peak periods barrier closures cause long southbound tail backs, sometimes approaching the Egham High Street roundabout. Equally, during the height of the morning peak, after the crossing has reopened, a northbound traffic queue forms from this roundabout, backing up over the railway.

## Barrier and Traffic Effects

5.3.6. The barrier assessment results for Vicarage Road, Egham are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:26:55 | 6.1 |
| Post Airtrack | 0:38:25 | 7.2 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 45% |
| Extra Airtrack closure | 19% |
| Barrier open with Airtrack | 36% |
| Barrier open time lost | 35% |



**Traffic capacity forecast with Airtrack operations**

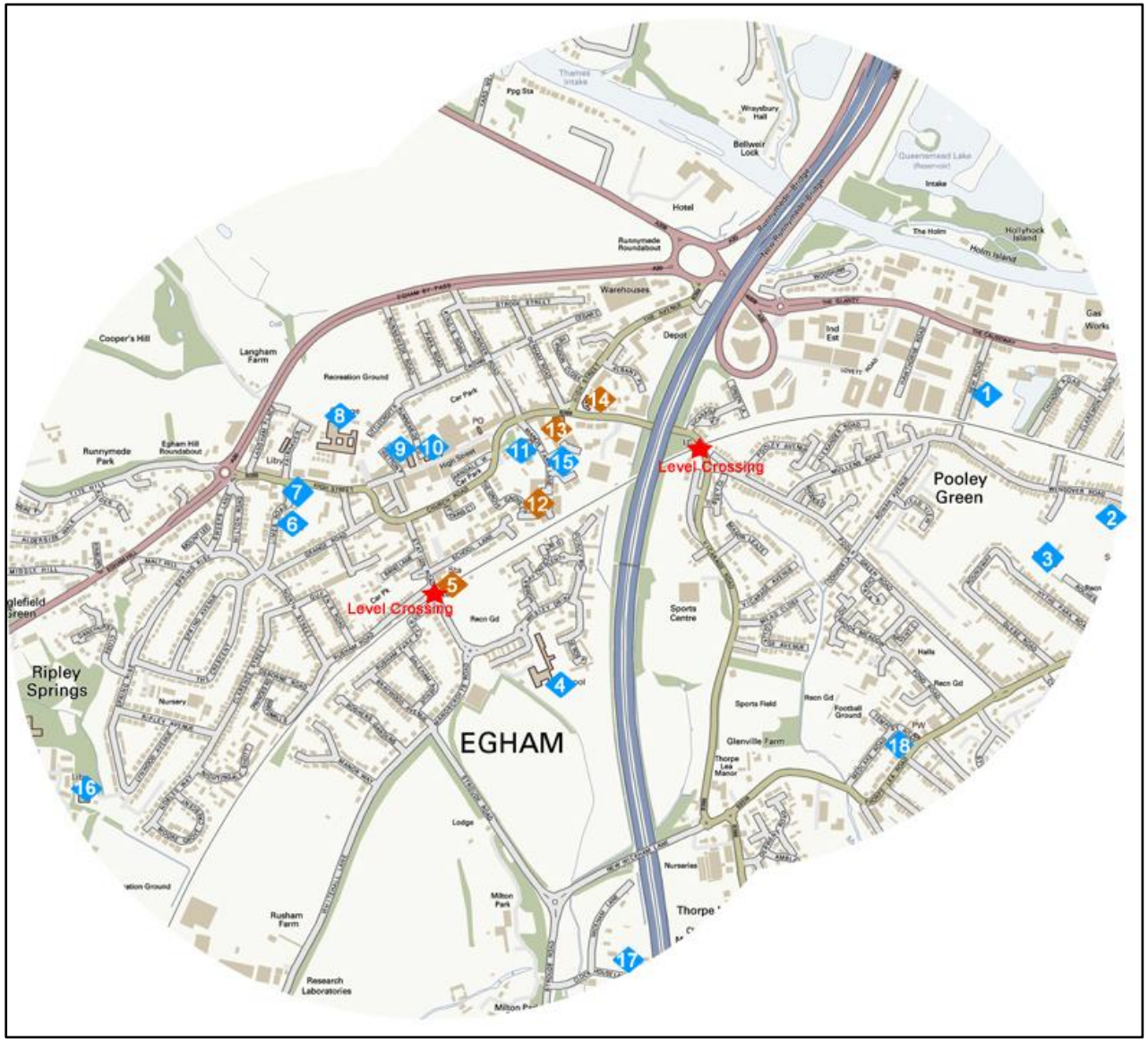
| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction AM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 7.2 | 179 | 26 | 558 | 471 | 84% |

5.3.7. Airtrack will double the number of passenger trains in each direction every hour, from four to eight causing 19% more barrier closure, or a 35% loss of barrier open time, during an average daytime hour. This equates to between 11 and 12 minutes more closure time per hour.

5.3.8. With the road already heavily congested during the AM peak, less traffic will be able to cross the railway because the roundabout congestion will continue to back traffic up to the railway. Off peak traffic is more likely to be delayed by a barrier closure but after re-opening the queues should dissipate within one minute.

5.3.9. Overall, Airtrack is predicted to have a **severe adverse** and **significant effect** on traffic at this location particularly when the impacts on the three bus services are taken into account.

## Figure 5.3 Community Facilities around Vicarage Road and Station Road Level Crossings




Key

1. Runnymede Christian Fellowship
2. Wendover Road Methodist Church
3. St John of Rochester Catholic Church
4. Manorcroft School (primary) and Nursery
5. Egham Railway Station
6. Friends Meeting House (Quakers)
7. Egham Youth Centre
8. Strodes College and Adult Education Centre
9. Egham Literary Institute
10. United Church of Egham
11. St John the Baptist Church
12. The Grove Community Health Centre
13. Egham Fire Station
14. Egham Police Station
15. Manor Farm Day Centre
16. Royal Holloway University
17. Christian Science Society Reading Room
18. Hythe Fields Gospel Hall

Note: Primary facilities are marked in orange and secondary facilities are marked in blue

## Community Effects

5.3.10. Community facilities located around the Vicarage Road crossing are shown above in **Figure 5.3**.

5.3.11. Of these, there are five facilities which have been categorised of primary sensitivity, namely:

- Egham fire station, located 400m north-west of the level crossing;
- Egham police station, located 300m north-west of the level crossing;
- Egham train station, located 700m west of the level crossing;
- the Grove Community Health centre, located 550m north-west of the level crossing; and
- Hythe Medical centre, located just over 1km east of the level crossing.

5.3.12. As noted above, there are limited road alternatives to this route. Increased delays at the level crossing would therefore affect emergency service vehicles, especially the fire service, although fire engines would at least be expected to 'queue jump' in an emergency situation as they do at present.

5.3.13. Facilities of secondary sensitivity lie either side of the level crossing and include places of worship, Manorcroft primary school to the south and Strodes college to the north. Alternative schools do not lie within the 1km radius of the level crossing and similarly the places of worship either side of the level crossing may not be seen as alternatives. Traffic delays will therefore impact use of these facilities.

5.3.14. There are footbridge crossings at New Road/Wendover Road some 600m to the east, and at Station Road (see below) some 700m to the west, however these are at some distance from Vicarage Road.

5.3.15. There are a variety of local services such as shops, post offices, recreation grounds that are situated either side of the level crossing, therefore providing alternatives for the local community.

5.3.16. Overall a **severe adverse** and therefore **significant effect** on community facilities is considered likely, with impacts on access to schools, churches and for emergency fire services in particular affected by delays due to loss of barrier open time and the absence of convenient crossings. This effect is exacerbated by the similar effects predicted at the nearby crossing at Station Road.

## Air Quality Effects

5.3.17. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic flow speeds at the level crossing and approaching roads. This equates to an estimated flow pattern change of some 2,063 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds by some way the equivalent emission factored criterion of 500 vehicles per day within Screening Stage 1 and was therefore progressed to Screening Stage 2.

5.3.18. Screening Stage 2 determined that Airtrack will result in changes in daily average speed of 8km/hr. Although this is less than the 10km/hr trigger, the decision was made to perform detailed dispersion modelling at this location. The outcomes of these predictions are included within **Table 5-3** and **Table 5-4** below. The highlighted change for each refers to the change which equates directly with the DfT TAG criterion at 20m from the pollution source; see *s.2.5.16*.

5.3.19. Based on the DfT TAG criteria within Screening Stage 3, the predicted changes in $PM_{10}$ and $NO_2$ concentrations at locations near the Vicarage Road level crossing are substantially below those considered to represent a significant air quality impact (2µg/$m^3$ and 1µg/$m^3$ respectively). Consequently the impact of Airtrack is likely to be negligible in terms of air quality impacts.

**Table 5-3 Vicarage Road $NO_2$ Predictions**

| Distance (m) | 2009 Baseline $NO_2$ ($\mu g/m^3$) | 2015 Without Airtrack $NO_2$ ($\mu g/m^3$) | 2015 With Airtrack $NO_2$ ($\mu g/m^3$) | Change $NO_2$ ($\mu g/m^3$) |
|---|---|---|---|---|
| 0 | 29.10 | 23.40 | 23.65 | 0.26 |
| 10 | 29.05 | 23.37 | 23.58 | 0.21 |
| 20 | 28.72 | 23.11 | 23.31 | **0.20** |
| 30 | 28.72 | 23.11 | 23.30 | 0.19 |
| 40 | 29.03 | 23.36 | 23.55 | 0.19 |
| 50 | 29.02 | 23.36 | 23.54 | 0.19 |
| 60 | 29.01 | 23.35 | 23.54 | 0.18 |
| 70 | 28.99 | 23.34 | 23.53 | 0.19 |
| 80 | 28.65 | 23.07 | 23.25 | 0.19 |
| 90 | 28.63 | 23.05 | 23.23 | 0.18 |
| 100 | 28.94 | 23.30 | 23.48 | 0.18 |
| 110 | 28.92 | 23.29 | 23.46 | 0.17 |
| 120 | 28.58 | 23.02 | 23.18 | 0.16 |
| 130 | 28.88 | 23.26 | 23.42 | 0.16 |
| 140 | 28.86 | 23.25 | 23.40 | 0.16 |
| 150 | 28.51 | 22.97 | 23.12 | 0.15 |
| 160 | 28.79 | 23.21 | 23.36 | 0.15 |
| 170 | 28.75 | 23.18 | 23.33 | 0.15 |
| 180 | 28.40 | 22.89 | 23.04 | 0.14 |
| 190 | 28.67 | 23.12 | 23.25 | 0.13 |
| 200 | 28.57 | 23.04 | 23.16 | 0.12 |

**Table 5-4 Vicarage Road PM10 Predictions**

| Distance (m) | 2009 Baseline $PM_{10}$ ($\mu g/m^3$) | 2015 Without Airtrack $PM_{10}$ ($\mu g/m^3$) | 2015 With Airtrack $PM_{10}$ ($\mu g/m^3$) | Change $PM_{10}$ ($\mu g/m^3$) |
|---|---|---|---|---|
| 0 | 22.24 | 20.60 | 20.63 | 0.03 |
| 10 | 22.31 | 20.59 | 20.62 | 0.03 |
| 20 | 22.34 | 20.59 | 20.62 | **0.03** |
| 30 | 22.35 | 20.59 | 20.62 | 0.03 |
| 40 | 22.36 | 20.59 | 20.61 | 0.02 |
| 50 | 22.36 | 20.59 | 20.61 | 0.02 |
| 60 | 22.36 | 20.59 | 20.61 | 0.02 |
| 70 | 22.36 | 20.59 | 20.61 | 0.02 |
| 80 | 22.36 | 20.58 | 20.61 | 0.02 |
| 90 | 22.36 | 20.58 | 20.61 | 0.02 |
| 100 | 22.36 | 20.58 | 20.60 | 0.02 |
| 110 | 22.35 | 20.58 | 20.60 | 0.02 |
| 120 | 22.35 | 20.58 | 20.60 | 0.02 |
| 130 | 22.35 | 20.58 | 20.60 | 0.02 |
| 140 | 22.34 | 20.57 | 20.59 | 0.02 |
| 150 | 22.34 | 20.57 | 20.59 | 0.02 |
| 160 | 22.33 | 20.57 | 20.59 | 0.02 |
| 170 | 22.32 | 20.57 | 20.59 | 0.02 |
| 180 | 22.31 | 20.56 | 20.58 | 0.02 |
| 190 | 22.29 | 20.56 | 20.58 | 0.02 |
| 200 | 22.21 | 20.55 | 20.57 | 0.02 |

## 5.4. Station Road, Egham

### Baseline Context for the Crossing

5.4.1. The railway line bisects Egham, and Station Road provides the main link between its commercial centre to the north, a large residential area (about 20% of the residential area of Egham) and its various community facilities to the south. This level crossing is the third of the three closely spaced level crossings without an immediate alternative route that avoids the railway. This crossing has the heaviest pedestrian usage. The crossing is 170m from the Church Road traffic signals.

5.4.2. Traffic flows[12] observed during the morning peak (08:00-09:00) were in the order of 281 vph towards Egham (pedestrians 274 per hour) and 265 vph away from Egham (pedestrians 175 per hour). In the evening peak (17:00-18:00) 350 vph and 50 pedestrians were observed away from Egham and 239 vph and 130 pedestrians crossed towards Egham. The town centre and its northern bypass are congested during peak periods; in the morning peak northbound queues were observed to extend back from the Church Road lights, across the crossing and as far south as the Manorcroft roundabout.

5.4.3. Proctor and Gamble run a peak hour shuttle bus to and from the station and Royal Holloway College (University of London) operates a single-decker bus under contract scheduled to depart the lay by just SE of the level crossing every 15 minutes throughout the day. Manorcroft Primary school and Egham station generate large numbers of pedestrian and vehicle movements over the railway There is, however, a pedestrian bridge alongside Station Road, and another some 300m to the south-west linking Rusham Road and Rusham Park Avenue. The Station Road footbridge was surveyed over a 12 hour day in February 2009; only 125 people used the bridge compared with 1,885 using the level crossing.

[12] Traffic observed at 08:00-09:00 on a weekday in May 2008; pedestrians in February 2009.

5.4.4. Station Road is used by bus services 566 and 567, both connecting Egham and Staines. They each run every hour and operate in alternation with each other providing in effect a service every 30 minutes between Egham and Staines.

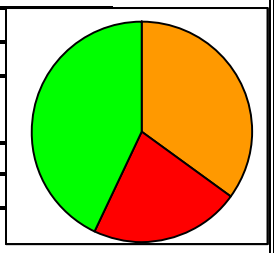
5.4.5. Eight trains pass the crossing every hour during the day (four in each direction), resulting in some six closures and a total downtime of almost 21 minutes in an average daytime hour.

