



**Figure 29: Location of Proposed Cycle Storage**

**d. Kiss and ride – 3.5% of trips**

6.22 As defined by the Department for Transport for the National Rail Travel Survey, Kiss and Ride Trips represent trips which are ‘car (Dropped Off By someone)’. Currently on site observations indicate that Kiss and Ride trips take place on the car park access road, on the southern side of the road in the lay-by. The lay-by has space for approximately 3 cars.

6.23 The Interchange proposals includes for a Kiss and Ride area located within the station interchange. This will have direct access to the station building via a lift and stairs. The lay-by will accommodate approximately 3 cars.

**e. Parking – 3% of trips**

6.24 It is proposed to provide 35 replacement station car parking spaces on site, including 3 disabled spaces for commuters. The remaining 9 spaces will be provided on the Station Yard site unless a reduction can be agreed with the Train Operating Company. This is in line with the Station Travel Plan objectives to not increase the capacity of car parking. However, the proposals include for an increase in disabled parking, in line with the increase in accessibility for disabled users, Electric Vehicle Charging Points, in line with the aspirations of the draft replacement London Plan and three car club spaces.

**f. Taxi users – 0.7% of trips**

- 6.25 There is a taxi rank located on the car park access road. There is a lay-by on the southern side of the road, which has space for approximately 3 taxis. Rail passengers using taxis to access/ egress the station then walk up the staircase from the car park to the station entrance.
- 6.26 The proposals include for a 3 space taxi rank within the station interchange area. The taxi rank location will have direct access to the station via a lift and stairs, and will be well lit and covered by CCTV. The taxi rank proposals are in line with the current provision of the taxi rank.
- 6.27 Discussions with TfL and the London Borough of Richmond have identified that it would be desirable to have a taxi space on the station forecourt to be used for evening times only. Therefore, a shared space taxi bay, to be shared as a servicing bay for one block of residential units, will be provided on the station forecourt. The taxi/servicing bay will be restricted to times that it can be used. For the taxis, it will be restricted to 8pm to 2am. This will be clearly defined.

**Summary of the Interchange Proposals**

| Interchange Mode | Percentage of Movements | Alterations Proposed   |
|------------------|-------------------------|--|
| Access on Foot   | 76.2%                   | Improved pedestrian area outside of the station. Improved signage, and the introduction of a comprehensive awareness strategy  |
| Access by Cycle  | 2.3%                    | Increase in provision from 80 to approximately 250 spaces.   |
| Access by Bus    | 13.8%                   | Improved connections to the bus stop opposite the station. Improved signage to other bus stops in the area, and the introduction of a comprehensive awareness strategy. Interchange  |
| Kiss and Ride    | 3.5%                    | The provision of a larger lay-by for kiss and ride, with direct access to the station building via a lift and stairs.  |
| Parking          | 3%                      | Maintenance of the Existing Provision  |
| Taxis            | 0.7%                    | Relocated to the interchange area, with direct access to the station via a lift and stairs. The proposals are consistent with the existing provision for taxis, with provision for a night time taxi bay on a lay-by within the station concourse. |

**Table 8: Summary of the Interchange Proposals**

6.28 It can be seen that the proposals provide a considerable betterment to the sustainable modes of access (foot, cycle and bus), which represent around 93% of trips and provide like for like replacements for the car access modes, which represent 7% of trips.

**(iv) Pedestrian Environment Review (PER Analysis)**

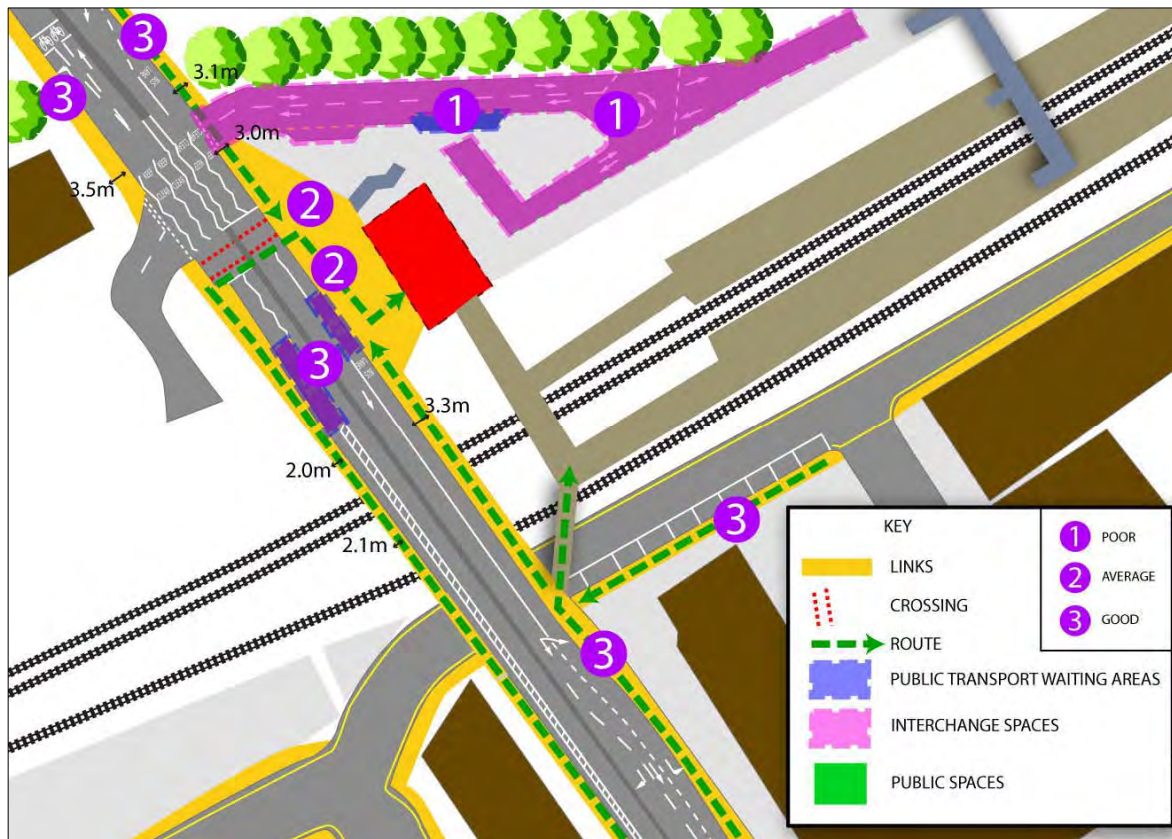
6.29 A Pedestrian Environment Review of the station has been undertaken, (in line with the TfL PERS system) and is contained in Appendix D. This looks at a catchment area around the station, and considers the quality of the pedestrian links, crossings, routes, public transport waiting areas, interchange spaces and public spaces. This was undertaken for the existing and proposed station.

6.30 Each of the criteria is marked out of 1 (poor) to 3 (good). The full results of the review are contained in Appendix D, and are summarised below;

*Existing*

- Kiss & Ride, Taxi rank and parking facilities are not easily accessible
- Queuing capacity for match days on the station forecourt is low
- The Pedestrian Crossing is in a good accessible location adjacent to wide footpaths

6.31 This is shown in Figure 30.



**Figure 30: Existing Station Pedestrian Routes**

6.32 Figure 30 shows that the existing routes from the station via London Road are of a high quality, with wide footpaths in either direction from the pedestrian crossing to the station. However, the station interchange area and forecourt are inadequate. Figure 30 also shows that there is no public space at the station at present.

*Proposed*

- Re-positioning of the Kiss & Ride and Taxi Rank facilities around a central island, enabling vehicles to drop off and exit easily, with full accessibility by mobility impaired users
- Greater pedestrian space outside of the station to allow a better queue management at the station on event days
- New public open space at the station
- New route along the River Crane from the station to Moor Mead Gardens.

6.33 The locations of the improvements identified from the PER analysis are shown in Figure 31.





**Figure 31: Proposed Station Pedestrian Routes**

6.34 Figure 31 shows that the proposals include for an improvement to the pedestrian environment at the station, with more public space and better interchange area.

**Conclusions to this Section**

6.35 It can be seen that the proposals provide a considerable improvement in respect of pedestrian and cycle accessibility to the station, without bringing any changes which would have an impact on the operation of the Strategic Road Network.

## 7. PARKING AND SERVICING

- 7.1 In this section of the report we consider the parking proposals, together with the Management of servicing and deliveries.
- 7.2 The management of parking at the station is considered further in the Car Park Management Plan which forms Appendix F to this submission. The management of the Servicing is also considered further in the Delivery and Servicing Plan which forms Appendix G to this submission.

### The Parking Proposals

- 7.3 The station redevelopment includes for 35 replacement parking spaces for commuters, including 3 disabled commuter spaces, on site. The increase in disabled commuter parking spaces is in line with the increased accessibility of the station. The remaining 9 commuter spaces will be located on the Station Yard site, unless a reduction can be agreed with the Train Operating Company (TOC). The onsite commuter parking at the station will include for 3 active and 4 passive Electric Vehicle Charging Points, in line with the aspirations of the draft replacement London Plan. As stated previously, the residential element of the scheme will be car free with the exception of 3 residential disabled parking spaces and 3 car club spaces.
- 7.4 The residential element of the scheme will be car free, excepting 3 disabled parking spaces, in accordance with standards. This is in accordance with the high level of accessibility of the site by non car means considered in Sections 3 and 5. The concept of a car free scheme at this site has been accepted by TfL, for which in their pre-application advice letter regarding the previous application, (Appendix A) they stated;

*“TfL notes that the residential scheme is promoted as being car free. It is acknowledged that apart from provision of 5 disabled spaces, there will be no dedicated car parking for the residential and commercial elements of the scheme. TfL understands that as a condition of the planning consent, residents will not be eligible for parking permits in the surrounding controlled parking zones. Given the proximity of the site to the station and interchange and supported by the high PTAL, this approach is welcomed by TfL as it accords with London Plan policy 3C.23 ‘Parking strategy’ and the draft replacement London Plan policy 6.13 Parking.”*

- 7.5 The parking for the station will be within an underground car park underneath the station building, at the River Crane Level. The parking access will remain as the existing access, from London Road. This will also be the area where “Kiss & Ride” and taxi drop off will take place.



- 7.6 The parking proposals also include for Electric Vehicle Charging Points in line with the aspirations of the Draft Replacement London Plan policy 6.13. There will be 3 active and 4 passive Electric Vehicle Charging Points within the station car park.
- 7.7 As stated in Section 5 there is controlled parking in the area. Twickenham Station lies within controlled parking zones 'C' and 'D' which both have a Monday to Saturday 8.30am – 6.30pm restriction. The roads and the applied parking restrictions are set out in Figure 32.