## Barrier and Traffic Effects

5.4.6. The barrier assessment results for Station Road, Egham are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:20:45 | 6.3 |
| Post Airtrack | 0:33:45 | 9.2 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 35% |
| Extra Airtrack closure | 22% |
| Barrier open with Airtrack | 43% |
| Barrier open time lost | 33% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction AM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 9.2 | 172 | 16 | 422 | 326 | 77% |

5.4.7. Airtrack will double the number of passenger trains in each direction from four to eight every hour, causing 21% more barrier closure, or a 33% loss of barrier open time, during an average daytime hour. This equates to some 13 minutes more closure time per hour.

5.4.8. Despite the significant increase in barrier closures due to Airtrack, in peak periods at least, impacts on traffic will be partly obscured by the existing congestion due to the constrained local junction capacity. Off peak traffic is, however, more likely to be delayed by a barrier closure, although after reopening the queues should dissipate within one minute.

5.4.9. Overall, Airtrack is predicted to have a **severe adverse** and **significant effect** on traffic at this location, particularly when the impacts on the two bus services are taken into account.

## Community Effects

5.4.10. Community facilities located around the Station Road crossing are shown in **Figure 5.3** above.

5.4.11. Of these, there are four facilities which have been categorised of primary sensitivity, namely:

- Egham fire station, located 500m north-east of the level crossing
- Egham police station, located 550m north-east of the level crossing
- Egham train station, located at the crossing; and
- Grove Community Health centre, located 250m north-east of the level crossing.

5.4.12. As noted above, there are no immediate road alternatives to this route. As with Vicarage Road, increased delays at the level crossing would therefore potentially affect emergency service vehicles, especially the fire service, although (as previously mentioned) fire engines would at least be expected to 'queue jump' in an emergency situation as they do at present. Users of the rail station are able to access both platforms either via a public footbridge or via a paid footbridge joining the platforms, although neither is DDA compliant. There is another (non DDA compliant) footbridge, some 300m west of the crossing, linking Rusham Road and Rusham Park Avenue.

5.4.13. There are a small number of schools within a 1km radius. Manorcroft primary school lies to the south of the level crossing, with no other primary schools within 1km to the north. Strodes College lies to the north as well as Royal Holloway University to the south. As before there are many

places of worship either side of the level crossing, many addressed by the Vicarage Road and Thorpe Road catchments.

5.4.14. A variety of local services such as shops, post offices, recreation grounds are situated either side of the level crossing, providing local people with good alternatives.

5.4.15. Overall a **severe adverse** and therefore **significant effect** on community facilities is considered likely, with impacts on access to schools, places of worship and for emergency fire services in particular affected by delays due to loss of barrier open time; a potentially more severe effect is reduced by the availability of foot crossings in the locality.

## Air Quality Effects

5.4.16. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic flow speeds at the level crossing and approaching roads. This equates to an estimated flow pattern change of some 1,345 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds the equivalent emission factored criterion of 500 vehicles per day and was therefore progressed to Screening Stage 2.

Screening Stage 2 determined that Airtrack will result in changes in daily average speed of 2km/hr. Although this is less than the 10km/hr trigger, the decision was made to perform detailed dispersion modelling at this location. The outcomes of these predictions are included within **Table 5-5** and **Table 5-6** below. The highlighted change for each refers to the change which equates directly with the DfT TAG criterion at 20m from the pollution source; see *s.2.5.16*.

**Table 5-5 Station Road, Egham $NO_2$ Predictions**

| Distance (m) | 2009 Baseline $NO^2$ ($\mu g/m^3$) | 2015 Without Airtrack $NO^2$ ($\mu g/m^3$) | 2015 With Airtrack $NO^2$ ($\mu g/m^3$) | Change $NO^2$ ($\mu g/m^3$) |
|---|---|---|---|---|
| 0 | 28.68 | 23.08 | 23.33 | 0.25 |
| 10 | 28.63 | 23.05 | 23.26 | 0.20 |
| 20 | 28.30 | 22.79 | 22.97 | **0.18** |
| 30 | 28.28 | 22.77 | 22.95 | 0.18 |
| 40 | 28.57 | 23.02 | 23.18 | 0.17 |
| 50 | 28.55 | 23.00 | 23.16 | 0.16 |
| 60 | 28.53 | 22.99 | 23.14 | 0.15 |
| 70 | 28.49 | 22.96 | 23.11 | 0.15 |
| 80 | 28.13 | 22.68 | 22.81 | 0.13 |
| 90 | 28.09 | 22.65 | 22.77 | 0.12 |
| 100 | 28.37 | 22.88 | 22.99 | 0.11 |
| 110 | 28.35 | 22.86 | 22.96 | 0.10 |
| 120 | 28.02 | 22.59 | 22.68 | 0.09 |
| 130 | 28.32 | 22.83 | 22.91 | 0.08 |
| 140 | 28.31 | 22.82 | 22.89 | 0.07 |
| 150 | 27.98 | 22.56 | 22.62 | 0.06 |
| 160 | 28.29 | 22.81 | 22.86 | 0.05 |
| 170 | 28.28 | 22.80 | 22.84 | 0.04 |
| 180 | 27.96 | 22.54 | 22.57 | 0.03 |
| 190 | 28.26 | 22.79 | 22.81 | 0.03 |
| 200 | 28.22 | 22.75 | 22.78 | 0.02 |

**Table 5-6 Station Road, Egham PM10 Predictions**

| Distance (m) | 2009 Baseline $PM_{10}$ ($\mu g/m^3$) | 2015 Without Airtrack $PM_{10}$ ($\mu g/m^3$) | 2015 With Airtrack $PM_{10}$ ($\mu g/m^3$) | Change $PM_{10}$ ($\mu g/m^3$) |
|---|---|---|---|---|
| 0 | 22.05 | 20.56 | 20.59 | 0.03 |
| 10 | 22.09 | 20.56 | 20.58 | 0.03 |
| 20 | 22.10 | 20.55 | 20.58 | **0.02** |
| 30 | 22.11 | 20.55 | 20.57 | 0.02 |
| 40 | 22.11 | 20.55 | 20.57 | 0.02 |
| 50 | 22.11 | 20.55 | 20.57 | 0.02 |
| 60 | 22.11 | 20.55 | 20.57 | 0.02 |
| 70 | 22.10 | 20.54 | 20.56 | 0.02 |
| 80 | 22.10 | 20.54 | 20.56 | 0.02 |
| 90 | 22.09 | 20.54 | 20.55 | 0.02 |
| 100 | 22.09 | 20.53 | 20.55 | 0.01 |
| 110 | 22.08 | 20.53 | 20.54 | 0.01 |
| 120 | 22.08 | 20.53 | 20.54 | 0.01 |
| 130 | 22.08 | 20.53 | 20.54 | 0.01 |
| 140 | 22.08 | 20.53 | 20.53 | 0.01 |
| 150 | 22.07 | 20.52 | 20.53 | 0.01 |
| 160 | 22.07 | 20.52 | 20.53 | 0.01 |
| 170 | 22.07 | 20.52 | 20.53 | 0.00 |
| 180 | 22.06 | 20.52 | 20.53 | 0.00 |
| 190 | 22.05 | 20.52 | 20.53 | 0.00 |
| 200 | 22.01 | 20.52 | 20.52 | 0.00 |

5.4.17. Based on the DfT TAG criteria within Screening Stage 3, the predicted changes in $PM_{10}$ and $NO_2$ concentrations at locations near the Station Road level crossing are substantially below those considered to represent a significant air quality impact ($2\mu g/m^3$ and $1\mu g/m^3$ respectively). Consequently the impact of Airtrack is likely to be negligible in terms of air quality impacts.

## 5.5. Prune Hill, Rusham

### Baseline Context for the Crossing

5.5.1. Prune Hill is a narrow lane in a rural location, but that provides important access to a pharmaceutical research establishment.

5.5.2. Traffic flows[13] in the morning peak 08:00 – 09:00 were in the order of 222vph eastbound and 170vph westbound; there were no observed pedestrian. In the evening peak (17:00 – 18:00) there were 194 vehicles and 2 pedestrians westbound and 134 vehicles and one pedestrian eastbound. Network Rail is able to operate an automatic half barrier level crossing, which closes for significantly shorter periods than manually operated full barrier crossings. The crossing has no local alternative route that avoids the railway.

5.5.3. No bus services have been identified that use Prune Road.

5.5.4. Eight in service passenger trains pass the crossing every hour during the day (four in each direction), resulting in some 10 closures and a total downtime of some 10 minutes in an average daytime hour. The low traffic volume and the comparatively short barrier closure period result in only short queues which dissipate within half a minute of the crossing reopening.

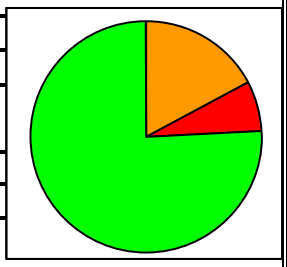
[13] Traffic and pedestrians observed 07:00-19:00 on a weekday in March 2009

### Barrier and Traffic Effects

5.5.5. The barrier assessment results for Prune Hill, Rusham are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:10:20 | 10.3 |
| Post Airtrack | 0:14:50 | 13.2 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 17% |
| Extra Airtrack closure | 7% |
| Barrier open with Airtrack | 75% |
| Barrier open time lost | 9% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction AM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 13.2 | 206 | 24 | 1088 | 217 | 20% |

5.5.6. Airtrack will double the number of passenger trains in each direction from four to eight, causing 7% more barrier closure, or an 8% loss of barrier open time, during an average daytime hour. This equates to some four and a half minutes more closure time per hour, and with average closure periods increasing from 49 to 56 seconds only. This is not likely to be noticed by road users so the effect is deemed to be no more than slightly adverse and not significant.

### Community Effects

5.5.7. The relatively small loss of barrier open time and its associated effects on access is considered unlikely to have any significant effects on community facilities and services.

### Air Quality Effects

5.5.8. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic movements at the level crossing and surrounding roads. This equates to an estimated flow pattern change of some 171 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This is less than the equivalent emission factored criterion of 500 vehicles per day. Impacts on air quality are therefore considered to be negligible and this location was scoped out at Screening Stage 1.

## 5.6. Effects on the Highway Network

5.6.1. The level crossings between Staines and Virginia Water already have a key impact on the movement of traffic in and out of a part of Runnymede District that is, in essence, islanded by railways north, west and south and by the River Thames to the east. This is shown in **Figure 5.1**. The M25 and M3 both pass through this area, but neither are accessible from within it.

5.6.2. The four level crossings on the Waterloo-Reading rail line affect the north-south access of this area. 68% of traffic using these crossings emanates from the islanded area, 18% is passing through to access Staines or Egham and 13% is passing through on a longer distance trip. Thorpe Road provides the principal route to Staines from Egham Hythe via Staines Bridge. There is alternative access via St Pauls Road and Bowes Road onto the A320, but this is hard to navigate and the A320 is frequently congested in common with Thorpe Road at its approach to the Causeway Roundabout. It therefore offers little prospect of time saving. At peak times when there is heavy traffic on the Causeway roundabout and on the narrow Staines Bridge, potential impacts of the Thorpe Road crossing on northbound traffic are obscured and effectively nullified. Southbound traffic queues can themselves impede movement on the roundabout and longer queues due to Airtrack services will exacerbate this.

- Vicarage Road is the strategic spine route through the islanded area carrying traffic to M25 junction 13. It links Pooley Green and Egham High Street. Potential impacts of the crossing

are obscured at peak times by heavy traffic on the High Street. In the morning peak period this High Street traffic is taking advantage of the signal controlled access to the Runneymede roundabout (and M25 junction 13) which avoids the long queues eastbound on the Egham bypass and its unsignalled junction with the roundabout. Under these conditions traffic on the High Street and the mini roundabout constrains northbound flows on Vicarage Road, causing regular backing up over the open crossing. Equally, in the pm peak the level crossing can cause queues to back up to the mini roundabout.

- Station Road is near to Vicarage Road and has similar issues. It also experiences the effects of traffic on the High Street/Church Road Having a signal controlled junction with Church Road, means that northbound traffic on Station Road can egress onto a congested Church Road at a regulated rate, but during the am peak only 18% of the fixed cycle time is currently dedicated to releasing the single line of vehicles from Station Road. The actual peak morning flows crossing the railway represent about 90% of the maximum capacity through the traffic signals consequently traffic queues regularly extend back over the open crossing.
- Prune Hill is not heavily used and serves mostly local traffic. It does not provide a reasonable alternative to Station Road as it forms a long detour.

5.6.3. Impacts on the immediate road network associated with the operation of the level crossings in the Egham area are complex. Increased barrier down time will exacerbate these impacts but are unlikely to result in significant effects on the wider network through diversions of existing traffic flows, owing to the lack of alternative routes and the high levels of traffic already using these routes.

## 5.7. Possible Solutions in Egham

5.7.1. For each of the significantly affected level crossings, any possible road network solutions would involve the local highway authority, although these would not be part of the Airtrack Scheme. These may involve strategic measures to improve capacity and reduce traffic congestion, for example, at the roundabouts. Introduction of signal control at the Egham Bypass/Runnymede roundabout junction may assist traffic flows at this location and so discourage the current morning peak propensity to divert via Church Road and the High Street, where such a signal controlled junction with the Runnymede roundabout already exists. Equally the provision of a wider entry to the Runnymede roundabout from the High Street by setting back the kerb line and allowing a sustained two-car width flow onto the roundabout under traffic signal control would help to assist traffic flow.

5.7.2. In some cases there may be simpler options. For example, at Station Road the existing traffic signals at Church Road T-junction have, until recently, operated on fixed time phasing and were therefore unresponsive to traffic conditions on the Station Road approach arising from the level crossing operation. It is understood that a more demand-responsive control system on these lights has recently been introduced, where sensors buried in the road or pavement detect the presence of traffic waiting at the light, and this should help to avoid unnecessary delays. The introduction of an ‘intelligent link’ between the traffic lights and the level crossing could help to further manage traffic flows on Station Road.

5.7.3. Unless improved highway operation can be achieved around these level crossings, available barrier-open time will continue to be wasted by traffic queues tailing back across the railway line during peak demand periods.