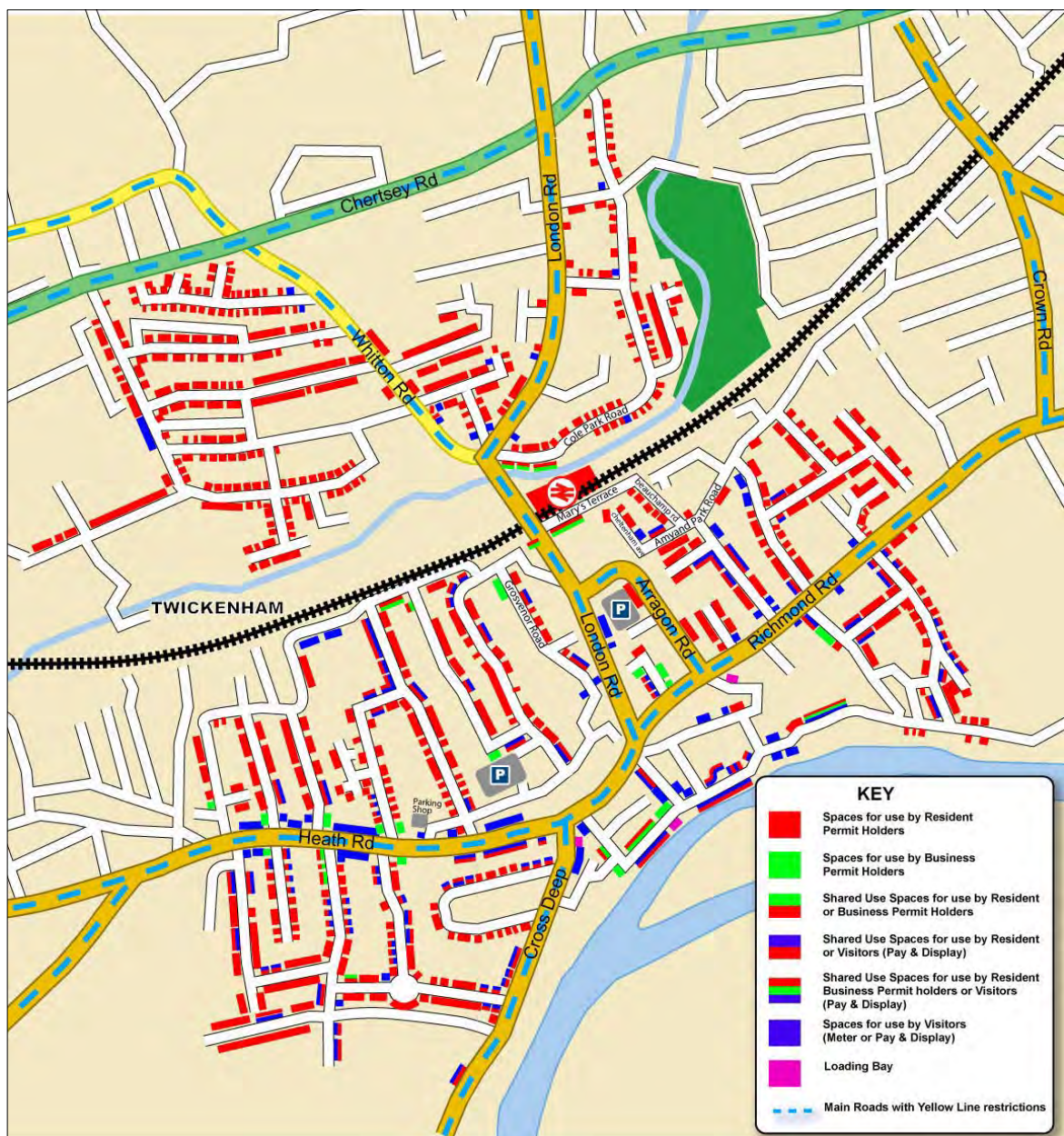


Figure 32: Controlled Parking Zone

- 
- 7.8 As part of the proposals of a car free scheme, the residential development will be car capped, meaning that residents of the development will not be able to apply for a parking permit to park in the surrounding residential roads.
- 7.9 The fact that the area has controlled parking between Monday to Saturday, 8.30am to 6.30pm, and that residents will not be able to obtain a parking permit, as confirmed in the Section 106 Agreement, is consistent with car free schemes throughout London.
- 7.10 Discussions have been held with Transport for London and the London Borough of Richmond in pre-application discussions, regarding parking in the area. In their pre-application advice letter for the previous application, contained in Appendix A, TfL stated;
- “TfL agrees that due to the car free nature of the development, the impact of the scheme on the local road network is likely to be insignificant and therefore detailed highway modelling will not be necessary. TfL would wish for the developer to demonstrate that any residual car parking outside of the controlled parking hours will be monitored and kept to an absolute minimum via the Travel Plan and Subsequent Car Parking Monitoring. TfL understands that the applicant will be undertaking night time parking beat surveys in accordance with the Lambeth methodology to assess the on street capacity within the surrounding area and will include the results within the finalised Transport Statement.”*
- 7.11 Following this, a detailed parking survey was undertaken in Twickenham on Thursday 30<sup>th</sup> September and Friday 1<sup>st</sup> October 2010, following the Lambeth Parking Survey Methodology, to assess the available parking capacity in the surrounding roads, within 200m of the site.
- 7.12 Four surveys were undertaken on each night between; 6.30pm-8.00pm, 8.30pm-10.00pm, 11.00pm-12.30am and 1.30am-3.00am, for which the number of cars parked on the surrounding roads were counted. This included Residential Permit Holder (RPH) Bays and Single Yellow Lines (SYL), and looked at whether or not a residential parking permit was displayed.
- 7.13 A full Car Parking Survey Technical Note is contained in Appendix H, with the results summarised in the following paragraphs.
- 7.14 Figure 33 shows a plan of the roads that were surveyed and the capacity of RPH bays and SYL that were surveyed.





Figure 33: Parking Survey Capacity Plan

- 7.15 Figure 33 shows that there was less than 25% capacity used on Single Yellow Lines on all of the roads that were surveyed. In terms of residential parking bays/ pay and display bays, all of which can be parked on by non-permit holders between 6.30pm-8.30am, Cole Park Road had less than 25% capacity used, which is the lowest of all of the roads surveyed. March Road, London Road north and London Road south and Grosvenor Road had between 51%-75% capacity used, leaving over 25% capacity for parking. Whitton Road, Beauchamp Road, Amyand Park Road, Cheltenham Avenue, Queens Road and Station Road all had over 75% capacity used.
- 7.16 As noted by TfL in their per-application advice letter, they would like for the any parking in the surrounding streets to be kept to a minimum via the Travel Plan and subsequent car park monitoring.
- 7.17 A detailed Car Parking Management Plan will form a pre-commencement condition of any planning permission. A draft Plan is contained in Appendix F. The summary and how car parking in the area will be managed is set out below.

#### ***Station Parking Management***

- (i) Signage schedule within the car park, indicating that it is a managed area for Station Use only;
- (ii) Clear schedules indicating the car parking charges that would be applicable; and
- (iii) The commitment to undertake a regular car park monitoring survey, recording car park usage and rail services usage and a requirement to present proposals regarding changes in management or charging structure if non rail related usage occurs.

#### ***Residential Parking Management***

- (i) A car capping scheme will be introduced at the development, to disallow residents to apply for parking permits to park in the surrounding streets;
- (ii) The marketing packs that residents receive will advise them that this is a controlled parking area, and all roads within the vicinity have restrictions;
- (iii) A Parking Survey will be undertaken prior to the occupation of the first residential unit in the surrounding roads following the same methodology as the survey contained in Appendix H, to confirm the level of on street parking prior to occupation of the development; and
- (iv) A survey will be undertaken within 6 months of the first occupation and on an annual basis for a further 2 years to confirm the level of parking on the surrounding road network.

- (v) The results of the surveys will be presented to the Council and discussed at a review meeting. The Car Parking Management Plan includes for a fund to be available should any issues arise from the Car Parking Surveys.

## **Part 2 - The Servicing Arrangements**

- 7.18 Delivery and servicing movements to the site will be managed in accordance with the Delivery and Servicing Plan contained in Appendix G to this report.
- 7.19 There will be two servicing points for the site. The main servicing location will take place in the interchange area, where a designated service vehicle turning point is located. This will serve the station and 2 of the residential blocks. There will also be a lay-by within the station car park dedicated for deliveries. The secondary servicing point, for refuse collection only, will be a shared evening taxi bay/ servicing bay on the station forecourt, which will be a shared surface area. This will be for servicing for the third residential block. A Delivery and Servicing Plan, which sets out the details of servicing of the site is set out in Appendix G.
- 7.20 Under the Delivery and Servicing Plan, service vehicle movements will be restricted between 7.30 am and 9m and 4pm to 6pm, Monday to Friday, and all day when there are events at Twickenham Stadium, to ensure no conflicts with peak pedestrian flows occur. This will be applicable for both servicing bays.
- 7.21 In terms of requirements by the different uses, they would be as follows;
  - (i) Residential Uses**
  - 7.22 The principal requirement would be for refuse collection. The London Borough of Richmond upon Thames has 1 collection per week.
  - (ii) Shop Units**
  - 7.23 The proposals include for 6 retail units. The final use of the shop units is not known at present, therefore, we estimate no more than one service vehicle per day per unit as a worse case.
  - 7.24 It is anticipated that the retail units would wish for servicing to be outside of the main trading hours.
  - (iii) Summary of Servicing Requirements**
  - 7.25 Table 9 sets out the total weekly usage of the servicing for each of the uses of the proposed development.

| Use                   | Delivery Requirements                | Type of Vehicle    | Duration of Stay | Total |
|-----------------------|--------------------------------------|--------------------|------------------|-------|
| Residential           | 1/2 per week                         | 26 tonne bin lorry | 10 minutes       | 1/2   |
| Additional Shop Units | Maximum 6 weekly deliveries per unit | 10-12m rigid       |                  | 36    |
| TOTAL per week        |                                      |                    |                  | 37/38 |
| Total per day (max)   |                                      |                    |                  | 5-6   |

**Table 9: Servicing Requirements**

7.26 The Delivery and Servicing Plan includes for a requirement for a coordinator of the service deliveries so all parties occupying the development are aware of anticipated vehicle movements and consequently the loading bays can be managed effectively.

**Conclusions to this section**

7.27 In conclusion it can be seen that car parking on the site will be carefully managed and charges for car parking apply at all times. In respect of Servicing and Delivery Movements, these will take place at specified loadings bays within the site. The Delivery and Servicing Plan will restrict service vehicles at the peak times for pedestrian movements in the am and pm peaks and on event days at Twickenham Stadium.



## **8. MOVEMENTS**

8.1 In this Section of the report, we consider the likely movements resulting from the different elements of the proposals, namely;

- (i) The Station and Interchange
- (ii) The Residential Uses

8.2 The objective of this Section is to understand how pedestrian and vehicle movements might change at the station.

### **(i) Station and Interchange**

8.3 As stated previously, the proposals do not change the number of commuter parking spaces at the station and as set out in Section 9; a Station Travel Plan will be introduced, with a targeted aim of reducing the vehicle movements to and from the station.

8.4 Future growth in the use of the Station would be accommodated through accessibility by non car means.

### **(ii) The Residential Uses**

8.5 The site is located in PTAL 5 and is proposed as a car free development, in line with policies contained in the London Borough of Richmond upon Thames LDF and UDP.

#### ***Vehicle Trips***

8.6 As set out in Section 5, all on street parking is controlled in the vicinity of the site and the applicant will enter into an Obligation in respect of preventing residents from applying for permits to park in the surrounding areas.

8.7 All off street parking is chargeable and Section 7 has set out the details of the Management Proposals for the Station car park, including details of the charges that apply. In simple terms a resident would have to pay at least £700 per annum to use the Station Car Park, even if they could ensure that their car was never in the car park during the peak tariff period.

8.8 Notwithstanding this, we have used the TRAVL Database to project the modal share of the proposed residential development.

**Modal Share**

- 8.9 We have looked at 4 different sites in London, all of which have no parking provision on site for residents. The sites that we have looked at are listed below.
- Winchester Mews, Camden – 22 units with a PTAL of 3;
  - Coverly Close, Whitechapel – 14 units with a PTAL of 3;
  - Green Dragon House, Camden – 29 units with a PTAL of 6; and
  - Albion Wharf, Lambeth – 45 units with a PTAL of 4.
- 8.10 It can be seen that the sites have a range of PTAL, three of which have a lower PTAL than the proposed site, which makes this a conservative assessment.
- 8.11 It should be noted that there is limited data on the TRAVL database in terms of car free schemes, so the sites used have a lower provision of residential units than the proposed development. All of the analysis used was broken down to the movements per unit and factored to the proposed number of residential units for this development.
- 8.12 We have used the questionnaire surveys which were undertaken at each of these sites and looked at the resident’s main mode of travel. We have used the average of all four of the sites mode of travel, to obtain an average modal share for a car free development in London.

| <b>Projected Modal Share</b> |             |
|------------------------------|-------------|
| All Car Drivers              | 0%          |
| Car Passenger                | 1%          |
| Bus/Rail/Underground         | 57%         |
| Motor Cycle                  | 1%          |
| Pedal Cycle                  | 4%          |
| Walk                         | 37%         |
| <b>TOTAL</b>                 | <b>100%</b> |

**Table 10: Projected Modal Share for the Residential Uses**

- 8.13 Table 10 shows that public transport is the highest mode of predicted trips from the development, with 57%, followed by walking with 37% of trips. We have used National Statistics ‘Method of Travel to Work – Resident Population’ Data to derive a split of the predicted modes of public transport. This is shown in Table 11.

| Projected Modal Share |             |
|-----------------------|-------------|
| All Car Drivers       | 0%          |
| Car Passenger         | 1%          |
| Underground           | 4%          |
| Rail                  | 44%         |
| Bus                   | 9%          |
| Motor Cycle           | 1%          |
| Pedal Cycle           | 4%          |
| Walk                  | 37%         |
| <b>TOTAL</b>          | <b>100%</b> |

**Table 11: Split of Predicted Modal Share for Public Transport Uses**

8.14 We have also used the TRAVL Database to obtain a peak trip rate, based on the same four sites set out above. This has been obtained using the survey data for the sites listed, for which an average has been taken as used as a predicted number of trips from the development. We have then used this against the modal share to derive a split number of peak trips to and from the development.

| Mode            |             | AM (07.00-09.00) | PM (16.00-18.00) |
|-----------------|-------------|------------------|------------------|
| All Car Drivers | 0%          | 0                | 0                |
| Car Passenger   | 1%          | 3                | 3                |
| Underground     | 4%          | 8                | 9                |
| Rail            | 44%         | 93               | 98               |
| Bus             | 9%          | 19               | 20               |
| Motor Cycle     | 1%          | 2                | 3                |
| Pedal Cycle     | 4%          | 8                | 8                |
| Walk            | 37%         | 77               | 81               |
| <b>TOTAL</b>    | <b>100%</b> | <b>210</b>       | <b>221</b>       |

**Table 12: Projected Peak Hour Trips to and from the Development**

8.15 Table 12 shows that the projected number of peak period trips is 210 for the am peak and 221 for the pm peak, the majority of which are rail trips and trips on foot. Details of this can be found in Appendix I.

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### **Visitor Trips**

- 8.16 In terms of visitor trips, we have considered the results of surveys undertaken at Plough Lane, in Wimbledon, as part of the Travel Plan Monitoring of the site. The survey showed that for the 570 unit development, 23% of them had visitors. The split between car and non car modes for visitors was 30% car and 70% non car.
- 8.17 If these figures were translated for the proposed application, this would demonstrate at most 8 visitor trips to the development by car per day. It is noted that unrestricted free car parking is available in the roads around the Plough Lane scheme.
- 8.18 Therefore it can be concluded that the number of vehicle trips to the Residential Development would be nominal.

### **Conclusions to this section**

- 8.19 This section has set out that the predicted number of peak trips to and from the proposed development, along with the projected modal share of trips. This has shown that the number of predicted trips is minimal, of which the majority will be on foot or by rail. This section has also shown that on a conservative basis at least 70% of visitor trips to the development will be by non car modes, and using a survey of a residential development in Wimbledon, it is predicted that there will be approximately 8 visitor trips to the development per day. Therefore any impacts as a result of the development will be negligible.



## 9. EVENT DAY MOVEMENTS AND ANALYSIS

9.1 Twickenham Stadium is used for a variety of events over a calendar year. The calendar for 2011 is shown below, showing the anticipated attendances.

| Date   | Event                          | Kick Off Time     | Estimate Attendances |
|--|--------------------------------|-------------------|----------------------|
| Sat 12 <sup>th</sup> February 2011                   | England v Italy                | 14.30             | 82,000               |
| Sat 26 <sup>th</sup> February 2011                   | England v France               | 17.00 – 18.30     | 82,000               |
| Sun 13 <sup>th</sup> March 2011                      | England v Scotland             | 15.00-16.30       | 82,000               |
| Wed 6 <sup>th</sup> April 2011                       | Daily Mail Schools Day         | 11.00-15.30       | 5,000                |
| Sat 23 <sup>rd</sup> April 2011                      | St. Georges Day                | 17.30 (TBC)       | 65,000               |
| Wed 27 <sup>th</sup> April 2011                      | BUCS Finals                    | 12.30 and 15.00   | 3,000                |
| Sat 7 <sup>th</sup> May 2011                         | Army v Navy                    | 15.00-16.30       | 50,000               |
| Sun 8 <sup>th</sup> May 2011                         | League Champions Cup Finals    | 12.00-16.00       | 5,000                |
| Sat 14 <sup>th</sup> May 2011                        | RFU Cup Finals                 | 11.00-17.00       | 5,000                |
| Sat 21 <sup>st</sup> /Sun 22 <sup>nd</sup> May 2011  | Emirates Airline London Sevens | TBC               | 30,000/40,000        |
| Sat 28 <sup>th</sup> May 2011                        | Aviva Premiership Rugby Final  | 15.00             | 82,000               |
| Sun 29 <sup>th</sup> May 2011                        | England v Barbarians           | TBC               | 35,000               |
| Fri 29 <sup>th</sup> -Sun 31 <sup>st</sup> July 2011 | Watchtower Convention          | 10.00-17.30       | 20,000 daily         |
| Sat 6 <sup>th</sup> August 2011                      | England v Wales                | TBC               | 70,000               |
| Sat 13 <sup>th</sup> August 2011 (TBC)               | Middlesex Sevens               | 10.30-19.00 (TBC) | 25,000               |
| Sat 3 <sup>rd</sup> September 2011                   | London Double Header           | TBC               | 82,000               |
| Sat 26 <sup>th</sup> November 2011                   | Possible International (TBC)   | TBC               | 50,000+              |
| Sat 3 <sup>rd</sup> December 2011                    | Possible International (TBC)   | TBC               | 50,000+              |
| Thurs 8 <sup>th</sup> December 2011                  | Varsity Match                  | TBC               | TBC                  |

**Table 13: Twickenham Stadium Event Calendar for 2011**

- 9.2 Table 13 shows that in a 12 month period for 2011 there are approximately 19 events at Twickenham. Of those events approximately 5 are at maximum capacity and approximately 8 at less than half the maximum capacity of the stadium.
- 9.3 We have looked at the routes taken from the stadium to the station, which is shown in Figure 34 below.



**Figure 34: Route from Twickenham Stadium to the Station**

- 9.4 We have analysed the existing management of the Station on an event day in order to fully understand what happens at the station to ensure that the proposals have a non-detriment effect on the station management. This has been achieved through attendance at the station on match days on 2 occasions and through liaisons with South West Trains.
- 9.5 We have been provided with an event train timetable from the England v Italy Rugby Match, which took place on Saturday 12<sup>th</sup> February 2011. The Kick Off was at 14.30, and we have set out in Tables 14 and 15 the timetables for west and east bound services from 12.00-14.30 and from 17.00-19.30 on this day.

| Down Services   |                   |                         |                             | Up Services |          |                         |                             |
|-----------------|-------------------|-------------------------|-----------------------------|-------------|----------|-------------------------|-----------------------------|
| From            | To                | Arrival (at Twickenham) | Departure (from Twickenham) | From        | To       | Arrival (at Twickenham) | Departure (from Twickenham) |
| Waterloo        | Wimbledon         | 12.03                   | 12.04                       | Reading     | Waterloo | 12.10                   | 12.11                       |
| <b>Waterloo</b> | <b>Twickenham</b> |                         | <b>12.06 (terminates)</b>   | Wimbledon   | Waterloo | 12.11                   | 12.13                       |
| Waterloo        | Reading           | 12.09                   | 12.10                       | Windsor ER  | Waterloo | 12.22                   | 12.23                       |
| Waterloo        | Chiswick          | 12.16                   | 12.17                       | Chiswick    | Waterloo | 12.26                   | 12.28                       |
| Waterloo        | Windsor ER        | 12.21                   | 12.22                       | Reading     | Waterloo | 12.40                   | 12.41                       |
| Waterloo        | Wimbledon         | 12.33                   | 12.34                       | Wimbledon   | Waterloo | 12.41                   | 12.43                       |
| <b>Waterloo</b> | <b>Twickenham</b> |                         | <b>12.36 (terminates)</b>   | Windsor ER  | Waterloo | 12.52                   | 12.53                       |
| Waterloo        | Reading           | 12.39                   | 12.40                       | Chiswick    | Waterloo | 12.56                   | 12.58                       |
| Waterloo        | Chiswick          | 12.46                   | 12.47                       | Reading     | Waterloo | 13.10                   | 13.11                       |
| Waterloo        | Windsor ER        | 12.51                   | 12.52                       | Wimbledon   | Waterloo | 13.11                   | 13.13                       |
| Waterloo        | Wimbledon         | 13.03                   | 13.04                       | Windsor ER  | Waterloo | 13.22                   | 13.23                       |
| <b>Waterloo</b> | <b>Twickenham</b> |                         | <b>13.06 (terminates)</b>   | Chiswick    | Waterloo | 13.26                   | 13.28                       |
| Waterloo        | Reading           | 13.09                   | 13.10                       | Reading     | Waterloo | 13.40                   | 13.41                       |
| Waterloo        | Chiswick          | 13.16                   | 16.17                       | Wimbledon   | Waterloo | 13.41                   | 13.43                       |
| Waterloo        | Windsor ER        | 13.21                   | 13.22                       | Windsor ER  | Waterloo | 13.52                   | 13.53                       |
| Waterloo        | Wimbledon         | 13.33                   | 13.34                       | Chiswick    | Waterloo | 13.56                   | 13.58                       |
| <b>Waterloo</b> | <b>Twickenham</b> |                         | <b>13.36 (terminates)</b>   | Reading     | Waterloo | 14.10                   | 14.11                       |
| Waterloo        | Reading           | 13.39                   | 13.40                       | Wimbledon   | Waterloo | 14.22                   | 14.23                       |
| Waterloo        | Chiswick          | 13.46                   | 13.47                       | Windsor ER  | Waterloo | 14.26                   | 14.28                       |
| Waterloo        | Windsor ER        | 13.51                   | 13.52                       | -           | -        | -                       | -                           |
| Waterloo        | Wimbledon         | 14.03                   | 14.04                       | -           | -        | -                       | -                           |
| Waterloo        | Reading           | 14.09                   | 14.10                       | -           | -        | -                       | -                           |
| Waterloo        | Chiswick          | 14.16                   | 17.14                       | -           | -        | -                       | -                           |
| Waterloo        | Windsor ER        | 14.21                   | 14.22                       | -           | -        | -                       | -                           |
| Waterloo        | Wimbledon         | 14.33                   | 14.34                       | -           | -        | -                       | -                           |