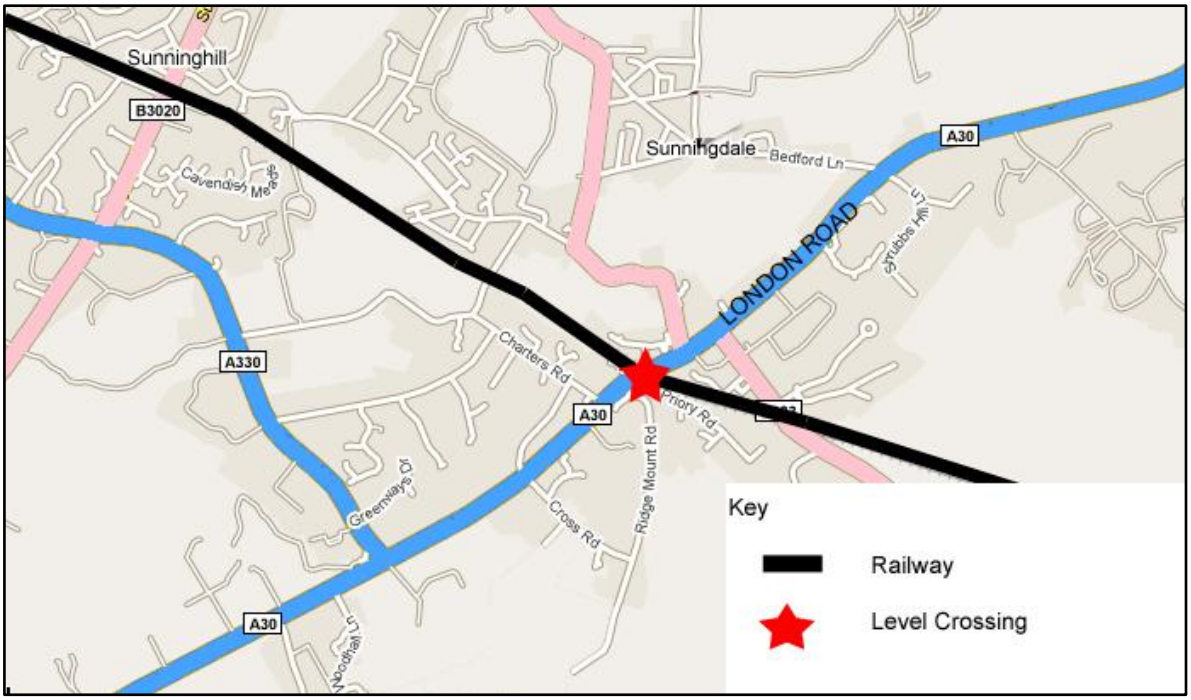
5.7.4. As with Richmond, other options to address existing and future traffic delays at crossings in the area include optimising the performance of level crossing closures. This would require strategic changes in barrier operations by Network Rail.

# 6. SUNNINGDALE

## 6.1. Introduction

6.1.1. At Sunningdale, in the District of Windsor and Eton, there is only one level crossing that will be affected by Airtrack: on London Road.

**Figure 6.1 Level Crossing in Sunningdale**




## 6.2. London Road, Sunningdale

### Baseline Context for the Crossing

6.2.1. The A30 London Road passes through Sunningdale and crosses the railway adjacent to the station. It has two lanes in each direction and attracts quite high traffic volume. Frequent pedestrian or cycle movements are consistent with a relatively compact town. Traffic flows[14] in the morning peak (07:00 – 08:00) were in the order of 696vph northbound (pedestrians 16)and 394 vph southbound (pedestrians 24). In the evening peak (17:00 – 18:00) larger volumes were observed; 754 vph (pedestrians 34) southbound and 578 vph (pedestrians 55) northbound.

6.2.2. An alternative route avoiding the level crossing is available via the Dry Arch Road under-railbridge located approximately 600m to the north-west. The route to the bridge passes along Charters Road, a quiet residential road, and close to Sunningdale School. Under normal circumstances with most crossing closures being for a single train movement, the journey time avoiding the level crossing closure would be longer than the delay awaiting re-opening.

6.2.3. Three bus services use the London Road level crossing. Bus service 1 operates between Sunninghill and Ascot; bus service 24 operates between Sunninghill and Winkfield; and bus service 500 operates between Sunningdale and Staines. These are not frequent services, the 24 bus only operating once daily, and the 1 and 500 services being hourly.

6.2.4. Four in service passenger trains pass the crossing every hour during the day (two in each direction), resulting in some five closures and a total barrier down time of some 13 minutes in an average daytime hour. During off peak closures queues of up to 25 to 30 vehicles build up but are dissipated within the first minute after re-opening. The traffic queue on the town side of the crossing extends across the station access and food retail car park entrance.

[14] Traffic and pedestrians observed 07:00 – 19:00 on a weekday in March 2009

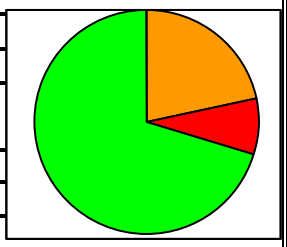
6.2.5. Between 29th September and 12th December 2008, Network Rail initiated a "leaf fall" timetable change to overcome the seasonal problems of slippery rails. The level crossing barriers were closed significantly earlier. This had the observed effect of making otherwise separated Up and Down train movements into longer closures for a two- direction train crossing. The impact of the changes was considerable with some 'both direction' train barrier closures being observed at more than nine minutes. However, the conditions assumed for this assessment were those occurring during the non-autumn timetable.

## Barrier and Traffic Effects

6.2.6. The barrier assessment results for London Road, Sunningdale are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:13:00 | 5.2 |
| Post Airtrack | 0:17:40 | 7.0 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 22% |
| Extra Airtrack closure | 8% |
| Barrier open with Airtrack | 71% |
| Barrier open time lost | 10% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction AM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 7.0 | 363 | 36 | 1525 | 547 | 36% |

6.2.7. Airtrack will double the number of passenger trains in each direction from two to four but the number of closures will be much the same, so that the crossing will be closed for some 20 minutes in every average daytime hour, an increase of almost six minutes each hour. The average closure duration will increase from the current 2.75 minutes to 4 minutes.

6.2.8. Road traffic will be more likely to encounter a barrier closure but the traffic built up at each closure will dissipate generally within the first minute after reopening followed by on average five minutes of free-flow condition. Airtrack will therefore have a slight adverse and non-significant effect on traffic at this location.

## Community Effects

6.2.9. The relatively small loss of barrier open time and its associated effects on access is considered unlikely to have any significant effects on community facilities and services.

## Air Quality Effects

6.2.10. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic movements at the level crossing and surrounding roads. This equates to an estimated flow pattern change of some 1,201 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds the equivalent emission factored criterion of 500 vehicles per day and was therefore progressed to Screening Stage 2.

6.2.11. Screening Stage 2 determined that Airtrack will result in changes in daily average speed of 4km/hr and peak average speed of 3km/hr. This is considerably less than the 10km/hr and 20km/hr triggers of potential significance, and the crossing was therefore considered unlikely to result in a significant air quality impact.

# 6.3. Effects on the Highway Network

6.3.1. The A30 London Road is a dual carriageway, which serves both local and longer distance traffic. Despite the queues that form during a barrier closure, these dissipate quickly and drivers are

unlikely to seek an alternative route currently, the nearest being via an underbridge located along Charters Road and Dry Arch Road some 600m to the north-west. This situation is unlikely to change with the introduction of Airtrack. However, were Network Rail to continue to manage barrier closures during the autumn timetable with longer advanced closures, local drivers at least might begin to seek alternative routes. This would not have impacts on the wider network, but might result in more traffic on this particular alternative route.

## 6.4. Possible Solutions in Sunningdale

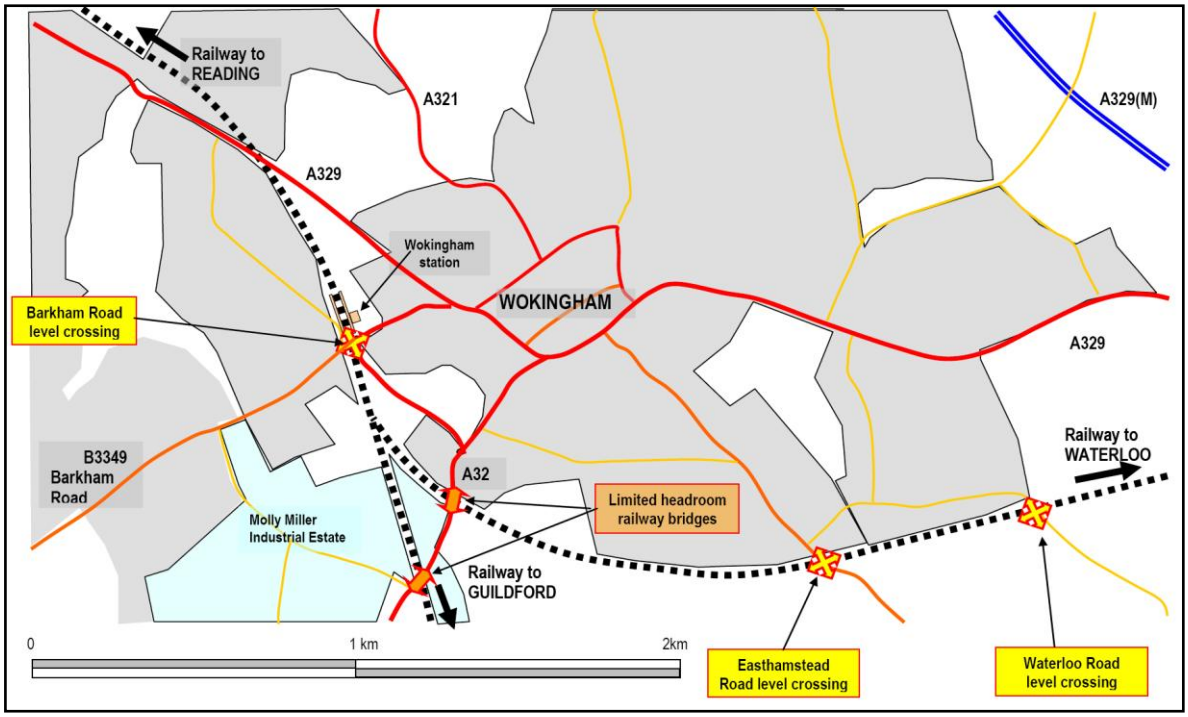
6.4.1. There are few current issues associated with the operation of this crossing other than those to do with the operation of the autumn timetable. The barrier operation regime during this period is an operational safety matter managed by Network Rail.

# 7. WOKINGHAM

## 7.1. Introduction

7.1.1. In Wokingham in the District of Wokingham, there are three level crossings that will be affected by Airtrack: on Waterloo Road, Easthampstead Road and Barkham Road.

**Figure 7.1 Level Crossings in Wokingham**




7.1.2. The baseline context reported here may be greatly affected by new proposed development south of the Easthampstead Road crossing. The draft Wokingham Core Strategy proposes substantial new developments including 2,500 new homes south of the railway. At the time of writing, the Examination in Public is closed and the Inspector's report awaited. Without new infrastructure these developments will significantly add to traffic at the crossings. However, the scheme includes a new distributor road from A321 Finchampstead Road to A329 London Road including improvements at the station with a new bridge crossing the railway south East of Wokingham. Network Rail has made representations that closing the crossings should be considered if the distributor road is built.

## 7.2. Waterloo Road, Wokingham

### Baseline Context for the Crossing

7.2.1. Waterloo Road is a narrow rural lane where the south-eastern limit of Wokingham residential area meets open countryside en-route to Bracknell. It attracts light traffic as there is a faster route via A329 which bridges the railway 1.4km to the east. There are very few pedestrian or cycle movements. Traffic flows[15] were in the order of 102vph northbound and 84vph southbound.

7.2.2. Network Rail is able to operate an automatic half barrier level crossing, which closes for significantly shorter periods than a manually operated full barrier crossing would.

7.2.3. No bus services have been identified that use Waterloo Road.

7.2.4. Four in service passenger trains pass the crossing every hour during the day (two in each direction), resulting in some five closures and a total barrier down time of some four minutes in an

[15] Traffic observed at 14:00 on a weekday in September 2008

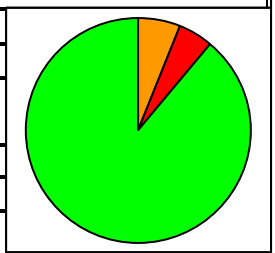
average daytime hour. The low traffic volume and the comparatively short barrier closure period result in only short queues which dissipate within half a minute of the crossing reopening.

### Barrier and Traffic Effects

7.2.5. The barrier assessment results for Waterloo Road, Wokingham are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:03:50 | 4.8 |
| Post Airtrack | 0:07:00 | 8.7 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 6% |
| Extra Airtrack closure | 5% |
| Barrier open with Airtrack | 88% |
| Barrier open time lost | 6% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction off peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 8.7 | 367 | 24 | 1277 | 102 | 8% |

7.2.6. Airtrack will double the number of passenger trains in each direction from two to four, which will almost double the average number of hourly closures, from about five to nine. The crossing will be closed for some seven minutes in every average daytime hour, an increase of a little over three minutes each hour. However, where the closure durations are less than one minute, this will have no significant effect on a crossing that will remain open for almost 90% of the time.

7.2.7. With the continued large open time for this barrier, Airtrack will have only a slight adverse and non-significant effect on traffic at this location.

### Community Effects

7.2.8. The relatively small loss of barrier open time and its associated effects on access is considered unlikely to have any significant effects on community facilities and services.

### Air Quality Effects

7.2.9. Changes in barrier down time are predicted to result in an equivalent emission factored '1000 AADT flow' criterion of +164, meaning that during the day, 164 more vehicles are likely to be stationary than would be in the absence of Airtrack. This change is therefore not considered as significant in terms of air quality and was scoped out at Screening Stage 1.

## 7.3. Easthampstead Road, Wokingham

### Baseline Context for the Crossing

7.3.1. Easthampstead Road is a residential road from Wokingham town centre running south-east to the railway where it passes into open countryside towards the southern sector of Bracknell. It attracts moderate traffic volume, but with few pedestrian or cycle movements. Traffic flows[16] were in the order of 310vph away from Wokingham and 248vph towards the town centre. Alternative routes comprise Waterloo Road about 700m east, which is also via level crossing, and the A321 Finchampstead Road underpass located about 1.5km to the west.

7.3.2. No bus services have been identified that use Easthampstead Road.

7.3.3. Four in service passenger trains pass the crossing every hour during the day (two in each direction), resulting in some five closures and a total barrier down time of some 13 minutes in an

[16] Traffic observed at 15:00 on a weekday in September 2008

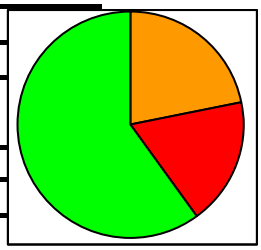
average daytime hour. During off peak closures, southbound queues of up to 15 vehicles build up and can extend back to the Waterloo Road junction, 70m from railway, but these dissipate within the first minute after reopening.

## Barrier and Traffic Effects

7.3.4. The barrier assessment results for Easthampstead Road, Wokingham are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:13:05 | 4.7 |
| Post Airtrack | 0:23:50 | 8.2 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 22% |
| Extra Airtrack closure | 18% |
| Barrier open with Airtrack | 60% |
| Barrier open time lost | 23% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction off peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 8.2 | 264 | 22 | 794 | 310 | 39% |

7.3.5. Airtrack will double the number of passenger trains in each direction from two to four, which will increase barrier closures from about five to nine during the average daytime hours, causing a proportional total increase in closure time of some 75% and an overall loss of barrier open time over an hour of 23%. This equates to an increase of around 11 minutes during an average hour when the barrier will be closed. However, the closure durations will increase by an average of just seven seconds so queue lengths will not change much. Even with Airtrack the crossing will remain open 60% of the time.