**Table 14: Egress Train Timetable**

| Down Services     |                |                         |                             | Up Services       |                 |                         |                             |
|-------------------|----------------|-------------------------|-----------------------------|-------------------|-----------------|-------------------------|-----------------------------|
| From              | To             | Arrival (at Twickenham) | Departure (from Twickenham) | From              | To              | Arrival (at Twickenham) | Departure (from Twickenham) |
| Waterloo          | Wimbledon      | 17.03                   | 17.05                       | <b>Twickenham</b> | <b>Waterloo</b> |                         | <b>17.05</b>                |
| Waterloo          | Reading        | 17.09                   | 17.11                       | Reading           | Waterloo        | 17.10                   | 17.12                       |
| Waterloo          | Chiswick       | 17.16                   | 17.18                       | Wimbledon         | Waterloo        | 17.15                   | 17.16                       |
| Waterloo          | Windsor ER     | 17.21                   | 17.23                       | Windsor ER        | Waterloo        | 17.23                   | 17.24                       |
| <b>Twickenham</b> | <b>Reading</b> |                         | <b>17.28</b>                | Chiswick          | Waterloo        | 17.27                   | 17.29                       |
| Waterloo          | Wimbledon      | 17.33                   | 17.35                       | <b>Twickenham</b> | <b>Waterloo</b> | <b>17.33</b>            | <b>17.35</b>                |
| Waterloo          | Reading        | 17.39                   | 17.41                       | Reading           | Waterloo        | 17.40                   | 17.42                       |
| Waterloo          | Chiswick       | 17.46                   | 17.46                       | Wimbledon         | Waterloo        | 17.45                   | 17.46                       |
| Waterloo          | Windsor ER     | 17.51                   | 17.53                       | Windsor ER        | Waterloo        | 17.53                   | 17.54                       |
| <b>Twickenham</b> | <b>Reading</b> |                         | <b>17.58</b>                | Chiswick          | Waterloo        | 17.57                   | 17.59                       |
| Waterloo          | Wimbledon      | 18.03                   | 18.05                       | <b>Twickenham</b> | <b>Waterloo</b> | <b>18.01</b>            | <b>18.05</b>                |
| Waterloo          | Reading        | 18.10                   | 18.12                       | Reading           | Waterloo        | 18.10                   | 18.12                       |
| Waterloo          | Chiswick       | 18.16                   | 18.18                       | Wimbledon         | Waterloo        | 18.15                   | 18.16                       |
| Waterloo          | Windsor ER     | 18.21                   | 18.22                       | Windsor ER        | Waterloo        | 18.22                   | 18.24                       |
| Waterloo          | Wimbledon      | 18.33                   | 18.34                       | Chiswick          | Waterloo        | 18.27                   | 18.29                       |
| Waterloo          | Reading        | 18.39                   | 18.41                       | <b>Twickenham</b> | <b>Waterloo</b> | <b>18.31</b>            | <b>18.35</b>                |
| Waterloo          | Chiswick       | 18.46                   | 18.47                       | Reading           | Waterloo        | 18.40                   | 18.42                       |
| Waterloo          | Windsor ER     | 18.51                   | 18.52                       | Wimbledon         | Waterloo        | 18.45                   | 18.46                       |
| Waterloo          | Wimbledon      | 19.03                   | 19.04                       | Windsor ER        | Waterloo        | 18.53                   | 18.54                       |
| Waterloo          | Reading        | 19.09                   | 19.11                       | Chiswick          | Waterloo        | 18.57                   | 18.59                       |
| Waterloo          | Chiswick       | 19.16                   | 19.17                       | <b>Twickenham</b> | <b>Waterloo</b> | <b>19.01</b>            | <b>19.05</b>                |
| Waterloo          | Windsor ER     | 19.21                   | 19.22                       | Reading           | Waterloo        | 19.10                   | 19.12                       |
| Waterloo          | Wimbledon      | 19.33                   | 19.34                       | Wimbledon         | Waterloo        | 19.14                   | 19.16                       |
| -                 | -              | -                       | -                           | Windsor ER        | Waterloo        | 19.23                   | 19.24                       |
| -                 | -              | -                       | -                           | Chiswick          | Waterloo        | 19.27                   | 19.29                       |
| -                 | -              | -                       | -                           | <b>Twickenham</b> | <b>Waterloo</b> | <b>19.31</b>            | <b>19.35</b>                |

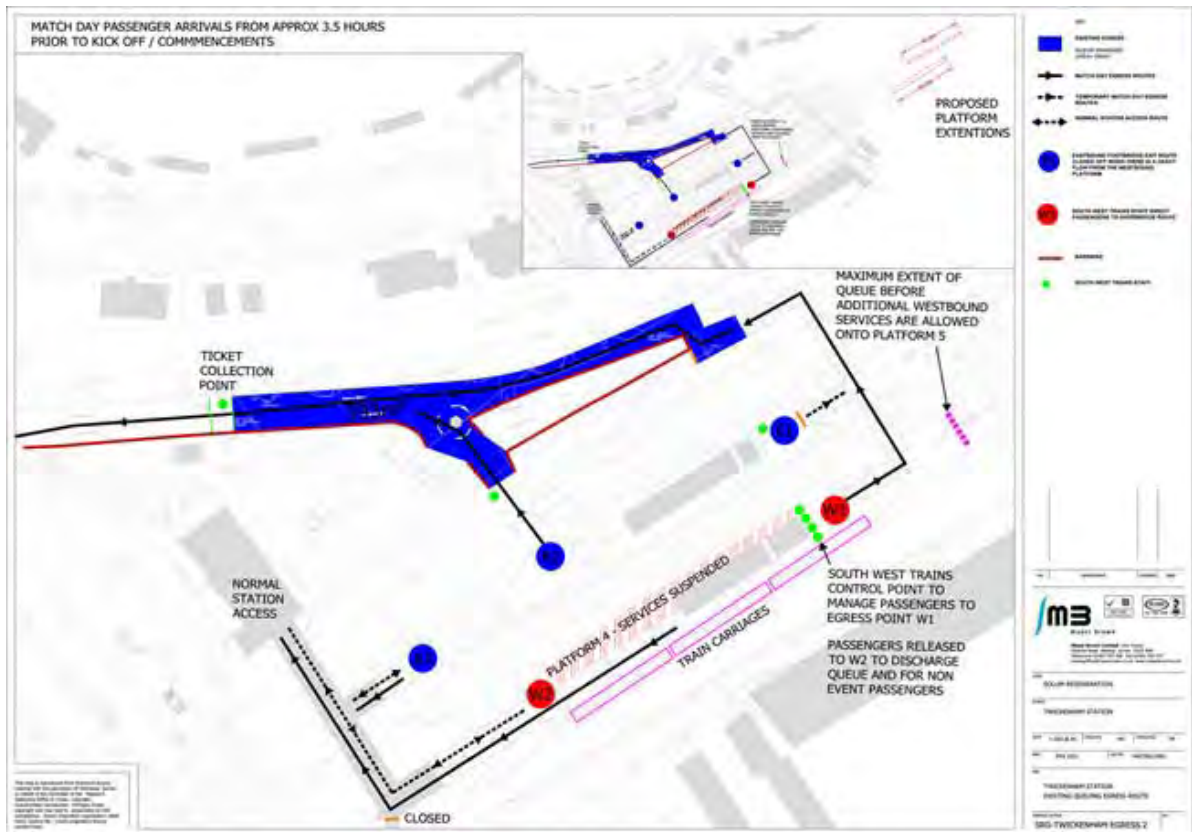
**Table 15: Ingress Train Timetable**



- 9.6 Tables 14 and 15 show that on an average match day, there are 10 trains per hour in each direction, this includes for are an additional 2 trains per hour which terminate at Twickenham prior to an event, and commence at Twickenham following an Event.
- 9.7 The train capacity for an 8 carriage train is approximately 800-900 passengers. South West Trains have advised us that they clear approximately 9000 eastbound and approximately 1500 west bound passengers per hour, giving a total of approximately 10500 passengers per hour boarding trains on a match day.

### **Existing Management at the Station – Egress**

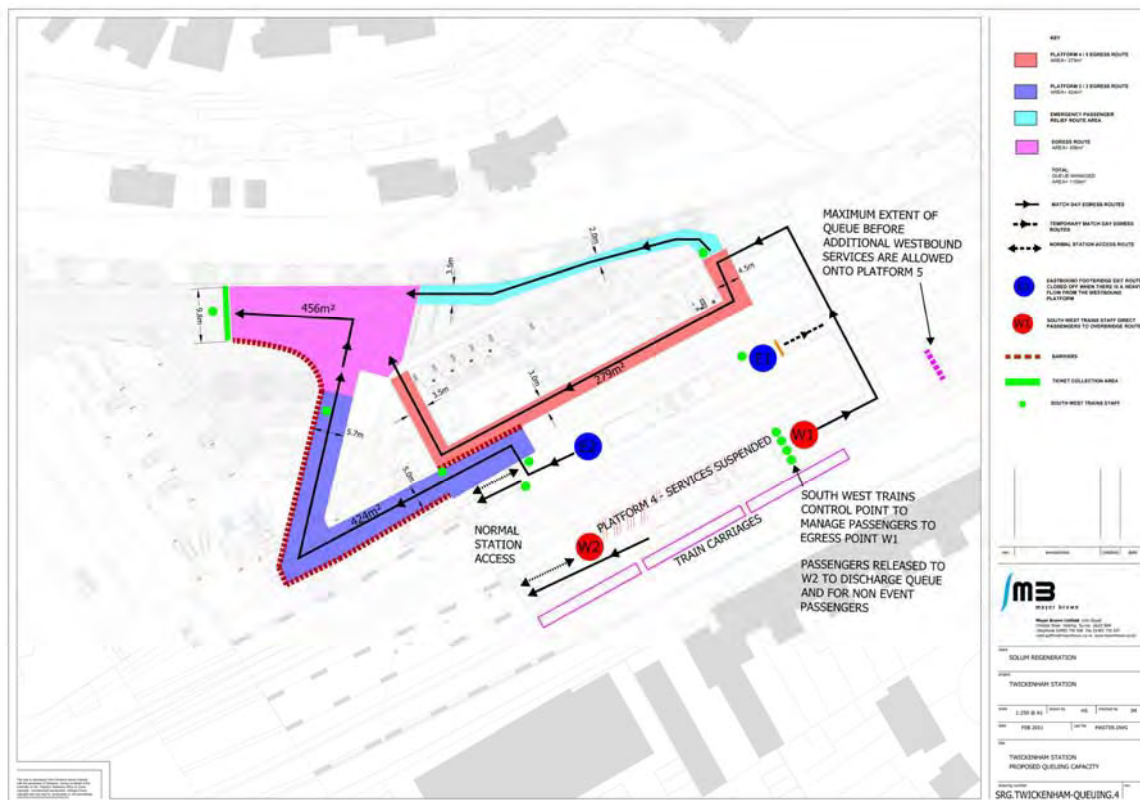
- 9.8 When an event takes place at the stadium, the management system commences from approximately 3 hours before kick-off time.
- 9.9 On the egress route passengers are directed by event staff which direction to exit the station. The passengers from the first 2.5 carriages on Platform 5 are directed to exit through the station forecourt. The remaining 5.5 carriages of passengers are directed to the bridge at the eastern end of the station which leads to the eastern end of the car park. If a queue gets past a certain point on platform 5 (please see marked on plan SRG-TWICKENHAM-EGRESS.2, contained in Appendix J), trains arriving at Platform 5 are suspended to allow the queue to minimise. Trains to Platform 4 are suspended.
- 9.10 Passengers from Platforms 2/3 are directed to use the gate that leads into the car park to exit via the access road. As with passengers on Platform 5, the first 2.5 carriages are directed to exit the station via the station forecourt. When there are no passengers leaving from Platform 5, some of the passengers from platforms 2/3 are directed to use the eastern footbridge. This only occurs for a minimum period of time.
- 9.11 The existing egress route has an area of 593sqm
- 9.12 The existing egress route from the station to the stadium is shown in Figure 35, with the full size scale plan (SRG-TWICKENHAM-EGRESS.2) contained in Appendix J.