7.3.6. This crossing has no good local alternative route that avoids the level crossing. Road traffic built up at each closure will dissipate generally within the first minute after reopening, but drivers are almost twice as likely to encounter a closed barrier. Airtrack will therefore have a **moderate adverse** and therefore **significant effect** on traffic at this location.

## Community Effects

7.3.7. Community facilities located around the Easthampstead Road crossing are shown in **Figure 7.2**.

7.3.8. Of these, the Royal Berkshire Fire and Rescue service is located within 1km of the crossing and is considered of primary sensitivity. However, the crossing is also in the catchment for the south central ambulance service which distributes responder vehicles and is located 1.2km to the west of the level crossing on the north side, and the police station located 1km north-west of the crossing, but police vehicles are generally deployed from mobile patrol locations.

7.3.9. The majority of community facilities lie to the north of the level crossing including a number of schools however there are two schools within 1km to the south of the level crossing, but equally, the residential community is very sparse to the south, although this could change should proposals for residential development south of the railway to proceed. There is no footbridge by the level crossing and no convenient footbridge alternative within 1km.

7.3.10. Given the polarity of the residents and local community facilities, with the majority located north of the crossing, the effect on community facilities from loss of barrier open time at the Easthampstead level crossing is likely to be no more than slight adverse and therefore not significant. Ambulance services are unlikely to use this crossing given the proximity of the ambulance station to the A321

### Air Quality Effects

7.3.11. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic movements at the level crossing and surrounding roads. This equates to an estimated flow pattern change of some 1,665 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds the equivalent emission factored criterion of 500 vehicles per day, which warrants further consideration as part of a Screening Stage 2 assessment.

7.3.12. In the absence of average speed data, it was not possible to determine changes in average traffic speed and so address this location at Screening Stage 2 or progress to the detailed Stage 3 modelling assessment. However, based on the results of the Stage 2 and Stage 3 assessments for crossings at Egham, which are likely to result in a similar number of slow moving vehicles due to Airtrack than would occur here, any air quality impacts at Easthampstead Road are likely to be negligible.

## 7.4. Barkham Road, Wokingham

### Baseline Context for the Crossing

7.4.1. This level crossing is on the south-west limb of a four arm mini roundabout serving the town centre and the railway station. The existing junction is already poorly configured to deal with the complex traffic and pedestrian movements especially when the level crossing closure causes queuing on the Wokingham side. There is only space for a single car to clear the level crossing to approach the roundabout give-way line. Consequently the flow from Barkham progresses in a stop/start manner in an extremely inefficient way. This level crossing is manually operated from the adjacent signal box where the signaller has direct vision over the crossing and its approaches. It has a footbridge available for pedestrian use during barrier closures. Traffic flows[17] were in the order of 294vph towards Wokingham and 210vph from Wokingham.

7.4.2. There are alternative routes from Barkham Road that avoid the railway crossing. Oxford Road leaves Barkham Road immediately west of the level crossing and provides a route to the A329 to Reading avoiding Wokingham town centre. To the south of Barkham Road, a route through Molly Miller Industrial estate provides access to the A321 Finchampstead Road, which then connects with Wokingham town. Using two under-bridges this 2km diversion offers limited headroom, but can be used by all but high-sided vehicles.

7.4.3. Barkham Road is used by bus services 122 (connecting Woosehill and Crowthorne), 144 (connecting Reading and Wokingham) and 145 (connecting Three Mile Cross and Winnersh). Bus service 144 operates twice every hour and is the most frequent of services that use this level crossing. Service 122 operates 2-3 per hour weekdays and Saturday. Service 145 is a weekly service.

7.4.4. Eight in service passenger trains pass the crossing every hour during the day (four in each direction), resulting in six to seven closures and a total barrier down time of some 21 minutes in an average daytime hour. When the crossing is open the dominant traffic from Wellington Road into Station Road severely limits traffic from Barkham Road crossing the railway. When the crossing is closed traffic between Wokingham and Barkham builds up and disrupts other traffic movement. The signalised pedestrian crossing on Station Road is frequently activated causing disruption to all traffic movements.

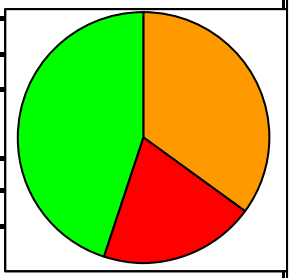
[17] Traffic observed at 08:00 on a weekday in September 2008

## Barrier and Traffic Effects

7.4.5. The barrier assessment results for Barkham Road, Wokingham are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:20:45 | 6.4 |
| Post Airtrack | 0:32:50 | 10.1 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 35% |
| Extra Airtrack closure | 20% |
| Barrier open with Airtrack | 45% |
| Barrier open time lost | 31% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Observed 2008 traffic per direction AM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 10.2 | 162 | 15 | 413 | 337 | 82% |

7.4.6. Airtrack will exacerbate the poor access to and from Wokingham along this road. It will add 50% more passenger trains (from four to six in each direction every hour) causing 60% more barrier closures (from about six to ten per average daytime hour), but without extending the duration of each. This means a total reduction in barrier open time over an hour of 31% which equates to 12 minutes more closure time per average daytime hour.

7.4.7. Existing peak traffic volumes struggle to make use of the available open crossing period due to the poor roundabout entry configuration. With additional Airtrack services road traffic using Barkham Road will experience longer delays; and queues towards Wokingham only infrequently likely to dissipate when the crossing is open due to the poor roundabout entry capacity. Airtrack is therefore predicted to result in a **severe adverse** and **significant effect** on traffic at this location, particularly when the impacts on the two most frequent bus services are taken into account.

## Community Effects

7.4.8. Community facilities located around the Barkham Road crossing are shown in **Figure 7.2**.

## Figure 7.2 Community Facilities around Barkham Road and Easthampstead Road Level Crossings


Key

1. The Dental Studio
2. The Holt School
3. St Pauls Parish Church
4. The Masonic Centre
5. Glebelands Residential Home
6. Walter Infant School and Nursery
7. West Oak Care Home
8. Wokingham Railway Station
9. Beachcroft Dental Practice
10. Wokingham Community Hospital
11. High Close School (Barnardo's)
12. Suffolk Lodge Residential Home
13. All Saints Parish Church
14. Wokingham Baptist Church
15. Bracknell and Wokingham College
16. Wokingham Methodist Church
17. Westcott Infant School
18. Westende Junior School
19. St Crispin's School
20. Wokingham Dental Clinic
21. Friends Meeting House (Quakers)
22. Lovatt House Care Home
23. St Theresa's Catholic Primary School
24. Corpus Christi Catholic Church
25. Down Lodge Care Home
26. Rectory Road Surgery
27. Wokingham Police Station
28. South Central Ambulance Service
29. The Berkshire Nursing Home
30. Southfield School
31. Ludgrove School
32. Holme Grange School
33. Wokingham Youth Centre
34. Smile 2O (Dentist)
35. Royal Berkshire Fire and Rescue

Note: Primary facilities are marked in orange and secondary facilities are marked in blue

7.4.9. Of these, there are five facilities which have been categorised of primary sensitivity, namely:

- South Central Ambulance Service, located 600m south of the level crossing;
- Wokingham Police Station, located 550m south-east of the level crossing;
- Royal Berkshire Fire and Rescue, located 700m east of the level crossing;
- Wokingham train station, located at the crossing; and
- Wokingham Community Hospital, located 200m west of the level crossing.

7.4.10. A footbridge at this crossing provides pedestrian access to both sides of the railway. However, emergency services and people accessing the community hospital will be impeded by traffic delays at the crossing, although emergency services would at least be expected to 'queue jump' in an emergency situation as they do at present. Other foot crossings are located 400m south linking the sports fields off Wellington Road and Ormonde Road (this crosses two lines, one by bridge and a second at grade), and a bridge crossing 350m north, off St Pauls Gate.

7.4.11. There are a number of secondary services within 1km of the level crossing including Holt Comprehensive School. There are primary schools and nurseries to the west and east of the crossing, but the footbridge will allow continuous access for those travelling by foot.

7.4.12. Overall a **severe adverse** and therefore **significant effect** on community facilities is considered likely, with impacts on access to the community hospital and from the Ambulance services in particular affected by delays due to loss of barrier open time. A more severe effect for pedestrians is reduced by the availability of foot crossings in the locality.

### Air Quality Effects

7.4.13. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic movements at the level crossing and surrounding roads. This equates to an estimated flow pattern change of some 1,447 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds the equivalent emission factored criterion of 500 vehicles per day, which would warrant further consideration as part of a Screening Stage 2 assessment.

7.4.14. In the absence of average speed data, it was not possible to determine changes in average traffic speed and so address this location at Screening Stage 2 or progress to the detailed Stage 3 modelling assessment. However, based on the results of the Stage 2 and Stage 3 assessments for crossings at Egham, which are likely to result in a similar number of slow moving vehicles due to Airtrack than would occur here, any air quality impacts at Barkham Road are likely to be negligible.

## 7.5. Effects on the Highway Network

7.5.1. The three level crossings in the Wokingham area each have a different strategic use based on their location, function and connection to the wider road network.

- Waterloo Road is lightly used by generally by Wokingham access traffic.
- Easthampstead Road also is likely to be dominated by Wokingham access traffic; longer distance traffic with no business in Wokingham would tend to travel via the A329 or A321. There are current proposals for a new large residential area south of this crossing, in which case its use will change substantially.
- Barkham Road provides some strategic function linking Wokingham with the A327 and A33, but because of the low capacity of the level crossing this route is likely to be dominated by Wokingham access traffic and high sided vehicles from the Molly Millar trading estate.. An alternative access for all but high sided traffic is available via Molly Millar's Lane and the A321 using two low rail underbridges.

7.5.2. Additional traffic delays at the Barkham Road crossing due to Airtrack could result in heavier use of the A321 alternative route, but is unlikely to result in significant traffic effects on the wider network, given the existing low level of service provided by current road/rail conditions.

## 7.6. Possible Solutions in Wokingham

7.6.1. Wokingham Borough Council (WBC) is progressing a study of options to improve the road system between the town centre and the railway, in order to improve public transport integration. This study is addressing the operational deficiencies of the current Barkham Road level crossing and should take account of the future Airtrack train service changes. In due course the proposal will be brought forward for public consultation. One option, being assessed collaboratively by WBC, Network Rail and South West Trains is the introduction of a new road link between Barkham Road and the A329, which would also allow for remodelling of the junctions either side of the level crossing and movement of pedestrian crossings. Any such solution would not be part of the Airtrack Scheme.

7.6.2. The District Councils owns a parcel of land immediately east of the Barkham Road level crossing, which offers potential to remodel the existing junction to separate it more from the railway crossing which currently exacerbate traffic congestion.

7.6.3. Any necessary infrastructure solutions for the additional barrier downtime at Easthampstead Road and Waterloo Road should be developed as part of the proposals for the South Wokingham Strategic Development Location

# 8. CHERTSEY AND ADDLESTONE

## Introduction

8.1.1. Chertsey and Addlestone are two distinct but nearby settlements within the District of Runnymede, each with a level crossing that will be affected by Airtrack, namely Guildford Road in Chertsey and Station Road in Addlestone.

**Figure 8.1 Level Crossing in Chertsey**

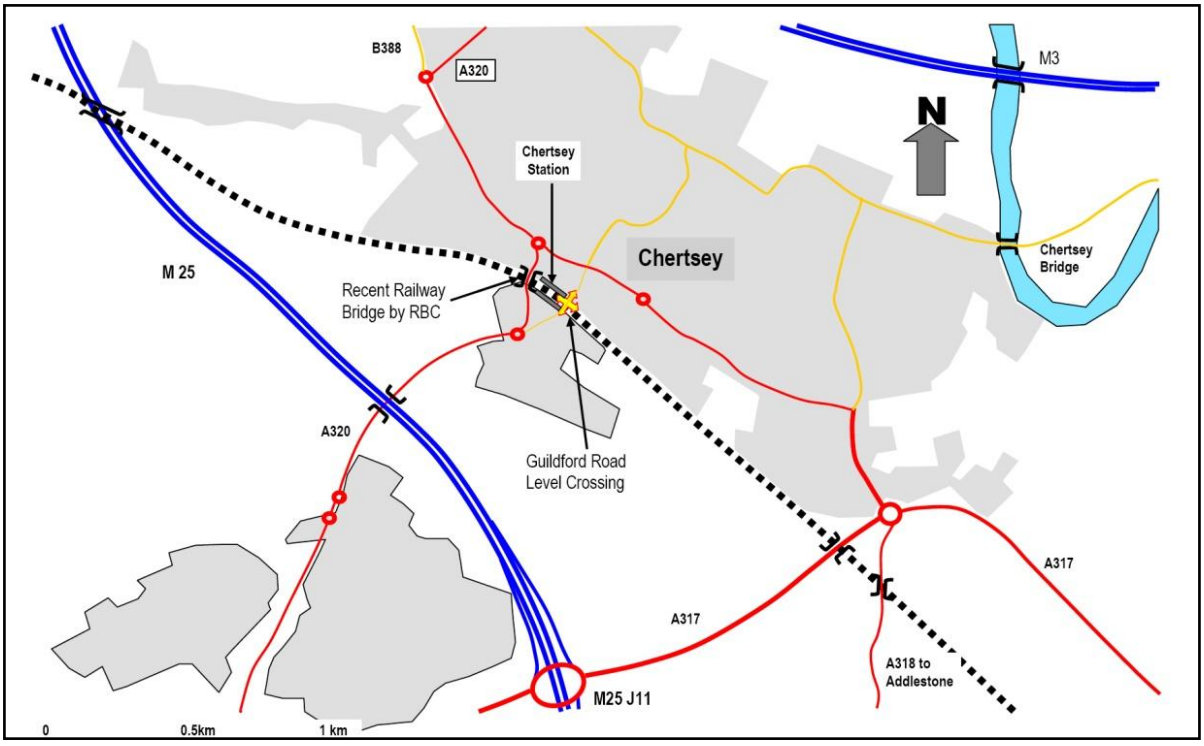
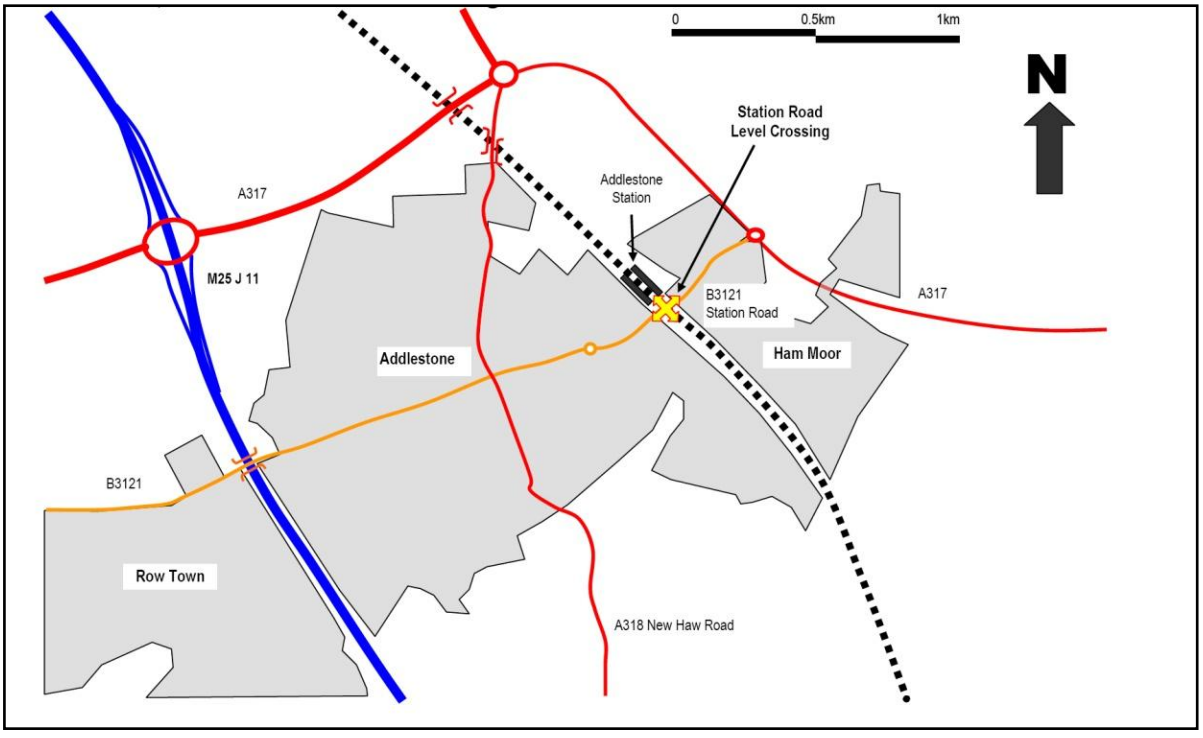