**Figure 35: Existing Egress Routes**

**Proposed Management at the Station – Egress**

- 9.13 In terms of the proposed station, a comprehensive egress route, in line with the existing route has been planned. This follows similar procedures, with 2 exit points, one for passengers from Platform 5, and one from passengers from Platforms 2/3.
- 9.14 Passengers exiting the station from Platform 5, will as existing, either be directed to exit via the station forecourt (for the first 2.5 carriages) or exit via the footbridge at the eastern end of the station (for the last 5.5 carriages). The footbridge route will then lead them to a route to the north of the tracks, which will lead to a gate to enter the car park.
- 9.15 For passengers exiting the station from Platforms 2/3, they will either be directed to exit via the station forecourt, as existing, or via a gate that follows a separate route to the car park, where they will meet passengers from Platform 5 (as existing).
- 9.16 The proposed egress route gives an area of 1159sqm, an increase over the existing provision. The proposals plan is shown in Figure 36, with a full size scale plan (SRG-TWICKENHAM-QUEUING.4) included in Appendix J.



**Figure 36: Proposed Egress Routes**

9.17 Figure 36 shows that there is also an emergency route, if for example, the queues on the two routes become congested. This emergency route will take place from the footbridge, where passengers will be directed to turn right, instead of left, and will continue a route on the northern side of the development of the car park. This route will only be used to clear passengers, and will then return to the main routes once the queues have cleared. This will be managed by event staff, and this route will be gated.

### Existing Management at the Station – Ingress

9.18 The existing queue system for the ingress route for passengers is managed with 2 separate queues for east and west bound passengers. The system has been continually refined, in order to:

- (i) Ensure that all carriages on the trains are evenly loaded
- (ii) To minimise boarding times for trains to ensure that the timetable is maintained.

9.19 To advise passengers of which route to take, electronic signs are provided on the junction of London Road/Whitton Road, together with the provision of event staff to advise passengers which queue to join.

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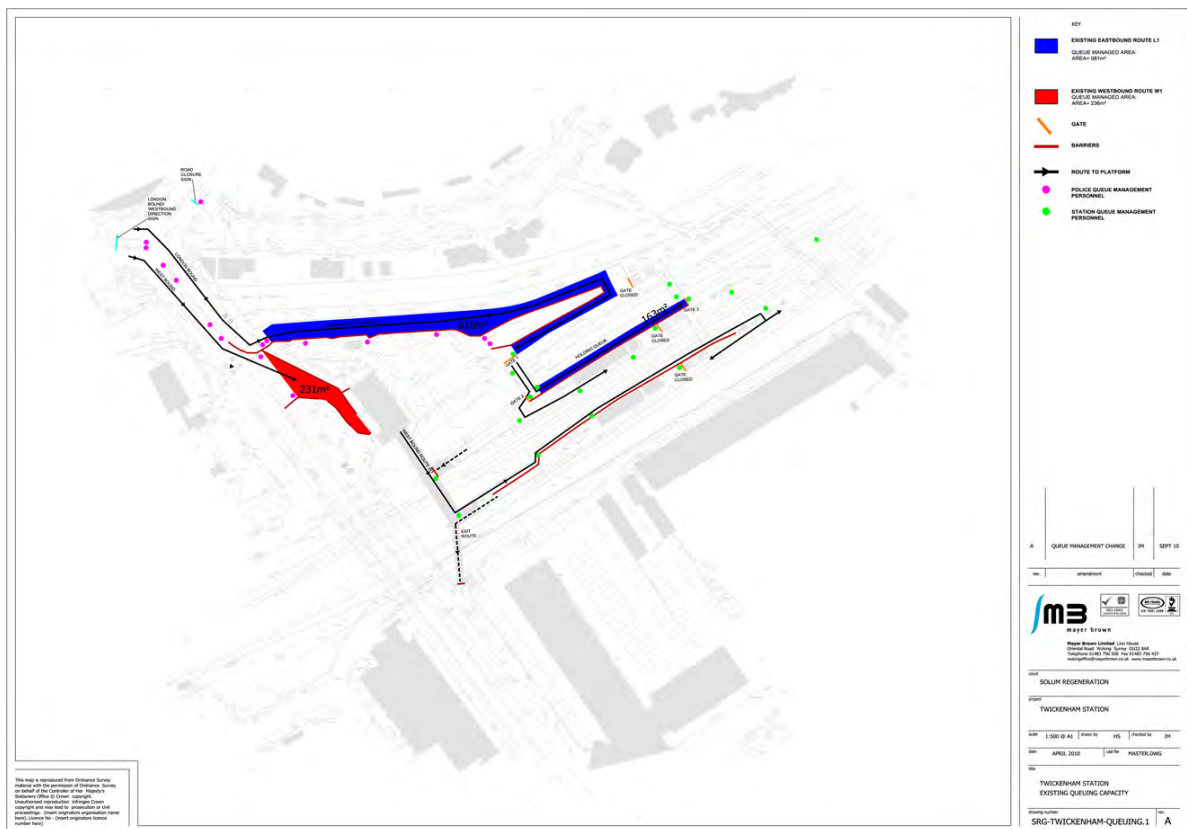
### ***East bound passengers***

- 9.20 Event Staff stay on the footbridge over the platforms for the duration, to oversee instruct event staff throughout the station.
- 9.21 For East Bound Passengers, the station car park is used to queue passengers onto the platforms and trains. A 'queue snake' is set out in the car park, which leads to the gate 1 (as shown on the plan SRG-TWICKENHAM-QUEUING.1, contained in Appendix J) that directly accesses platforms 2 and 3. This is managed by staff.
- 9.22 There are barriers which form the queue 'snake' to the gate, and at the gate there are staff which are instructed as to how many people to queue on each platform, depending on the train that is due to arrive.
- 9.23 Once they reach gate 1, they are instructed to either queue on platform 2 or platform 3. Once both platforms are full, they are instructed, one queue at a time to continue to the end of platform 3. The reason for holding the queue on platform 2 is to allow passengers to be able to access the eastern end of platform 3 quickly once the preceding train has been discharged. For safety, a train is placed on platform 2 to block the railway line.
- 9.24 The queuing from London Road is managed by a number of event staff and the metropolitan police. Police on horses manage the number of people let in to the car park at a time. Once in the car park, there is event staff managing the crowds.
- 9.25 There are 3 gates for the queue, gate 1, the access onto both platforms, gate 2, at the entrance to platform 3 and gate 3, which is located on the platform under the footbridge. This allows the staff to manage people once on the platforms. The stairways to the main station building and onto the footbridge at the eastern end of the platforms are gated off.
- 9.26 For passengers arriving on platform 3, they are directed to the stairs to the main entrance and are let through the closed gates by a member of staff, to then exit via the access gantry onto London Road, to the south of the station.
- 9.27 The total area for east bound passengers is 818sqm.

### ***West bound passengers***

- 9.28 For passengers travelling west bound, they are signed on London Road towards the main station entrance, for which the concourse is used as a queuing area. Passengers are queued throughout the station to the stair way on platforms 4 and 5. The stair way is separated, using the hand rail down the middle, so that passengers have to enter platform 4 (services suspended), which is continued to be separated from platform 5 by barriers. Passengers are then instructed to walk up the platform and then join the queue on platform 5.

- 9.29 Passengers exiting the station are instructed by a member of staff to exit the platform via the stairs, half of which are kept clear for exiting passengers, to use the access gantry onto London Road to the south of the station entrance.
- 9.30 Similar to the London bound passengers; west bound passengers are instructed by event staff where to queue. The event staff on the platforms is instructed by the event staff on the footbridge of how many people to queue per train.
- 9.31 The total area for west bound passengers is 231sqm.
- 9.32 Figure 37 shows the existing ingress queue plan, along with a full size plan (SRG-TWICKENHAM-QUEUING.1) contained in Appendix J.



**Figure 37: Existing Ingress Routes**

**Proposed Management at the Station - Ingress**

- 9.33 As stated previously, the objective of the proposals was to ensure that there was no detriment to the existing management of the station on Match Days, as the system has been refined over a period of time to maximise the quick and efficient loading of passengers onto the trains.



9.34 The proposals, therefore, follow a similar procedure to the existing management at the station on match days.

**East Bound Passengers**

9.35 For East Bound passengers, they will continue to queue through the station car park, via a ‘queue snake’. This then leads to a gate which gives access to Platforms 2/3. The same procedure will then continue as the existing, for 2 queues on platforms 2 and 3, which will be organised by event staff.

9.36 There are also 2 emergency routes for eastbound passengers, for if an accident was to happen on the route to the platform, to allow for diversion of passengers to continue with the management system.

9.37 The total area for the proposed east bound route is 820sqm.

9.38 The proposed east bound route is shown in Figure 38, along with a full size scale (SRG-TWICKENHAM-QUEUING.3) plan included in Appendix J.



**Figure 38: Proposed East Bound Queue Route**

### West Bound Passengers

- 9.39 For west bound passengers, they will still queue via the station forecourt. The proposed station forecourt is further south than the existing, giving more queuing capacity on London Road, along the footpath. The forecourt itself will also be larger in size, which will allow for 2 queues to the station entrance.
- 9.40 There will be a gate on the approach to the forecourt, which will allow staff to manage 2 queues. Staff will direct passengers to join a queue which will lead to the station entrance. There will be a second gate on each queue to give a space between the entrance and the queue. Staff will then direct one queue at a time into the station, to queue in the station, down to the platforms. The same queue management will take place on the platforms as the existing management system.
- 9.41 The proposed queue area for west bound passengers is 512sqm.
- 9.42 The proposed west bound route is shown in Figure 39, along with a full size scale (SOLUM.TWICKENHAM-QUEUING.1) plan included in Appendix J.



Figure 39: Proposed West Bound Queue Route

9.43 Passengers exiting the station on the inward leg will be directed through the station to exit via the main entrance, where a passageway will be left clear.

**Match Day Queuing Conclusion**

9.44 In conclusion, it can be seen that a comprehensive match day management strategy has been established for the proposed development, which satisfies the needs of the South West Trains event management staff. The proposed management system is in line with the existing system, and provides an overall increase in area for the management. This is shown in Table 16.

| Queue                | Existing Area  | Proposed Area  | Increase      | % Increase |
|----------------------|----------------|----------------|---------------|------------|
| <b>Egress Route</b>  |                |                |               |            |
| Egress route         | 593sqm         | 1159sqm        | 566sqm        | 95%        |
| <b>TOTAL Egress</b>  | <b>593sqm</b>  | <b>1159sqm</b> | <b>566sqm</b> | <b>95%</b> |
| <b>Ingress Route</b> |                |                |               |            |
| East bound route     | 818sqm         | 820sqm         | 2sqm          | 0.2%       |
| West Bound route     | 231sqm         | 512sqm         | 281sqm        | 122%       |
| <b>TOTAL Ingress</b> | <b>1049sqm</b> | <b>1322sqm</b> | <b>283sqm</b> | <b>27%</b> |

**Table 16: Existing and Proposed Queuing Areas**

9.45 Table 16 shows that there will be a 95% increase in area for the egress routes, and a 27% increase in the ingress routes. All of the routes provide an increase over the existing provision of area for queuing passengers on a match day.

**Discussions with South West Trains**

9.46 As stated previously, the existing station management arrangement for match days were analysed along with discussions taking place with South West Trains to prepare a proposed match day management system for the proposed development. South West Trains have advised that they are content with the proposed management strategy and queuing routes for the development, and that they can continue to effectively manage queuing at the station when an event takes place.

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## **Discussions with the Emergency Services**

9.47 Discussions were also held with the Emergency Services for Twickenham to discuss the match day and non match day proposals. These discussions included the emergency plans for the Station for both scenarios, along with the residents access on Match Days. These are set out in the following paragraphs.

### *Emergency Access*

9.48 We have looked at how emergency vehicles would access the station on normal days and on match days. For a normal day at the station, the emergency access would be as the existing, from the station forecourt, and from the station car park. A 3.7m wide corridor would also be available for residents at the far eastern part of the site, should the need for a vehicle to access this area be required.

9.49 For Match Days, areas will be kept clear from passengers to allow access for emergency vehicles. Firstly on the station forecourt, an area will be kept clear for exiting passengers from the station, which will be used for emergency vehicles. Within the car park area, a clear passageway will be kept to the north of the queue, adjacent to the far eastern residential units for emergency vehicle access.

9.50 Station Event Staff will manage passengers if an emergency vehicle needs access to the station. This is in line with the existing emergency vehicle access as set out in the South West Trains 'Local Emergency Plan for Twickenham Station' Document.

### *Residents Access*

9.51 In terms of resident's access on a Match Day, it is proposed that residents will have access to the site via the bridge that leads from Beauchamp Road/Mary's Terrace to the eastern end of the station. There will then be a gate, which only residents will have a key to allow them access to the site. Notwithstanding this, a comprehensive information strategy will be implemented as part of the Travel Plan, which will include information for residents on when events are taking place, and at what times the station will be busy.

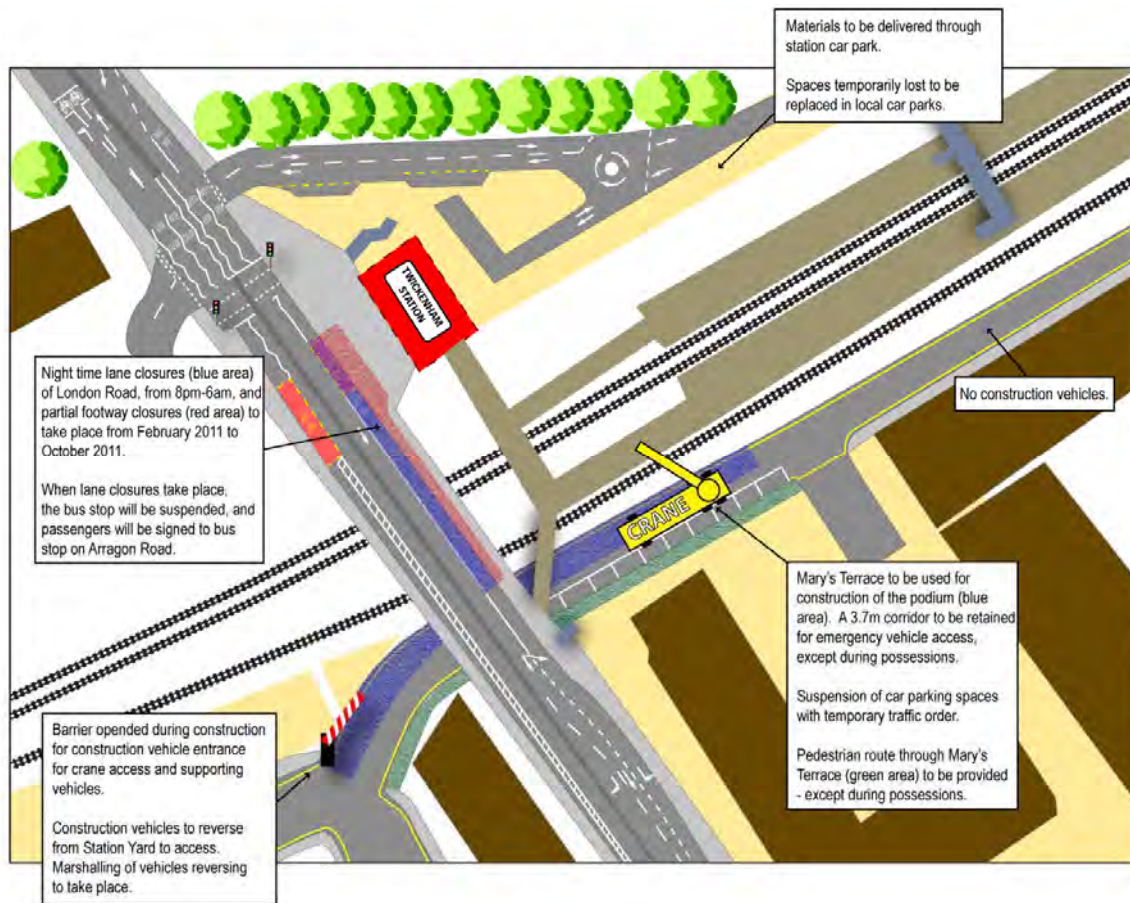
## **Conclusion**

9.52 The proposed development has been analysed in relation to how the station would work on a match day, without a detrimental effect on the existing management at the station. The proposals for match days at the station allows for the existing management system to be retained, with a considerable increase in capacity for the egress and ingress of passengers. This section has also set out the details of how emergency and residential access to the station will be achieved when an event takes place at Twickenham Stadium.

## 10. CONSTRUCTION

- 10.1 The applicants would accept any approval to involve a pre-commencement planning condition, requiring full details of how the scheme will be constructed. This would be prepared with the detailed involvement of the selected contractor on the basis of the designed scheme and would include for details of duration of works, construction routes, any temporary lane or footway closures, the management of pedestrians on a day to day basis and the management proposals when events are taking place at Twickenham Stadium and other nearby venues.
- 10.2 In anticipation that there will be a detailed condition to satisfy, this section sets out the principles in terms of construction of the;
- (i) The Podium
  - (ii) The Main Station Works
  - (iii) Management of Construction during events
- 10.3 This should be read in parallel with the Construction Chapter of the ES.
- 10.4 A draft construction and logistics plan has been prepared setting out the principles, and is contained in Appendix K.
- (i) The Podium**
- 10.5 A plan of how the podium will be constructed was provided as part of the planning application for the podium. A plan showing the proposed construction access of the podium, including the emergency vehicles access provisions is set out in Figure 40.





**Figure 40: Proposed Construction of the Podium**

10.6 The construction of the podium will take place between mid/late 2011 and April 2012, and will utilise planned rail closures (possessions) by Network Rail, which will take place between September and December 2011.

10.7 Figure 40 shows that the proposed construction involves;

- (i) Mary's Terrace will be partially closed during construction, from mid/late 2011 to April 2012 for access to the tracks and for crane placement. A pedestrian route and a 3.7m corridor for emergency access will be provided during this period, except during rail possessions. During rail possessions, vehicles will enter via Beauchamp Road, where a temporary wall boundary will be constructed to allow for vehicles to be able to manoeuvre around the narrow bend;
- (ii) Night time lane closures on London Road are to take place from 8pm-6am, along with partial footway closures from mid/late 2011.

- (iii) The car park will be subject to part of full closures during these times, for which advanced notice to users of the car park will be given, with instructions in respect of the availability of other local parks.
- (iv) It is intended that the level of existing cycle parking provision will be maintained during the construction period. The exact location of the cycle parking will need to vary during the construction process and the details of how this will be managed will be dealt with through the construction management statement

10.8 In relation to the construction of the podium, a meeting was held with the Station Manager of Twickenham Fire Station to discuss emergency access to Mary's Terrace when construction was being undertaken. This concluded that a 3.7m corridor would be left at the western end of Mary's Terrace to allow for emergency vehicles to access the road should an emergency occur during this period. This would be throughout the construction period excepting the 4 weekend possessions that will take place. During the rail possessions, vehicles will enter via Beauchamp Road, for which a temporary wall boundary will be constructed to allow emergency vehicles to be able to manoeuvre around the narrow bend from Beauchamp Road to Mary's Terrace.

**(ii) Construction of the main scheme**

10.9 The main scheme would be constructed over the Podium using again the access routes set out in Figure 40.

**(iii) Management of Construction during Events at the Stadium**

10.10 Construction is likely to be occurring whilst events take place at the Stadium. Bespoke management measures will be developed dependent upon the stage of the construction project at the time, when an event is taking place. The principals included in the construction plan are likely to involve;

- (i) Advising on the Transport and Stadium web sites and other information sites that construction work is taking place and there may be some delays.
- (ii) Advising visitors of the alternative arrangements that would be available on a temporary basis in order to slightly manage down the numbers
- (iii) Providing clear legible routes between the platforms and the outside area.

## 11. MITIGATION

11.1 This section sets out the proposed mitigation measures that will be implemented to support the development.

11.2 The site is an excellent location for a car free development in accordance with National and Local Transport Policies and the interchange improvements are consistent with the high level of existing movements on foot. Notwithstanding this, a package of improvements to support the development, which are outlined in this Transport Statement and contained in the relevant Appendices outlined below.

- (i) A Car Parking Management Plan – Appendix F
- (ii) A Servicing and Delivery Plan – Appendix G
- (iii) A Construction and Logistics Plan – Appendix K
- (iv) Travel Plans (Station TP and Residential TP) – Appendix L and M

11.3 Each of the above are contained in their respective appendix and are summarised below.

### **(i) Car Parking Management Plan – Appendix F**

11.4 A Car Parking Management Plan is included in Appendix F of this report. This sets out how the car parking for all of the elements of the development will be effectively managed. The contents of the Car Parking Management Plan sets out how the car parking will be enforced, the car parking opening hours and access control, the parking policies and how the car park will be monitored.

### **(ii) Delivery and Servicing Plan – Appendix G**

11.5 A Delivery and Servicing Plan is included in Appendix G to this report. In summary, the Delivery and Servicing Plan sets out the number of expected service vehicles, for which is approximately 37-38 per week at maximum, for all of the development. The Delivery and Servicing Plan also sets out how the Servicing of the site will be managed, which includes;

- a. Restrictions on loading times to ensure that there are no conflicts with peak movements on site.
- b. Proactive management of deliveries to reduce the number of unnecessary journeys and to prevent any conflict of servicing on site.
- c. An agreement with the occupants to use freight operators which demonstrate their commitment to following best practice

- d. Ongoing review of the management plan.

**(iii) The provision of a Construction and Logistics Plan – Appendix K**

- 11.6 The provision of a Construction and Logistics Plan will form either an obligation or condition of the development. A template of the Construction and Logistics Plan is contained in Appendix K and in particular demonstrates that vehicle routes for construction vehicles will be defined as well as working times and delivery times.

**(iv) Travel Plans**

- 11.7 A Station Travel Plan will be introduced for the Station, together with bespoke Travel Plans for the residential uses. A synopsis of each of the Travel Plans is shown below;

***Station Travel Plan – Appendix L***

- 11.8 The object of the Station Travel Plan will be to further encourage movements to and from the Station by non car means, seeking in particular an ongoing reduction in vehicle movements to and from the station.

- 11.9 The key features, include;

(v) *Clear Travel Information at the Station.*

- 11.10 The Station will have clear information located throughout the station to encourage travel by sustainable means. The information could include how to Car Share, and the promotion of Walking and Cycling to the Station.

(vi) *The provision of a car sharing scheme*

- 11.11 A Car Sharing Scheme will be set up for the rail users, which will be promoted throughout the station.

- 11.12 The Car Sharing Scheme will involve a website for rail users to sign up to car sharing, which will locate other drivers also wishing to car share.

- 11.13 The car sharing scheme will be promoted throughout the station, via posters and leaflets on the benefits of car sharing and how rail users can sign up to it.

(vii) *Safe and Secure Cycle Storage*

- 11.14 The proposals increase the number of safe and secure cycle parking from 80 spaces to 250 spaces for the rail users to encourage people to cycle to and from the station. The cycle parking will be provided in a mezzanine area above the car parking area.

(viii) *Monitoring and Targets*

- 11.15 Annual surveys will be undertaken, in particular recording the use of the car park and vehicle drop off and pick up movements at the station.

***Residential Travel Plan – Appendix M***

- 11.16 We demonstrated in Section 5 of this report that the site is in an excellent location for a car free development due to its relationship to public transport services and local amenities. Therefore the residential Travel Plan will include for;

- (i) The provision of travel information for residents through Travel Folders and a Community Travel Web Site
- (ii) The provision of Secure Cycle Storage in accordance with the Local Authorities Standards and the Draft Replacement London Plan.
- (iii) The provision of three car club spaces and a discount for residents for use of the car club.
- (iv) Access Management for Event Days at Twickenham Stadium via the Community Travel Web Site.