**Figure 8.2 Level Crossing in Addlestone**



## 8.2. Guildford Road, Chertsey

### Baseline Context for the Crossing

8.2.1. London Road used to carry the A320 from the south-east across this level crossing to Chertsey town centre. However, the construction of the Bell Road inner bypass created an alternative route over the railway that has left the London Road as a very lightly trafficked access route. Only short traffic queues were observed which dissipated within half a minute of the crossing reopening. Traffic flows[18] were in the order of 29vph northbound and 34vph southbound.

8.2.2. Four bus services operate across Guildford Road, namely:

- 461 connecting Addlestone with Staines (one journey per hour);
- 557 connecting Addlestone with Heathrow Airport (one journey per hour);
- 426 connecting Staines and Woking (hourly, Monday to Saturday); and
- 446 connecting Staines and Woking (hourly, Monday to Saturday).

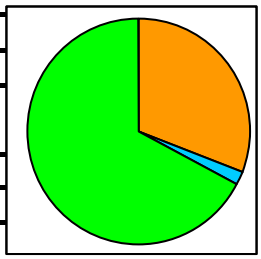
8.2.3. Four in service passenger trains pass the crossing every hour during the day (two in each direction), resulting in four to five closures and a total barrier down time of over 19 minutes in an average daytime hour.

### Barrier and Traffic Effects

8.2.4. The barrier assessment results for Guildford Road, Chertsey are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:19:15 | 4.7 |
| Post Airtrack | 0:18:05 | 3.6 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 32% |
| Extra Airtrack closure | -2% |
| Barrier open with Airtrack | 70% |
| Barrier open time lost | -3% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Approx 2008 traffic per direction PM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 3.6 | 693 | 22 | 915 | 34 | 4% |

8.2.5. The Airtrack timetable will introduce fewer but longer barrier closures in spite of doubling the hourly train movements from two to four in each direction. There will be over a minute less closure time per hour, but with average closure periods increasing by about a minute each. Overall this will result in 2% less closure time, or a 3% increase in barrier open time, during an average daytime hour.

8.2.6. The nominal traffic built up at each closure will dissipate generally within half a minute after reopening followed by on average 11 minutes of free-flow condition. Therefore, the very light traffic on this road will be less likely to encounter closed barrier, but they will have to wait, on average, one minute longer than present when they do. There is, however, a nearby alternative route that bridges the railway.

8.2.7. The respective benefits and disadvantages of the changes due to Airtrack will cancel each other yielding an overall negligible effect on traffic.

[18] Traffic observed at 17:00 on a weekday in September 2008

### Community Effects

8.2.8. The marginal increase in barrier up time and its associated effects on access is considered highly unlikely to have any significant effects on community facilities and services.

### Air Quality Effects

8.2.9. AADT flow' criterion of -11, meaning that during the day, 11 fewer vehicles are likely to be stationary than would be in the absence of Airtrack. This was therefore scoped out at Screening Stage 1 and is considered to have negligible impact on air quality.

## 8.3. Station Road, Addlestone

### Baseline Context for the Crossing

8.3.1. Station Road (B3121) carries traffic from the A317 Weybridge Road west of Addlestone to the town centre. It is lined by offices, shops and community uses and provides access to the railway station. The A318 High Street through Addlestone bridges over the railway to the north.

8.3.2. Road access to Addlestone from north, west and south is free of level crossings. Access from Weybridge to the east is disrupted by level crossing closures. The diversion to avoid the level crossing adds about 1.2 km to the trip to the town centre.

8.3.3. Traffic flows[19] in the morning peak (08:00 – 09:00) were 561vph (pedestrians 102) towards Addlestone and 494vph (pedestrians 63) away from Addlestone. In the evening peak (17:00 – 18:00) 629 vph (pedestrians 62) out of Addlestone and 434vph (pedestrians 74) were observed crossing into the town. There are roundabout junctions approximately 250m north and south of the railway crossing, both of which appear to operate without causing queuing across the open level crossing.

8.3.4. Five bus services operate across Station Road, namely:

- P4 connecting Addlestone with Chertsey South (seven journeys per day, weekdays only);
- 437 connecting New Haw with Woking (every 20 minutes in peak hour, hourly during midday period);
- 461 connecting Addlestone with Staines (one journey per hour);
- 471 connecting Addlestone with Woking (two journey per hour); and
- 557 connecting Addlestone with Heathrow Airport (one journey per hour).

8.3.5. Four in service passenger trains pass the crossing every hour during the day (two in each direction), resulting in three to four closures and a total barrier down time of some 14 minutes in an average daytime hour When the crossing is closed, moderate traffic queues were observed in the PM peak to result in queues of up to 25 vehicles; these dissipate in just over a minute of the crossing reopening.

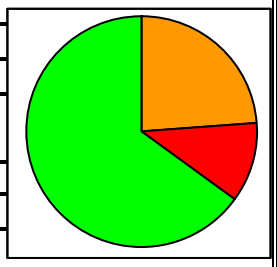
[19] Traffic and pedestrians observed 07:00 – 19:00 on a weekday in March 2009

## Barrier and Traffic Effects

8.3.6. The barrier assessment results for Station Road, Addlestone are summarised below:

| | Average daytime closure per hour 07:00 to 19:00 (mins:secs) | Number of closures per average daytime hour 07:00 to 19:00 |
|---|---|---|
| Pre Airtrack | 0:14:15 | 3.8 |
| Post Airtrack | 0:21:00 | 5.2 |

| | % closed/open per average daytime hour |
|---|---|
| Pre Airtrack closure | 24% |
| Extra Airtrack closure | 11% |
| Barrier open with Airtrack | 65% |
| Barrier open time lost | 15% |



**Traffic capacity forecast with Airtrack operations**

| Openings per average daytime hour | Average duration of barrier open time (seconds) | Observed saturation flow when barriers re-open (vehicles per minute) | Maximum traffic / hour / per direction with Airtrack | Approx 2008 traffic per direction PM peak | Observed 2008 traffic/ max traffic |
|---|---|---|---|---|---|
| 5.2 | 453 | 22 | 864 | 390 | 45% |

8.3.7. Airtrack will double the number of passenger trains in each direction from two to four, causing 10% more barrier closure time, or a 13% loss of barrier open time, during an average daytime hour. This equates to over six minutes more closure time per hour. The Airtrack services will increase the number of barrier closures by about two thirds but reduce each one by about 30 seconds on average.

8.3.8. Although drivers will be more likely to encounter a closed barrier, the traffic built up at each closure will dissipate generally within the first 90 seconds after reopening followed by on average six and a half minutes of free-flow condition. These changes are not likely to be noticed by road users so the effect is deemed to be no more than slightly adverse and not significant for traffic, including passengers on the bus services using this crossing.

## Community Effects

8.3.9. Traffic delays due to the loss of barrier up time and its associated effects on access are considered unlikely to have any significant effects on community facilities and services.

## Air Quality Effects

8.3.10. Loss of barrier open time brought about by Airtrack will give rise to a change in traffic movements at the level crossing and surrounding roads. This equates to an estimated flow pattern change of some 750 vehicles being stationary (daily) that would otherwise be moving through the level crossing without Airtrack. This exceeds the equivalent emission factored criterion of 500 AADT within Screening Stage 1.

8.3.11. Screening Stage 2 determined that Airtrack will result in changes in daily average speed of 4km/hr and peak average speed of 6km/hr. This is considerably less than the 10km/hr and 20km/hr triggers of potential significance, and the crossing was therefore considered unlikely to result in a significant air quality impact.

# 8.4. Effects on the Highway Network

8.4.1. No significant changes in traffic flows on the highway network are likely at Guildford Road Chertsey, where traffic effects at the level crossing are negligible.

8.4.2. The alternative route for the Station Road crossing at Addlestone is via Woburn Hill (A317) and Chertsey Road (A318). This adds some 1½ minutes journey time to the town centre cross roads in comparison to the route over Station Road with the barrier up. With Airtrack operational, drivers are still likely to encounter a barrier up two thirds of the time. They face a 1 in 3 chance of incurring a 3 – 4 minute delay at the level crossing. Depending upon the ultimate trip destination there is

therefore potential for greater use of the railway bridged route with Airtrack. Impacts on the wider road network as a result of Airtrack are likely to be negligible.

## 8.5. Possible Solutions in Chertsey and Addlestone

8.5.1. As there are no specific issues identified at either Chertsey or Addlestone no consideration has been given design or traffic management solutions.

# 9. SUMMARY OF EFFECTS

## 9.1. Barrier Down Time and Traffic Effects

9.1.1. **Table 9-1** summarises the effects at each for the 15 road crossings affected by Airtrack.

**Table 9-1 Summary of Traffic Delays at Level Crossings with Airtrack**

| Road | Location | Closure time change | | Total closure (mins/hour) | Increased congestion & delay | Evaluation |
|---|---|---|---|---|---|---|
| | | Relative | Absolute (mins) | | | |
| **Richmond** | | | | | | |
| Vine Road | Barnes | -5% | - 1 | 41 | No | Slight +ve |
| White Hart Lane | Barnes | +4% | 1 | 41 | No | Slight -ve |
| Sheen Lane | Mortlake | +21% | 7 | 41 | Yes | **Moderate -ve** |
| Manor Road | North Sheen | +25% | 7 | 40 | Yes | **Moderate -ve** |
| **Feltham** | | | | | | |
| Bedfont Lane | Feltham | +7% | 1½ | 38 | No | Slight -ve |
| **Egham** | | | | | | |
| Thorpe Road | Staines | +32% | 13 | 33 | Yes | **Severe -ve** |
| Vicarage Road | Egham | +36% | 11-12 | 39 | Yes | **Severe -ve** |
| Station Road | Egham | +33% | 13 | 3½ | Yes | **Severe -ve** |
| Prune Hill | Rusham | +8% | 4 | 12½ | No | Slight -ve |
| **Sunningdale** | | | | | | |
| London Road | Sunningdale | +12% | 5½ | 20 | No | Slight -ve |
| **Chertsey & Addlestone** | | | | | | |
| Guildford Road | Chertsey | -3% | -1 | 18 | No | Negligible |
| Station Road | Addlestone | +13% | 6 | 19½ | No | Slight -ve |
| **Wokingham** | | | | | | |
| Waterloo Road | Wokingham | +6% | 3 | 7 | No | Slight -ve |
| Easthampstead Road | Wokingham | +23% | 11 s | 24 | Yes | **Moderate -ve** |
| Barkham Road | Wokingham | +31% | 12 | 33 | Yes | **Severe -ve** |

## 9.2. Highway Network Effects

9.2.1. In no cases is the impact of the Airtrack service considered likely to result in significant changes to traffic flows on the wider road network, although some diversion by local alternatives is likely to arise in particular at:

- the Charters Road and Dry Arch Road alternative at Sunningdale (during operation of Network Rail's autumn timetable);
- the Woburn Hill and Chertsey Road alternative at Addlestone; and
- along the A321 as an alternative route to Barkham Road.

## 9.3. Community Effects

9.3.1. Traffic delay at level crossings can give rise to secondary effects on community facilities. This will depend both on the extent of the delay and the nature of the facility. For example, facilities that require fast and possibly emergency access, such as hospitals and fire stations, are deemed of greater sensitivity than schools; which are themselves deemed more sensitive than sports facilities, where timely access is generally less important.

9.3.2. The assessment has taken as its premise the likelihood of significant community effects only at those crossings where significant traffic delays have been predicted. On this basis, significant community effects are predicted at the following crossings:

- Sheen Lane, Mortlake;
- Manor Road, North Sheen;
- Thorpe Road, Staines;
- Vicarage Road, Egham;
- Station Road, Egham; and
- Barkham Road, Wokingham.

## 9.4. Air Quality Effects

9.4.1. A screening approach based on DMRB criteria for determining the potential for significant air quality impacts was used. Detailed air quality modelling was then used on the crossings worst affected by traffic, at Thorpe road and Vicarage Road, to verify the conclusions from the screening study. This established that at none of the level crossings will the predicted change in vehicle speed as a result of loss of barrier open time be sufficient to result in a significant change in air quality.

## 9.5. Summary of Possible Solutions

9.5.1. At eight locations the introduction of Airtrack services will have slight or negligible effect on the operation of the crossings. At the seven crossings at which significant traffic effects are predicted, potential solutions will vary for each crossing. In the first instance, and recognising the importance of operational safety, there may be scope for reducing unnecessary barrier down-time, perhaps changing the way that the crossing is operated; for example devoting a dedicated signalman at the control centre to manage the operation of crossings. These issues are being discussed with Network Rail.

9.5.2. At other crossings there is a possibility of providing new infrastructure. At Egham the potential for new infrastructure and traffic schemes is being explored, whereas at Wokingham, new infrastructure may be built as part of the development proposals in the Draft Core Strategy. Opportunities at Richmond are more limited.

9.5.3. In all cases responsibility for addressing the issues rests with Network Rail in operating the barriers and with the local highway and planning authorities to develop traffic management, land use and infrastructure solutions in relation to policy and current and predicted traffic flows.

# ANNEX A
# Detailed Air Quality Modelling at Road Level Crossings

# Detailed Air Quality Modelling at Level Crossings

Airtrack services will pass across a total of fifteen road level crossings and a study of the potential effects of Airtrack trains on the operation of these level crossings has been undertaken. The Airtrack Level Crossings Air Quality Screening Assessment, evaluated any likely air quality impacts resulting from Airtrack on the basis of two screening assessments. The first was based upon a DMRB 'Emission Factored' Criteria and the second was based upon DMRB Speed Changes. Whilst the screening assessments concluded that no further detailed assessment was required, notwithstanding this, detailed modelling has been carried out for three of the level crossings, Station Road, Vicarage Road and Thorpe Road.

The effect on local air quality of emissions as a result of changes to barrier closure times, resulting from the operation of Airtrack, has been assessed using an advanced atmospheric dispersion model, Breeze Roads Dispersion Model.

Most mobile source dispersion models predict air pollution concentrations near roadways resulting from motor vehicles traveling under free-flow conditions. However, Breeze Roads is an enhanced version of the CAL3QHCR, CALINE4, and CAL3QHC series of models that incorporates methods for estimating queue lengths and the contribution of emissions from idling vehicles.

Because idling emissions account for a substantial portion of total emissions at an intersection, this capability represents a significant improvement over other models. The application is especially designed to handle near saturated and over capacity conditions. For queue estimation, the model uses an approach delay equation and the emission source strength is calculated and then converted to a line source value so the model can processes it as a nominal free flow link.

The Breeze Roads model has been comprehensively verified in a large number of studies by the software manufacturer Trinity Consultants. Breeze models are all industry-standard dispersion models, developed or recognized by the U.S.EPA and many other environmental authorities around the world. Further information in relation to this is available from the Breeze web site at www.breeze-software.com.

## Traffic Data

Traffic flow data comprising annual average daily traffic (AADT) flows and % HGVs were used in this dispersion model. In addition the percentage barrier down time at each of the level crossings was used in the model. All traffic flow data and barrier down times were provided by HAL. The data has been provided for the baseline year of 2009 and for the future the year 2015, when Airtrack is anticipated to be operational.

The data includes hourly traffic flows to replicate how the average hourly traffic flow would vary throughout the day. In addition the data includes, the duration of the level crossing signal cycles during each hour of the week and the period of time during the signal cycles when the level crossing barriers are down. Therefore this data has been used within the Breeze Roads model for the years 2009 and 2015 and is presented in **Tables 1 to 3 of this Annex.**

An estimation of average speed is required. This can be based on the speed limits for sections of road; however, it is generally considered that these would represent free-flowing speeds, which would not be expected to be experienced in busy urban areas. Given the proximity of the road links to the level crossings an average speed of 35kph was applied to the free flowing links coming from the level crossing. The speed at which traffic moved along the queuing links, approaching the level crossings, was calculated by Breeze Roads.

## Annex A Table 1 - Traffic Data and Barrier Down Times at Thorpe Road Level Crossing

**Thorpe Road - Northbound**

| | Baseline 2009 | | | Without Airtrack 2015 | | | With Airtrack 2015 | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume |
| *00:00* | 1188 | 130 | 15 | 1188 | 130 | 16 | 2857 | 143 | 16 |
| *01:00* | 3600 | 150 | 6 | 3600 | 150 | 7 | 3600 | 0 | 7 |
| *02:00* | 3600 | 0 | 7 | 3600 | 0 | 8 | 3600 | 0 | 8 |
| *03:00* | 3600 | 0 | 11 | 3600 | 0 | 12 | 3600 | 0 | 12 |
| *04:00* | 3600 | 0 | 18 | 3600 | 0 | 19 | 3600 | 0 | 19 |
| *05:00* | 791 | 137 | 56 | 791 | 137 | 60 | 477 | 144 | 60 |
| *06:00* | 565 | 143 | 132 | 565 | 143 | 139 | 361 | 201 | 140 |
| 07:00 | 479 | 171 | 351 | 479 | 171 | 373 | 300 | 171 | 373 |
| 08:00 | 422 | 153 | 418 | 422 | 153 | 444 | 353 | 200 | 444 |
| 09:00 | 514 | 140 | 301 | 514 | 140 | 320 | 327 | 160 | 320 |
| 10:00 | 402 | 167 | 234 | 402 | 167 | 248 | 277 | 165 | 249 |
| 11:00 | 514 | 137 | 278 | 514 | 137 | 295 | 327 | 160 | 295 |
| 12:00 | 595 | 163 | 297 | 595 | 163 | 315 | 360 | 185 | 315 |
| 13:00 | 514 | 141 | 273 | 514 | 141 | 290 | 300 | 157 | 290 |
| 14:00 | 422 | 155 | 248 | 422 | 155 | 263 | 338 | 198 | 263 |
| 15:00 | 561 | 152 | 294 | 561 | 152 | 312 | 317 | 163 | 312 |
| 16:00 | 400 | 143 | 270 | 400 | 143 | 287 | 360 | 187 | 287 |
| 17:00 | 447 | 144 | 308 | 447 | 144 | 327 | 360 | 193 | 327 |
| 18:00 | 360 | 164 | 262 | 360 | 164 | 278 | 327 | 221 | 278 |
| 19:00 | 327 | 138 | 253 | 327 | 138 | 268 | 321 | 201 | 268 |
| 20:00 | 411 | 145 | 164 | 411 | 145 | 174 | 283 | 169 | 174 |
| 21:00 | 437 | 144 | 108 | 437 | 144 | 115 | 325 | 180 | 115 |
| 22:00 | 450 | 146 | 102 | 450 | 146 | 108 | 327 | 169 | 108 |
| 23:00 | 600 | 140 | 52 | 600 | 140 | 55 | 900 | 421 | 55 |

**Thorpe Road - Southbound**

| | Baseline 2009 | | | Without Airtrack 2015 | | | With Airtrack 2015 | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume |
| *00:00* | 1188 | 130 | 14 | 1188 | 130 | 15 | 2857 | 143 | 15 |
| *01:00* | 3600 | 150 | 6 | 3600 | 150 | 7 | 3600 | 0 | 7 |
| *02:00* | 3600 | 0 | 7 | 3600 | 0 | 7 | 3600 | 0 | 7 |
| *03:00* | 3600 | 0 | 11 | 3600 | 0 | 11 | 3600 | 0 | 11 |
| *04:00* | 3600 | 0 | 17 | 3600 | 0 | 18 | 3600 | 0 | 18 |
| *05:00* | 791 | 137 | 54 | 791 | 137 | 57 | 477 | 144 | 58 |
| *06:00* | 565 | 143 | 127 | 565 | 143 | 135 | 361 | 201 | 135 |
| 07:00 | 479 | 171 | 176 | 479 | 171 | 187 | 300 | 171 | 187 |
| 08:00 | 422 | 153 | 319 | 422 | 153 | 339 | 353 | 200 | 339 |
| 09:00 | 514 | 140 | 191 | 514 | 140 | 203 | 327 | 160 | 203 |
| 10:00 | 402 | 167 | 237 | 402 | 167 | 252 | 277 | 165 | 252 |
| 11:00 | 514 | 137 | 254 | 514 | 137 | 270 | 327 | 160 | 270 |
| 12:00 | 595 | 163 | 294 | 595 | 163 | 312 | 360 | 185 | 312 |
| 13:00 | 514 | 141 | 272 | 514 | 141 | 289 | 300 | 157 | 289 |
| 14:00 | 422 | 155 | 253 | 422 | 155 | 269 | 338 | 198 | 269 |
| 15:00 | 561 | 152 | 359 | 561 | 152 | 381 | 317 | 163 | 381 |
| 16:00 | 400 | 143 | 291 | 400 | 143 | 309 | 360 | 187 | 309 |
| 17:00 | 447 | 144 | 411 | 447 | 144 | 436 | 360 | 193 | 436 |
| 18:00 | 360 | 164 | 357 | 360 | 164 | 379 | 327 | 221 | 379 |
| 19:00 | 327 | 138 | 244 | 327 | 138 | 259 | 321 | 201 | 259 |
| 20:00 | 411 | 145 | 158 | 411 | 145 | 168 | 283 | 169 | 168 |
| 21:00 | 437 | 144 | 105 | 437 | 144 | 111 | 325 | 180 | 111 |
| 22:00 | 450 | 146 | 98 | 450 | 146 | 104 | 327 | 169 | 104 |
| 23:00 | 600 | 140 | 50 | 600 | 140 | 53 | 900 | 421 | 53 |

## Annex A Table 2 - Traffic Data and Barrier Down Times at Station Road Level Crossing

**Station Road - Northbound**

| | Baseline 2009 | | | Without Airtrack 2015 | | | With Airtrack 2015 | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume |
| *00:00* | 1200 | 160 | 11 | 1200 | 160 | 12 | 720 | 147 | 12 |
| *01:00* | 3600 | 140 | 5 | 3600 | 140 | 6 | 3600 | 140 | 6 |
| *02:00* | 3600 | 0 | 3 | 3600 | 0 | 3 | 3600 | 0 | 3 |
| *03:00* | 3600 | 0 | 5 | 3600 | 0 | 5 | 3600 | 0 | 5 |
| *04:00* | 3600 | 0 | 10 | 3600 | 0 | 11 | 3600 | 0 | 11 |
| *05:00* | 900 | 172 | 20 | 900 | 172 | 22 | 450 | 151 | 22 |
| *06:00* | 600 | 196 | 69 | 600 | 196 | 73 | 400 | 243 | 73 |
| 07:00 | 600 | 226 | 200 | 600 | 226 | 212 | 360 | 228 | 212 |
| 08:00 | 450 | 177 | 228 | 450 | 177 | 242 | 400 | 224 | 242 |
| 09:00 | 720 | 208 | 244 | 720 | 208 | 259 | 400 | 206 | 259 |
| 10:00 | 600 | 243 | 163 | 600 | 243 | 173 | 400 | 239 | 173 |
| 11:00 | 720 | 190 | 154 | 720 | 190 | 163 | 360 | 178 | 163 |
| 12:00 | 720 | 192 | 189 | 720 | 192 | 201 | 360 | 181 | 201 |
| 13:00 | 720 | 196 | 217 | 720 | 196 | 230 | 400 | 207 | 230 |
| 14:00 | 514 | 185 | 178 | 514 | 185 | 189 | 327 | 182 | 189 |
| 15:00 | 720 | 197 | 268 | 720 | 197 | 284 | 360 | 186 | 284 |
| 16:00 | 514 | 189 | 265 | 514 | 189 | 281 | 400 | 229 | 281 |
| 17:00 | 514 | 189 | 239 | 514 | 189 | 254 | 450 | 257 | 254 |
| 18:00 | 360 | 178 | 191 | 360 | 178 | 203 | 514 | 342 | 203 |
| 19:00 | 389 | 176 | 145 | 389 | 176 | 153 | 508 | 301 | 153 |
| 20:00 | 533 | 192 | 104 | 533 | 192 | 110 | 404 | 242 | 110 |
| 21:00 | 514 | 177 | 66 | 514 | 177 | 70 | 400 | 208 | 70 |
| 22:00 | 600 | 195 | 53 | 600 | 195 | 57 | 360 | 203 | 57 |
| 23:00 | 900 | 194 | 30 | 900 | 194 | 32 | 360 | 182 | 32 |

**Station Road - Southbound**

| | Baseline 2009 | | | Without Airtrack 2015 | | | With Airtrack 2015 | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume |
| *00:00* | 1200 | 160 | 13 | 288 | 160 | 13 | 720 | 147 | 13 |
| *01:00* | 3600 | 140 | 6 | 604 | 140 | 6 | 3600 | 140 | 6 |
| *02:00* | 3600 | 0 | 3 | 1287 | 0 | 3 | 3600 | 0 | 3 |
| *03:00* | 3600 | 0 | 6 | 644 | 0 | 6 | 3600 | 0 | 6 |
| *04:00* | 3600 | 0 | 11 | 322 | 0 | 12 | 3600 | 0 | 12 |
| *05:00* | 900 | 172 | 22 | 161 | 172 | 24 | 450 | 151 | 24 |
| *06:00* | 600 | 196 | 76 | 48 | 196 | 80 | 400 | 243 | 80 |
| 07:00 | 600 | 226 | 205 | 18 | 226 | 218 | 360 | 228 | 218 |
| 08:00 | 450 | 177 | 265 | 14 | 177 | 281 | 400 | 224 | 281 |
| 09:00 | 720 | 208 | 186 | 19 | 208 | 197 | 400 | 206 | 197 |
| 10:00 | 600 | 243 | 166 | 22 | 243 | 176 | 400 | 239 | 176 |
| 11:00 | 720 | 190 | 185 | 19 | 190 | 196 | 360 | 178 | 196 |
| 12:00 | 720 | 192 | 223 | 16 | 192 | 237 | 360 | 181 | 237 |
| 13:00 | 720 | 196 | 211 | 17 | 196 | 224 | 400 | 207 | 224 |
| 14:00 | 514 | 185 | 276 | 13 | 185 | 293 | 327 | 182 | 293 |
| 15:00 | 720 | 197 | 235 | 15 | 197 | 249 | 360 | 186 | 249 |
| 16:00 | 514 | 189 | 272 | 13 | 189 | 289 | 400 | 229 | 289 |
| 17:00 | 514 | 189 | 350 | 10 | 189 | 372 | 450 | 257 | 372 |
| 18:00 | 360 | 178 | 219 | 16 | 178 | 232 | 514 | 342 | 232 |
| 19:00 | 389 | 176 | 159 | 23 | 176 | 169 | 508 | 301 | 169 |
| 20:00 | 533 | 192 | 115 | 31 | 192 | 122 | 404 | 242 | 122 |
| 21:00 | 514 | 177 | 73 | 50 | 177 | 77 | 400 | 208 | 77 |
| 22:00 | 600 | 195 | 59 | 61 | 195 | 62 | 360 | 203 | 62 |
| 23:00 | 900 | 194 | 34 | 107 | 194 | 36 | 360 | 182 | 36 |