**Conclusions to this Section and Planning Obligations**

- 11.17 The proposals involve a number of innovative measures designed to encourage people to make journeys by means other than the private car, and to create a culture of travel from the outset.
- 11.18 All of the Travel Plans will be subject to monitoring and will each have their own targets.



## 12. IMPACTS

12.1 This section of the report looks at the impacts from the development. In accordance with the Transport for London Guidance on the preparation of Transport Statements, the impacts should be considered in relation to the following;

- (i) Road Network – Public Highway and Footway
- (ii) Bus Network
- (iii) LU/ DLR
- (iv) National Rail Network
- (v) Walking and Cycling
- (vi) Trams
- (vii) Taxi's
- (viii) River Services

12.2 These are discussed in more detail in the following paragraphs.

### **(i) Road Network - Public Highway and Footway**

12.3 Section 8, considered the changes in vehicle and pedestrian movements at the station. As stated previously, the station includes for provision of the existing number of parking spaces, which means there will be no change in the number of vehicles to and from the station. In terms of pedestrian trips, Section 8 has shown that it is expected that there will be an additional 77 am and 81 pm peak trips on foot and the residential element of the scheme will be car free, excepting the provision of 3 disabled parking bays, therefore there will be no highways impact as a result of the development.

12.4 The proposals include for an improved pedestrian area on the station concourse. Along with the improved pedestrian area, it is proposed to relocate southern bus stop nearer to the station entrance.

**(ii) Bus Network**

- 12.5 Section 5 of the submission has demonstrated that the site is well located in relation to a number of local bus services. We have also looked at the projected movements to and from the residential development, which has shown 19 am and 20 pm peak trips, which will not have an impact on the bus capacity in the area. TfL stated in their pre-application advice letter for the previous application (Appendix A),

*“Given the scale of the development and the frequency of local bus services it is TfL’s view that this development will have a limited impact on bus service capacity. Therefore TfL deems the current service levels as appropriate and confirms there is no justification for significant route adjustments or increased services to this site as a result of this development.”*

**(iii) LU/ DLR**

- 12.6 The nearest underground station to Twickenham is Richmond, approximately 4km from the site. Therefore, no Impacts are expected on the London Underground.

**(iv) National Rail Network**

- 12.7 The nearest National Rail Station is Twickenham Rail Station. The development proposals will have a nominal effect on loadings on the National Rail Services. It was set out in Section 8 that the projected number of rail trips from the residential development is 93 am peak and 98 pm peak trips from the residential development, which in consideration of the number of passengers at Twickenham Station.

**(v) Cycling**

- 12.8 The proposals include for an increase in cycle parking spaces at the station, along with a new cycle/ pedestrian link along the River Crane from the station, therefore the impacts on cycling will be positive. However, we have looked at the number of expected peak trips from the residential development by cycle, which shows approximately 8 am and 8 pm trips, which will not impact on the cycle network.

**(vi) Trams**

- 12.9 There are no trams within the vicinity of the site.

**(vii) Taxi’s**

- 12.10 The taxi rank at Twickenham Station will be relocated to the proposed interchange, with the same provision for taxi spaces as there is at present. The taxi rank will be more accessible for passengers at the station than the existing location.

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**(viii) River Services**

- 12.11 The river services are located approximately 1.5km from the site; therefore there will be no impacts on the river services.

**Conclusion to this section**

- 12.12 It can be seen that the site is in a good location in terms of accessibility; however it is not consider that there will be any negative impacts on the area as a result of the proposed development.

### 13. IMPACTS ON THE ROYAL MAIL SITE DEVELOPMENT PROPOSALS COMING FORWARD

13.1 This section looks the possible impacts that the proposals for the development at Twickenham Station may have the proposed development at the Royal Mail site, opposite the station, coming forward. The planning context in terms of the Twickenham Station site and other neighbouring sites is considered in the planning statement prepared by Maddox and Associates. This section just considers the potential future linkages between the Station Development and the Royal Mail Site, should that come forward.

13.2 Meetings were held with the promoters of the Royal Mail site, and the principles were that the current vehicle access would be retained and any scheme would clearly benefit from the improvements at the station.

13.3 Figure 41, shows the potential future linkages between the Royal Mail Site and the Station Site.

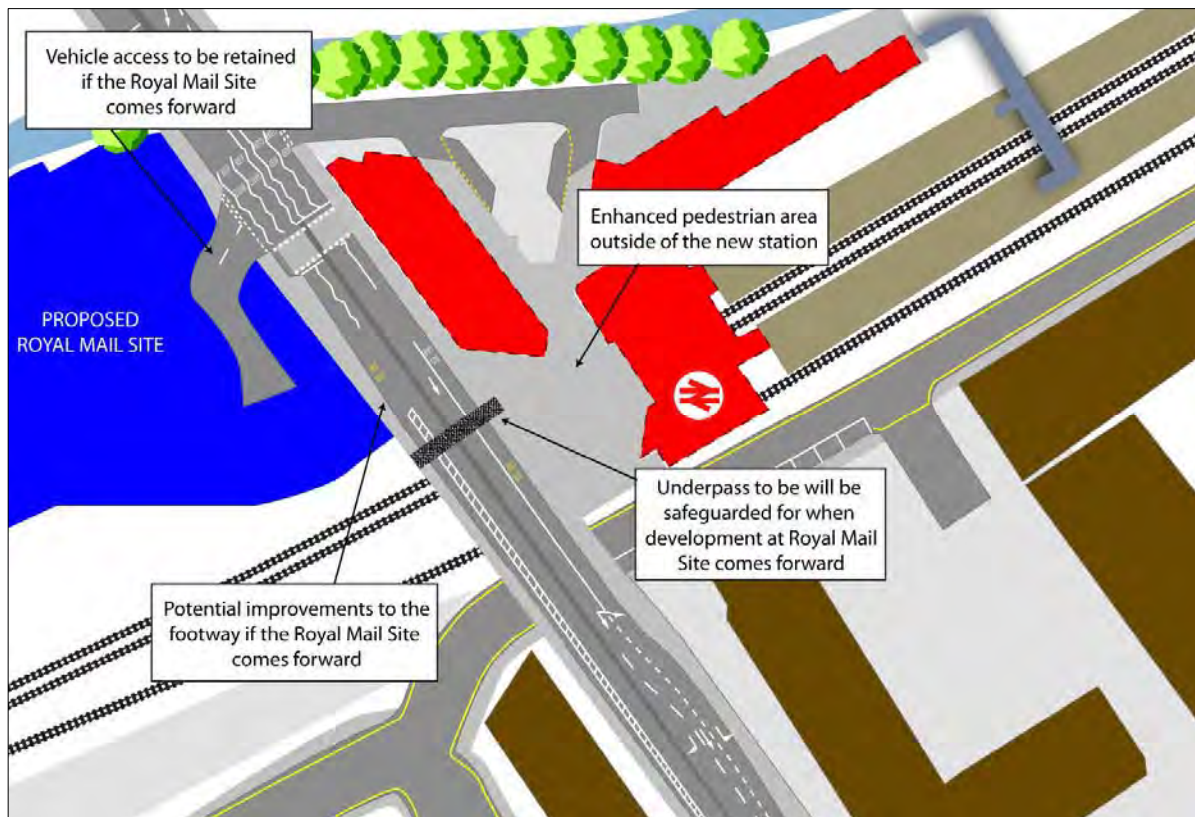


Figure 41: Royal Mail Proposed Site

- 
- 13.4 In particular it shows that the Station development provides an increase in pedestrian footway capacity that would benefit the Royal Mail Site, should that come forward and that the development proposals by safeguarding the existing underpass that leads from the station to the Royal Mail site, under the London Road Bridge, allow a pedestrian route between the two developments to be provided, when the Royal Mail Site comes forward.

**Conclusion to this section**

- 13.5 On the basis that the Station development is a car free scheme, then there are no highways implications arising from the Station site coming forward. Vehicle and pedestrian access can be provided to the Royal Mail site in such a way as to work with the Station development.
- 13.6 It is considered that the proposals for Twickenham Station do not prejudice any development coming forward at the Royal Mail Site.



## 14. CONCLUSIONS

14.1 This Transport Statement and supporting Travel Plans have been prepared on behalf of Solum Regeneration, a joint venture between Network Rail and Kier property, to support an application for the comprehensive redevelopment of Twickenham Station to provide a new station concourse facility, an improved transport interchange, 734sqm of commercial floorspace and residential accommodation (115 units) together with associated car parking and soft and hard landscaping including a new riverside walkway. The proposals also include for the relocation of the south bound bus stop on London Road, and the introduction of 3 car club spaces which will form part of an existing car club network.

14.2 In the following paragraphs, we have summarised the proposals under the following headings;

- Site Access and Design;
- Car Parking and Traffic Impact;
- Buses;
- Taxis;
- Walking;
- Cycling;
- Travel Plans;
- Servicing and Construction;
- Event Day Analysis;
- Mitigation/ Section 106 Contributions; and
- Summary.

### ***Site Access and Design***

14.3 The proposals include for an improved interchange at the station which will provide a considerable betterment to the sustainable modes of access (foot, cycle and bus). The interchange has been designed in accordance with TfL's 'Interchange Best Practice Guidance'. The interchange includes for a taxi rank and a "kiss & ride" area, public open space at the station, a considerable increase in cycle parking and a larger area outside the station for better queue management on event days.

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### ***Car Parking and Traffic Impact***

- 14.4 The residential proposals include for a car free scheme, excepting for 3 disabled parking spaces which will be allocated and 3 car club bays. This is in line with the excellent location of the site, with a PTAL of 5 and accords with the London Plan policy 3C.23 'Parking Strategy'. The scheme will be car capped, which means residents will not be allowed to apply for parking permits to park in the surrounding streets, which will be secured through a Section 106 Agreement.
- 14.5 The proposals include for 35 commuter parking spaces on site, which includes for 3 disabled parking spaces for commuters. The remaining 9 spaces will be provided on the Station Yard site, unless a reduction can be agreed with the Train Operating Company (TOC). The on-site car park will also see the introduction of Electric Vehicle Charging Points, in line with the Draft Replacement London Plan policy 6.13. The residential element of the scheme will be car free, excepting for 3 disabled spaces and 3 car club spaces. The concept of a car free scheme at this site has been agreed with TfL (Appendix A) and the London Borough of Richmond.
- 14.6 As stated previously, the residential element of the scheme will be car free, and the station users parking will be in line with the existing provision, unless a reduction can be agreed with the TOC, therefore there will be no impact on traffic. In line with TfL's views on other car free schemes, it is considered that no detailed highway modelling will be necessary.
- 14.7 The fact that the area has controlled parking between Monday to Saturday, 8.30am to 6.30pm, and that residents will not be able to obtain a parking permit, as confirmed in the Section 106 Agreement, is consistent with car free schemes throughout London.
- 14.8 Discussions have been held with Transport for London and the London Borough of Richmond in pre-application discussions, regarding parking in the area. Following this, a detailed parking survey was undertaken in Twickenham on Thursday 30<sup>th</sup> September and Friday 1<sup>st</sup> October 2010, following the Lambeth Parking Survey Methodology, to assess the available parking capacity in the surrounding roads, within 200m of the site. A full Car Parking Survey Technical Note is contained in Appendix H, with the results summarised in this report.
- 14.9 Overall, there was 61% capacity used on the roads surveyed, on the Thursday Survey, 55% with permits, 6% without permits. For the Friday Survey there was also 62% capacity used on the roads surveyed, 57% with permits, and 5% of cars without permits.
- 14.10 As noted by TfL in their pre-application advice letter, they would like for the any parking in the surrounding streets to be kept to a minimum via the Travel Plan and subsequent car park monitoring.

- 14.11 A detailed car parking management plan will form a pre-commencement condition of any planning permission. A draft plan is contained in Appendix F, and is summarised in this report.