## Annex A Table 3 - Traffic Data and Barrier Down Times at Vicarage Road Level Crossing

**Vicarage Road - Northbound**

| | Baseline 2009 | | | Without Airtrack 2015 | | | With Airtrack 2015 | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume |
| *00:00* | 3600 | 0 | 17 | 3600 | 0 | 18 | 3600 | 0 | 18 |
| *01:00* | 3600 | 0 | 8 | 3600 | 0 | 8 | 3600 | 0 | 8 |
| *02:00* | 3600 | 0 | 8 | 3600 | 0 | 9 | 3600 | 0 | 9 |
| *03:00* | 3600 | 0 | 13 | 3600 | 0 | 14 | 3600 | 0 | 14 |
| *04:00* | 3600 | 0 | 21 | 3600 | 0 | 22 | 3600 | 0 | 22 |
| *05:00* | 900 | 240 | 66 | 900 | 240 | 70 | 514 | 219 | 70 |
| *06:00* | 600 | 253 | 154 | 600 | 253 | 164 | 480 | 313 | 164 |
| 07:00 | 529 | 225 | 373 | 529 | 225 | 396 | 400 | 264 | 396 |
| 08:00 | 582 | 313 | 499 | 582 | 313 | 530 | 521 | 349 | 530 |
| 09:00 | 720 | 289 | 383 | 720 | 289 | 407 | 450 | 276 | 407 |
| 10:00 | 600 | 295 | 311 | 600 | 295 | 330 | 450 | 322 | 330 |
| 11:00 | 720 | 292 | 313 | 720 | 292 | 332 | 514 | 310 | 332 |
| 12:00 | 720 | 289 | 295 | 720 | 289 | 313 | 514 | 309 | 313 |
| 13:00 | 720 | 272 | 284 | 720 | 272 | 301 | 514 | 310 | 302 |
| 14:00 | 514 | 242 | 300 | 514 | 242 | 318 | 535 | 358 | 319 |
| 15:00 | 720 | 287 | 348 | 720 | 287 | 369 | 574 | 366 | 370 |
| 16:00 | 514 | 255 | 317 | 514 | 255 | 337 | 514 | 327 | 337 |
| 17:00 | 600 | 290 | 405 | 600 | 290 | 430 | 514 | 338 | 430 |
| 18:00 | 400 | 228 | 316 | 400 | 228 | 335 | 514 | 371 | 336 |
| 19:00 | 456 | 260 | 296 | 456 | 260 | 314 | 506 | 335 | 314 |
| 20:00 | 612 | 295 | 192 | 612 | 295 | 204 | 526 | 350 | 204 |
| 21:00 | 578 | 278 | 127 | 578 | 278 | 135 | 511 | 310 | 135 |
| 22:00 | 600 | 262 | 119 | 600 | 262 | 126 | 514 | 344 | 126 |
| 23:00 | 720 | 229 | 61 | 720 | 229 | 64 | 514 | 278 | 64 |

**Vicarage Road - Southbound**

| | Baseline 2009 | | | Without Airtrack 2015 | | | With Airtrack 2015 | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume | Signal Cycle/hour (sec) | Signal Cycle/Red (sec) | Traffic Volume |
| *00:00* | 3600 | 0 | 20 | 3600 | 0 | 21 | 3600 | 0 | 21 |
| *01:00* | 3600 | 0 | 9 | 3600 | 0 | 9 | 3600 | 0 | 9 |
| *02:00* | 3600 | 0 | 10 | 3600 | 0 | 10 | 3600 | 0 | 10 |
| *03:00* | 3600 | 0 | 15 | 3600 | 0 | 16 | 3600 | 0 | 16 |
| *04:00* | 3600 | 0 | 25 | 3600 | 0 | 26 | 3600 | 0 | 26 |
| *05:00* | 900 | 240 | 77 | 900 | 240 | 81 | 514 | 219 | 81 |
| *06:00* | 600 | 253 | 180 | 600 | 253 | 191 | 480 | 313 | 191 |
| 07:00 | 529 | 225 | 287 | 529 | 225 | 305 | 400 | 264 | 305 |
| 08:00 | 582 | 313 | 410 | 582 | 313 | 435 | 521 | 349 | 435 |
| 09:00 | 720 | 289 | 370 | 720 | 289 | 393 | 450 | 276 | 393 |
| 10:00 | 600 | 295 | 301 | 600 | 295 | 320 | 450 | 322 | 320 |
| 11:00 | 720 | 292 | 313 | 720 | 292 | 332 | 514 | 310 | 332 |
| 12:00 | 720 | 289 | 339 | 720 | 289 | 360 | 514 | 309 | 360 |
| 13:00 | 720 | 272 | 416 | 720 | 272 | 442 | 514 | 310 | 442 |
| 14:00 | 514 | 242 | 362 | 514 | 242 | 384 | 535 | 358 | 384 |
| 15:00 | 720 | 287 | 430 | 720 | 287 | 456 | 574 | 366 | 457 |
| 16:00 | 514 | 255 | 478 | 514 | 255 | 507 | 514 | 327 | 508 |
| 17:00 | 600 | 290 | 627 | 600 | 290 | 666 | 514 | 338 | 666 |
| 18:00 | 400 | 228 | 504 | 400 | 228 | 535 | 514 | 371 | 535 |
| 19:00 | 456 | 260 | 346 | 456 | 260 | 367 | 506 | 335 | 367 |
| 20:00 | 612 | 295 | 225 | 612 | 295 | 238 | 526 | 350 | 238 |
| 21:00 | 578 | 278 | 148 | 578 | 278 | 157 | 511 | 310 | 157 |
| 22:00 | 600 | 262 | 139 | 600 | 262 | 147 | 514 | 344 | 147 |
| 23:00 | 720 | 229 | 71 | 720 | 229 | 75 | 514 | 278 | 75 |

## Pollutant Background Concentrations

The Breeze-Roads model requires background pollutant concentration data (i.e. concentrations not including local pollutant sources such as roads or stacks), that are factored to the year of assessment, to which the model adds contributions from nearby roads. Background concentrations of $NO_x$, $NO_2$, and $PM_{10}$ can be obtained from the Air Quality Archive for the relevant 1km x 1km grid squares covering the study area (National Grid Reference 501500, 170500) from the UK National Air Quality Archive. This provides data for 2001 and 2004 dependant on the pollutant and projections for other years, for several pollutants, and is presented in the **Table 4** of this Annex.

### Annex A Table 4: NAQIA Mapped Background Concentrations (µg/m$^3$) for Grid Reference 501500, 170500

| Pollutant | Factored to 2009 | Factored to 2015 |
|---|---|---|
| $NO_x$ (µg/m$^3$) | 41.0 | 30.2 |
| $NO_2$ (µg/m$^3$) | 28.0 | 22.6 |
| $PM_{10}$ (µg/m$^3$) | 21.8 | 20.5 |

## Potentially Sensitive Receptors

The approach adopted by the UK Air Quality Strategy (Ref. 2 to 5) is to focus on areas where members of the public, (in a non-occupational capacity) at locations close to ground level, are likely to be exposed over the averaging time of the objective in question, i.e. over 1-hour, 24-hour or annual periods as appropriate. Objective exceedances principally relate to annual mean $NO_2$ and daily mean $PM_{10}$, so potentially sensitive locations relate mainly to residential properties and locations such as schools, where the public may be exposed for protracted periods.

At each of the level crossings modelled air quality receptors were positioned 5m from the roadside at 10m intervals along the road length for a distance of 200m on each side of the level crossing under study.

In the event that adverse air quality impacts are identified within the study area then sensitive locations will be identified in the vicinity.

## Metrological Data

Meteorological data provides information on a number of parameters including wind direction, wind speed, temperature, precipitation and the extent of cloud cover for each hour of a given year. As a minimum Breeze Roads requires wind speed, wind direction, and cloud cover. Meteorological data, to input into the model, was obtained from the Heathrow Meteorological Station.

In addition the model requires a surface roughness value to predict metrological conditions at ground level. A value of 1.0 was used in the model, which is representative of an urban environment.

## Model Data Processing

The modelling results are outputted as road contributions to annual mean $NO_x$ and have therefore been processed to calculate the pollutant and averaging periods required for comparison with air quality objectives. Background concentrations as detailed in Table 4 have been applied accordingly.

$NO_x$ emissions from combustion sources (including vehicle exhausts) comprise principally nitric oxide (NO) and nitrogen dioxide ($NO_2$). The emitted nitric oxide reacts with oxidants in the air (mainly ozone) to form more nitrogen dioxide. Since only nitrogen dioxide is associated with effects on human health, the air quality standards for the protection of human health are based on $NO_2$ and not total $NO_x$ or NO.

The method described within the Technical Guidance LAQM.TG (03) (Ref. 9) for annual mean $NO_2$ was superseded in April 2007 as a result of recent research which indicated that a higher proportion of $NO_x$ is transformed into $NO_2$ in the atmosphere (Ref. 9).

Therefore, a suitable $NO_x$:$NO_2$ conversion needs to be applied to the modelled $NO_x$ concentrations. There are a variety of different approaches to dealing with $NO_x$:$NO_2$ relationships and Government guidance indicates that the use of any of these is acceptable.

The revised equation to convert road-$NO_x$ to road-$NO_2$ for years 2003 onwards for Greater London has been applied to the $NO_x$ concentrations, which were calculated by the Breeze Roads model.

## Model Verification

Model verification is the process of comparing monitored and modelled pollutant concentrations.

Discrepancies between modelled and measured concentrations can arise for a number of reasons, such as traffic data uncertainties, background concentration estimates, metrological data uncertainties or model limitations.

The Breeze-Roads model was run to predict annual mean $NO_x$ concentrations at one intermediate $NO_2$ diffusion tube monitor located at the Egham Sports Centre, located between the M25 and Vicarage Road (National Grid Reference 501650, 170950). The diffusion tube was modelled at a height of 2.5m, the approximate height above ground of the monitor.

The latest year of monitoring data available is 2007. Therefore, 2007 traffic data was used from the M25 and Vicarage Road to enable consistency in the verification method.

As highlighted above, the $NO_2$ concentration is a function of $NO_x$ concentrations. Therefore, the roadside $NO_x$ concentration predicted by the model is compared with that measured. The Egham Sports Centre diffusion tube NOx concentration was calculated from the $NO_2$ concentration using an equivalent $NO_x$ concentration using the $NO_2$:$NO_x$ calculator provided by Defra.

The modelled and measured roadside $NO_x$ concentrations are compared in **Table 5 of this Annex**.

### Annex A Table 5: Model Verification Results for Annual Mean Total $NO_x$

| Location | Measured Annual Mean $NO_x$ ($\mu g/m^3$) | Modelled Annual Mean $NO_x$ ($\mu g/m^3$) | $\mu g/m^3$ Difference (modelled – measured) |
|---|---|---|---|
| Egham Sports Centre | 82.1 | 70.7 | -16.1% |

A simple comparison of the data presented in Table 6 indicates that the model is under-predicting at both of the monitoring locations and therefore requires verification/adjustment.

The Technical Guidance LAQM.TG(03) presents three methods of model verification and adjustment. The steps for verification/adjustment in this study are based on the guidance to local authorities within Example 1, ‘adjustment based on single monitoring site using a multiplication factor’.

Adjustment factors for the modelled roadside $NO_x$ were derived by comparing the $NO_x$ roadside increment at the Egham Sports Centre monitor as detailed in **Table 6**.

### Annex A Table 6: Calculation of Modelled Roadside (without background) Increment $NO_x$ Correction Factor

| Location | Measured Roadside $NO_x$ ($\mu g/m^3$) | Modelled Roadside $NO_x$ ($\mu g/m^3$) | Measured Roadside $NO_x$/ Modelled Roadside $NO_x$ (Correction Factor) |
|---|---|---|---|
| Egham Sports Centre | 38.0 | 26.6 | 1.43 |

**Table 7** compares the adjusted modelled annual mean $NO_2$ concentrations at the Egham Sports Centre monitoring locations.

### Annex A Table 7: Adjusted Annual Average $NO_2$ Concentrations Compared to Measured Annual Mean $NO_2$ Concentrations ($g/m^3$)

| Location | Measured Annual Mean ($\mu g/m^3$) | Adjusted Modelled Annual Mean ($\mu g/m^3$) | $\mu g/m^3$ Difference (modelled adjusted– measured) |
|---|---|---|---|
| Egham Sports Centre | 42.4 | 41.1 | -3.1% |

The data in Table 7 indicates an overall improved agreement between monitored and modelled annual mean $NO_2$ results compared to the unadjusted/unverified model. This process of verification improves confidence in the modelling results and further reduces uncertainty.

The adjustment process was then applied to the entire roadside $NO_x$ modelling results for each of the level crossings for 2009, and 2015 without and with Airtrack operational, at the specific receptors locations assessed.

No $PM_{10}$ monitoring data is available to compare to the model output. Therefore, the average roadside modelled $NO_x$ adjustment factor (1.43) as detailed above, was also applied to the roadside modelled annual mean $PM_{10}$ concentrations before relevant background concentrations were added.

### Significance Criteria

The significance of any changes in local air quality that are predicted, based on background pollutant concentrations and predicted traffic flows, can be established through the consideration of the following factors:

- Geographical extent (local, district or regional);
- Duration (temporary or long term);
- Reversibility (reversible or permanent);
- Magnitude of pollution concentration changes;
- Exceedence of standards (e.g. Air Quality Objectives); and
- Changes in pollutant exposure.

The NSCA Guidance 'Development Control: Planning for Air Quality' (Ref. 10) provides an example of criteria for magnitude of change and related significance of quantified effects as a result of a Development. Whilst this guidance is intended as an example, in the absence of other specific guidance it forms the basis for this assessment. However, the potential effects as a result of the operational traffic associated with the Development have been considered using the standard seven level scale of significance.

**Table 8** presents the magnitude of change in air pollutant concentration descriptors and **Table 9** presents the significance descriptors that take account of the magnitude of changes (both positive and negative) and the concentration in relation to the air quality objective.

In order to allow comparison with the significance criteria described in **Table 8** and **9**, the effect on the annual mean $NO_2$ objective, from additional idling traffic generated by increased barrier closure times, have been predicted.

### Annex A Table 8: Magnitude of Change Descriptor in Relation to Changes in Concentrations of $NO_2$ and $PM_{10}$

| Magnitude of Change | Annual Mean $NO_2/PM_{10}$ | Days $PM_{10}$ > 50μg/m$^3$ |
|---|---|---|
| Very large | Increase/decrease > 25% | Increase/decrease > 25 days |
| Large | Increase/decrease > 15-25% | Increase/decrease 15-25 days |
| Medium | Increase/decrease > 10-15% | Increase/decrease 10-15 days |
| Small | Increase/decrease > 5-10% | Increase/decrease 5-10 days |
| Very Small | Increase/decrease > 1-5% | Increase/decrease <1 days |
| Extremely Small | Increase/decrease < 1% | Increase/decrease < 1 days |

### Annex A Table 9: Effect Significance criteria for $NO_2$ and $PM_{10}$

| Concentration in Relation to Standard | Extremely Small | Very Small | Small | Medium | Large | Very Large |
|---|---|---|---|---|---|---|
| **Decrease with Development** | | | | | | |
| Above Objective with Development | Minor beneficial | Minor beneficial | Moderate beneficial | Moderate beneficial | Major beneficial | Major beneficial |
| Above Objective without Development, below with Development | Minor beneficial | Moderate Beneficial | Moderate beneficial | Major beneficial | Major beneficial | Major beneficial |
| Below Objective without Development, but not well below | Negligible | Minor beneficial | Minor beneficial | Moderate Beneficial | Moderate Beneficial | Major beneficial |
| Well Below Objective without Scheme | Negligible | Negligible | Minor beneficial | Minor beneficial | Minor beneficial | Moderate Beneficial |
| **Increase with Development** | | | | | | |
| Above Objective without Development | Minor adverse | Minor adverse | Moderate adverse | Moderate adverse | Major adverse | Major adverse |
| Below Objective without Development, above with Development | Minor adverse | Moderate adverse | Moderate adverse | Major adverse | Major adverse | Major adverse |
| Below Objective with Development, but not well below | Negligible | Minor adverse | Minor adverse | Moderate adverse | Moderate adverse | Major adverse |
| Well Below Objective with Scheme[20]† | Negligible | Negligible | Minor adverse | Minor adverse | Minor adverse | Moderate adverse |

## Dispersion Modelling Results

Airtrack is predicted to result in changes to traffic flows at each of the level crossings, due to increased barrier downtime when Airtrack is operational. This has the potential to affect local air quality as increased queuing times will result in increased vehicle emissions at the level crossings.

The results of the Breeze Roads dispersion modelling assessment for the baseline 2009 situation and the future year of 2015, with and without Airtrack operational, are presented in **Tables 11 and 12.**

[20] Note: Well below objective = <75% of the objective level

## Annex A Table 11: Changes on $NO_2$ Concentrations with and without Airtrack Operational

**Station Road**

| Distance (m) | 2009 Baseline NO2 (µg/m3) | 2015 Without Airtrack NO2 (µg/m3) | 2015 With Airtrack NO2 (µg/m3) | Change NO2 (µg/m3) |
|---|---|---|---|---|
| 0 | 28.68 | 23.08 | 23.33 | 0.25 |
| 10 | 28.63 | 23.05 | 23.26 | 0.20 |
| 20 | 28.30 | 22.79 | 22.97 | 0.18 |
| 30 | 28.28 | 22.77 | 22.95 | 0.18 |
| 40 | 28.57 | 23.02 | 23.18 | 0.17 |
| 50 | 28.55 | 23.00 | 23.16 | 0.16 |
| 60 | 28.53 | 22.99 | 23.14 | 0.15 |
| 70 | 28.49 | 22.96 | 23.11 | 0.15 |
| 80 | 28.13 | 22.68 | 22.81 | 0.13 |
| 90 | 28.09 | 22.65 | 22.77 | 0.12 |
| 100 | 28.37 | 22.88 | 22.99 | 0.11 |
| 110 | 28.35 | 22.86 | 22.96 | 0.10 |
| 120 | 28.02 | 22.59 | 22.68 | 0.09 |
| 130 | 28.32 | 22.83 | 22.91 | 0.08 |
| 140 | 28.31 | 22.82 | 22.89 | 0.07 |
| 150 | 27.98 | 22.56 | 22.62 | 0.06 |
| 160 | 28.29 | 22.81 | 22.86 | 0.05 |
| 170 | 28.28 | 22.80 | 22.84 | 0.04 |
| 180 | 27.96 | 22.54 | 22.57 | 0.03 |
| 190 | 28.26 | 22.79 | 22.81 | 0.03 |
| 200 | 28.22 | 22.75 | 22.78 | 0.02 |

**Vicarage Road**

| Distance (m) | 2009 Baseline NO2 (µg/m3) | 2015 Without Airtrack NO2 (µg/m3) | 2015 With Airtrack NO2 (µg/m3) | Change NO2 (µg/m3) |
|---|---|---|---|---|
| 0 | 29.10 | 23.40 | 23.65 | 0.26 |
| 10 | 29.05 | 23.37 | 23.58 | 0.21 |
| 20 | 28.72 | 23.11 | 23.31 | 0.20 |
| 30 | 28.72 | 23.11 | 23.30 | 0.19 |
| 40 | 29.03 | 23.36 | 23.55 | 0.19 |
| 50 | 29.02 | 23.36 | 23.54 | 0.19 |
| 60 | 29.01 | 23.35 | 23.54 | 0.18 |
| 70 | 28.99 | 23.34 | 23.53 | 0.19 |
| 80 | 28.65 | 23.07 | 23.25 | 0.19 |
| 90 | 28.63 | 23.05 | 23.23 | 0.18 |
| 100 | 28.94 | 23.30 | 23.48 | 0.18 |
| 110 | 28.92 | 23.29 | 23.46 | 0.17 |
| 120 | 28.58 | 23.02 | 23.18 | 0.16 |
| 130 | 28.88 | 23.26 | 23.42 | 0.16 |
| 140 | 28.86 | 23.25 | 23.40 | 0.16 |
| 150 | 28.51 | 22.97 | 23.12 | 0.15 |
| 160 | 28.79 | 23.21 | 23.36 | 0.15 |
| 170 | 28.75 | 23.18 | 23.33 | 0.15 |
| 180 | 28.40 | 22.89 | 23.04 | 0.14 |
| 190 | 28.67 | 23.12 | 23.25 | 0.13 |
| 200 | 28.57 | 23.04 | 23.16 | 0.12 |

**Thorpe Road**

| Distance (m) | 2009 Baseline NO2 (µg/m3) | 2015 Without Airtrack NO2 (µg/m3) | 2015 With Airtrack NO2 (µg/m3) | Change NO2 (µg/m3) |
|---|---|---|---|---|
| 0 | 28.74 | 23.14 | 23.41 | 0.27 |
| 10 | 28.71 | 23.12 | 23.34 | 0.23 |
| 20 | 28.38 | 22.86 | 23.07 | 0.21 |
| 30 | 28.37 | 22.85 | 23.06 | 0.21 |
| 40 | 28.66 | 23.09 | 23.29 | 0.20 |
| 50 | 28.65 | 23.08 | 23.27 | 0.19 |
| 60 | 28.62 | 23.06 | 23.24 | 0.18 |
| 70 | 28.58 | 23.04 | 23.21 | 0.18 |
| 80 | 28.21 | 22.75 | 22.92 | 0.17 |
| 90 | 28.18 | 22.72 | 22.88 | 0.16 |
| 100 | 28.47 | 22.95 | 23.09 | 0.13 |
| 110 | 28.44 | 22.94 | 23.04 | 0.11 |
| 120 | 28.10 | 22.66 | 22.75 | 0.09 |
| 130 | 28.41 | 22.91 | 22.98 | 0.08 |
| 140 | 28.39 | 22.90 | 22.96 | 0.07 |
| 150 | 28.07 | 22.63 | 22.69 | 0.05 |
| 160 | 28.38 | 22.88 | 22.93 | 0.05 |
| 170 | 28.37 | 22.88 | 22.91 | 0.04 |
| 180 | 28.04 | 22.61 | 22.64 | 0.03 |
| 190 | 28.34 | 22.85 | 22.88 | 0.03 |
| 200 | 28.29 | 22.81 | 22.84 | 0.03 |

## Annex A Table 12: Changes on $PM_{10}$ Concentrations with and without Airtrack Operational

**Station Road**

| Distance (m) | 2009 Baseline PM10 (µg/m3) | 2015 Without Airtrack PM10 (µg/m3) | 2015 With Airtrack PM10 (µg/m3) | Change PM10 (µg/m3) |
|---|---|---|---|---|
| 0 | 22.05 | 20.56 | 20.59 | 0.03 |
| 10 | 22.09 | 20.56 | 20.58 | 0.03 |
| 20 | 22.10 | 20.55 | 20.58 | 0.02 |
| 30 | 22.11 | 20.55 | 20.57 | 0.02 |
| 40 | 22.11 | 20.55 | 20.57 | 0.02 |
| 50 | 22.11 | 20.55 | 20.57 | 0.02 |
| 60 | 22.11 | 20.55 | 20.57 | 0.02 |
| 70 | 22.10 | 20.54 | 20.56 | 0.02 |
| 80 | 22.10 | 20.54 | 20.56 | 0.02 |
| 90 | 22.09 | 20.54 | 20.55 | 0.02 |
| 100 | 22.09 | 20.53 | 20.55 | 0.01 |
| 110 | 22.08 | 20.53 | 20.54 | 0.01 |
| 120 | 22.08 | 20.53 | 20.54 | 0.01 |
| 130 | 22.08 | 20.53 | 20.54 | 0.01 |
| 140 | 22.08 | 20.53 | 20.53 | 0.01 |
| 150 | 22.07 | 20.52 | 20.53 | 0.01 |
| 160 | 22.07 | 20.52 | 20.53 | 0.01 |
| 170 | 22.07 | 20.52 | 20.53 | 0.00 |
| 180 | 22.06 | 20.52 | 20.53 | 0.00 |
| 190 | 22.05 | 20.52 | 20.53 | 0.00 |
| 200 | 22.01 | 20.52 | 20.52 | 0.00 |

**Vicarage Road**

| Distance (m) | 2009 Baseline PM10 (µg/m3) | 2015 Without Airtrack PM10 (µg/m3) | 2015 With Airtrack PM10 (µg/m3) | Change PM10 (µg/m3) |
|---|---|---|---|---|
| 0 | 22.24 | 20.60 | 20.63 | 0.03 |
| 10 | 22.31 | 20.59 | 20.62 | 0.03 |
| 20 | 22.34 | 20.59 | 20.62 | 0.03 |
| 30 | 22.35 | 20.59 | 20.62 | 0.03 |
| 40 | 22.36 | 20.59 | 20.61 | 0.02 |
| 50 | 22.36 | 20.59 | 20.61 | 0.02 |
| 60 | 22.36 | 20.59 | 20.61 | 0.02 |
| 70 | 22.36 | 20.59 | 20.61 | 0.02 |
| 80 | 22.36 | 20.58 | 20.61 | 0.02 |
| 90 | 22.36 | 20.58 | 20.61 | 0.02 |
| 100 | 22.36 | 20.58 | 20.60 | 0.02 |
| 110 | 22.35 | 20.58 | 20.60 | 0.02 |
| 120 | 22.35 | 20.58 | 20.60 | 0.02 |
| 130 | 22.35 | 20.58 | 20.60 | 0.02 |
| 140 | 22.34 | 20.57 | 20.59 | 0.02 |
| 150 | 22.34 | 20.57 | 20.59 | 0.02 |
| 160 | 22.33 | 20.57 | 20.59 | 0.02 |
| 170 | 22.32 | 20.57 | 20.59 | 0.02 |
| 180 | 22.31 | 20.56 | 20.58 | 0.02 |
| 190 | 22.29 | 20.56 | 20.58 | 0.02 |
| 200 | 22.21 | 20.55 | 20.57 | 0.02 |

**Thorpe Road**

| Distance (m) | 2009 Baseline PM10 (µg/m3) | 2015 Without Airtrack PM10 (µg/m3) | 2015 With Airtrack PM10 (µg/m3) | Change PM10 (µg/m3) |
|---|---|---|---|---|
| 0 | 22.13 | 20.57 | 20.60 | 0.03 |
| 10 | 22.18 | 20.56 | 20.59 | 0.03 |
| 20 | 22.20 | 20.56 | 20.59 | 0.03 |
| 30 | 22.20 | 20.56 | 20.59 | 0.03 |
| 40 | 22.20 | 20.56 | 20.58 | 0.03 |
| 50 | 22.20 | 20.56 | 20.58 | 0.02 |
| 60 | 22.20 | 20.55 | 20.58 | 0.02 |
| 70 | 22.20 | 20.55 | 20.57 | 0.02 |
| 80 | 22.19 | 20.55 | 20.57 | 0.02 |
| 90 | 22.19 | 20.54 | 20.56 | 0.02 |
| 100 | 22.18 | 20.54 | 20.56 | 0.02 |
| 110 | 22.18 | 20.54 | 20.55 | 0.01 |
| 120 | 22.18 | 20.54 | 20.55 | 0.01 |
| 130 | 22.17 | 20.53 | 20.54 | 0.01 |
| 140 | 22.17 | 20.53 | 20.54 | 0.01 |
| 150 | 22.17 | 20.53 | 20.54 | 0.01 |
| 160 | 22.17 | 20.53 | 20.54 | 0.01 |
| 170 | 22.16 | 20.53 | 20.54 | 0.00 |
| 180 | 22.15 | 20.53 | 20.53 | 0.00 |
| 190 | 22.14 | 20.53 | 20.53 | 0.00 |
| 200 | 22.09 | 20.52 | 20.53 | 0.00 |

As shown by the results in **Tables 11** and **12,** no exceedances are predicted of the annual mean $NO_2$ and $PM_{10}$ objectives in 2009. The results also indicate that pollutant concentrations reduce between the 2009 baseline and 2015 scenarios as improved vehicle emission control technologies and EU legislative requirements in relation to vehicle emissions have an increased effect.

The operation of Airtrack is predicted to lead to minor increases in pollutant concentrations at Vicarage Road, Station Road and Thorpe Road, however the increases in pollutant concentrations predicted as a result of Airtrack are 'extremely' small (as per the descriptors in **Table 8**).

**Table 13** details the effect significance for each level crossing for annual mean $PM_{10}$ and $NO_2$ based on the criteria set out in **Tables 9 and 10** and the changes as a result of Airtrack shown in **Table 11**.

**Annex A Table 13 - Summary of Impact Significance (2015 with Airtrack Operational)**

| No. | Level Crossing | $NO_2$ and $PM_{10}$ Annual Mean |
|---|---|---|
| 1 | Thorpe Road, Staines | Negligible |
| 2 | Vicarage Road, Egham | Negligible |
| 3 | Station Road, Egham | Negligible |

## Conclusions

Negligible air quality effects are predicted at Thorpe Road, Station Road and Vicarage Road, as a result of the operation of Airtrack.

During the screening assessments of the level crossings affected by Airtrack, Thorpe Road, Station Road and Vicarage Road were identified as the level crossings, which would be most greatly affected by increases in pollutant concentrations, as the barriers closed for longer periods.

This assessment has shown that the operation of Airtrack is likely to have a negligible impact on the existing air quality conditions at the three level crossings modelled here. As a result it can therefore be concluded that Airtrack will not result in significant adverse air quality impacts at any of the 15 level crossings, as a result of the operation of Airtrack, given that these three worst case situations have shown negligible impacts.

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