**Buses**

- 14.12 Section 8 of this report sets out the predicted modal share for the proposed development. This is based on TRAVL Data and Census Data for the area. This shows that there will be approximately 19 am peak (7am to 9am) and 20 pm peak (4pm to 6pm) bus trips. TfL stated in their pre-application advice letter (Appendix A);

*“Given the scale of the development and the frequency of local bus services it is TfL’s view that this development will have a limited impact on bus service capacity. Therefore TfL deems the current service levels as appropriate and confirms there is no justification for significant route adjustments or increased services to this site as a result of this development.”*

- 14.13 Therefore, there will be limited impact on the London Bus Network.

**Taxis**

- 14.14 The proposals include for a 3 space taxi rank within the station, in the underground car park. The taxi rank location will have direct access to the station via a lift and stairs, and will be well lit and covered by CCTV. The taxi rank proposals are in line with the current provision of the taxi rank at the station.

- 14.15 Discussions with TfL and the London Borough of Richmond have identified that it would be desirable to have an additional taxi space on the station forecourt to be used for evening times only. Therefore, a shared surface taxi bay, to be shared as a servicing bay for one block of residential units, will be provided on the station forecourt. The taxi/servicing bay will be restricted to times that it can be used. For the taxis, it will be restricted for late night use. This will be clearly defined.

**Walking**

- 14.16 A Pedestrian Environment Review has been undertaken in accordance with the TfL PERS audit, which looks at the area around the station for the existing and proposed station.

- 14.17 The results of the review are contained in Appendix D, and shows;

*For the existing station*

- (iv) Kiss & Ride, Taxi rank and parking facilities are not easily accessible;
- (v) Queuing capacity for an event day at the stadium is low; and

- (vi) The Pedestrian Crossing is in a good accessible location adjacent to wide footpaths.

*For the proposed station*

- (v) Re-positioning of the Kiss & Ride and Taxi Rank facilities around a central island, enabling vehicles to drop off and exit easily, with full accessibility by mobility impaired users;
- (vi) Greater pedestrian space outside of the station to allow a better queue management at the station on event days;
- (vii) New public open space at the station; and
- (viii) New route along the River Crane from the station to Moor Mead Gardens.

14.18 Notwithstanding the considerable improvements set out above, we have also looked at the projected residential trips to and from the development, which projects that there will be 77 am peak period and 81 pm peak period trips on foot. In considering the existing trips on foot at the station, it is not considered that there will be any impact on the pedestrian areas at the station as a result of this development.

**Cycling**

- 14.19 The site is well located in relation to the existing cycle network, with on road and off road routes within the vicinity. The proposals include for an increase in cycle parking from 80 to 250 spaces at the station which will be provided in a mezzanine area above the car park. The proposals also include for a path along the river crane, from the station linking to Moor Mead Gardens.
- 14.20 Section 8 of this report looks at the predicted residential trips to and from the development, and projects that there will be 8 am peak period and 8 pm peak period cycle trips from the proposed residential development. Therefore, it is not considered that there will be any impact on the cycle network.
- 14.21 The cycle parking proposals provide an increase over TfL's '*Cycle Parking Standards*' and the cycling proposals accord with the London Plan policy 3C.22 '*Improving Conditions for Cycling*'. The residential units will be provided with 208 cycle parking spaces in secured areas by the relevant core entrances, which is an increase over the standards set out in Table 6.2 of the draft replacement London Plan.

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### ***Travel Plans***

- 14.22 The proposals include for a Residential Travel Plan, contained in Appendix M and a Station Travel Plan, contained in Appendix L. Both of the Travel Plans will be secured through a Section 106 Agreement.
- 14.23 Both Travel Plans have been prepared using TfL's Best Practice Guidance and using the ATTrBuTE Tool. The Travel Plans set out the objectives and aims, and the measures proposed to achieve the aims and the objectives. The Travel Plans also set out the proposed Action Plan in terms of implementation, targets to measure the success of the Travel Plans and how they will be monitored and reviewed.
- 14.24 Travel Coordinators will be appointed to implement and manage each of the Travel Plans for the development. The Travel Coordinators will liaise to ensure that the Travel Plans will work together, which will include joint steering groups and marketing events.

### ***Servicing and Construction***

- 14.25 The proposals include for a Delivery and Servicing Plan, which is summarised in Section 7 of this report, and is contained in Appendix G. This has been prepared in accordance with TfL's Guidance '*Managing Freight Effectively: Delivery and Servicing Plans*'. The Delivery and Servicing Plan sets out how the site will be serviced and how servicing will be managed.
- 14.26 In addition, the proposals include for a Construction and Logistics Plan, which is contained in Appendix K. The CLP has been prepared in accordance with TfL's Guidance '*Building a Better Future for Freight: Construction Logistics Plans*'. The CLP sets out how the site will be effectively constructed and managed to minimise disruption to the road network, local residents and users of the station.

### ***Event Day Analysis***

- 14.27 We have analysed the existing station management on Match Days, in order to ensure that the proposals have a non-detrimental effect on how the station is managed, and to construct proposals for how the new development would be managed on a Match Day. This involved attendance at the station when an event was taking place at the stadium on two occasions, and discussions with South West Trains.
- 14.28 We have looked at both egress and ingress routes. For egress, the majority (5.5 carriages) passengers from Platform 5 use the footbridge to the east of the station, with a minority (the first 2.5 carriages) using the station forecourt to exit the station. For Platforms 2/3, the majority of passengers use the gate from platform 2 to the car park, which then flows into the passengers from platform 5, with a minority of passengers using the station forecourt to exit the station. This is managed by event staff directing passengers to the appropriate exits.

- 
- 14.29 The proposals involve the same principal, with 2 queues from the different platforms. Platform 5 passengers would still use the footbridge to the east of the station, which would then lead to the station car park via a path along the northern side of the tracks.
- 14.30 Passengers from Platforms 2/3 will be directed, as at present, through a gate to the car park, to then flow into passengers from platform 5. These proposals allow for the existing management procedures continue. The proposals involve an overall increase of 95% of area, over the existing.
- 14.31 In terms of ingress routes, the existing station queues eastbound passengers into the car park, into a queue snake, which leads to the gate on platforms 2/3. Passengers are then managed to queue onto the platforms, until the train arrives, which allows maximising of train loads. The proposed eastbound route will follow a similar procedure, passengers will queue via a queue snake in the station car park to a gate that will lead to the platforms, and the existing management of passengers will continue as the existing procedures. The proposals give an additional 2sqm over the existing area.
- 14.32 Westbound passengers, at present, queue via the station forecourt on London Road, where they are directed by station management staff to queue on the stairwell onto platform 5. They then queue passengers along platform 4, to the end of the platform buildings, and then onto platform 5. The proposals again follow the same procedure, with passengers queuing on the station forecourt. The area of the proposed forecourt gives an increase over the existing area, which allows for 2 queues on the station forecourt, to be managed by event staff. Once in the station building, the same procedures would continue, as with the existing management. A full set of the Event day plans are contained in Appendix J.
- 14.33 Therefore, it can be seen that the proposed station will provide an increase in area for the queuing of passengers on a match day, and allows for the existing management at the station to be continued effectively. Discussions have been held with South West Trains, for which they have stated that they are content with the proposals.
- 14.34 Discussions were also held with the emergency services, to discuss a) the emergency access to the station on a match day and b) how residents would access their properties on match days.
- 14.35 For point a) areas will be kept clear from passengers, which will allow event management to move passengers away to allow emergency access, should the need arise. In relation to point b), the footbridge from Beauchamp Road will be utilised for residents to have access to their properties. There will be a gate for which residents will have a key, to gain access to their properties. The event day proposals are set out in detail in Section 9 of this report.
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***Summary***

- 14.36 It can be seen that the proposals involve a number of improvements for station users for a variation of modes of travel. The proposed development will be a car free development due to excellent accessibility of the site; therefore, there will be no impact on traffic.

## **Appendix A**

Pre-Application Advice Letter from TfL, dated 29<sup>th</sup> September 2010



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Group Planning

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Our ref: 10/0314  
Your ref: SOLUMTWICKENHAM.1

Ian Mitchell,  
Mayer Brown Limited,  
Lion House,  
Oriental Road,  
Woking,  
Surrey  
GU22 8AP

29<sup>th</sup> September 2010

Dear Ian,

## **Twickenham station, LB Richmond upon Thames - TfL pre application advice**

I write following the Transport for London (TfL) pre-application meeting on the above development, which took place on 14<sup>th</sup> September 2010.

Firstly, I would take this opportunity to thank you for taking advantage of the TfL pre-application service, the aim of which is to ensure that development is successful in transport terms and in accordance with relevant London Plan policies.

*Please note that the following comments represent the views of Transport for London (TfL) and are made entirely on a 'without prejudice' basis. They should not be taken to represent an indication of any subsequent Mayoral decision in relation to this scheme. These comments also do not necessarily represent the views of the Greater London Authority (GLA) which should be consulted separately.*

### **General Context**

TfL understands that this application is made by Solum Regeneration, a joint venture between Network Rail and Kier Group. At this stage the proposed development includes 164 residential units and small retail units in three individual blocks and will enable and include the redevelopment and refurbishment of the existing Network Rail station. In its entirety the scheme will include improvements for pedestrians, an improved interchange area, and relocation of the south bound bus stop on London Road. The proposals also include a taxi drop off, kiss and ride facility and an increased level of cycle parking.

In order to facilitate this development a separate planning application for a station podium has recently been submitted. This is a non-referable application and TfL will provide a separate response.

TfL understands that the aim is to complete works on site in time for the rugby World Cup in 2015.

Currently the site comprises the Twickenham National Rail station and car park, managed by South West Trains and provides services to Clapham Junction and Central London as well as to Windsor and Reading. The station fronts onto (A310) London Road which links to (A316) Chertsey Road approximately 500m to the north. The A316 is part of the Transport for London Road Network (TLRN) while (A305) King Street to the south is part of the Strategic Road Network (SRN).

Bus routes 267 and 281 operate along London Road and provide direct interchange with the station. An additional 5 bus services are available within 500m of the site. The combination of bus and rail services result in a public transport accessibility level (PTAL) of 5 for this site, on a scale of 1 to 6 where 6 is most accessible.

A site visit was undertaken by Hannah Bishop prior to the TfL pre-application meeting on the 14<sup>th</sup> September 2010. The meeting was attended by the following people:

- Nigel Carr – Solum Regeneration
- Ian Mitchell – Mayer Brown
- Rebecca Hobbs – Mayer Brown
- Mary Toffi – London Borough Richmond-upon-Thames
- Frank Hagan/Jackie Ford – TfL Surface Development Planning
- Andrew Wallace – TfL London Rail
- Lisa Labrousse – TfL Bus Network Development
- Keith Jaques – TfL Bus Operations West
- Simon Roberts – TfL London Routes and Places
- Hannah Bishop/Lee Campbell – TfL Land Use Planning

A Transport Statement (September 2010) was submitted for review prior to the pre-application meeting; in addition, at and since the meeting the applicant has provided some updated information, including updated scheme layouts, highway proposals and match day analysis data.

### **Site Access and Design**

The proposed station car park, kiss and ride and taxi drop off facilities will be accessed from the existing junction on London Road. This approach is supported.

In terms of station access TfL welcomes proposals to improve access, step free access and interchange facilities at the station. The design and layout of the public space and access approaches to the station should take account of TfL's Interchange Best Practice Guidelines 2009 (found at: <http://www.tfl.gov.uk/microsites/interchange/documents/interchange-bestpractice-guide-grp.pdf>).

Where these guidelines cannot be followed the applicant should provide justification.

TfL welcomes the Pedestrian Environmental Review System (PERS) audit carried out by the applicant. In particular this has identified that there are deficiencies with the existing kiss and ride and taxi facilities at the station and in the queuing capacity in front of the main entrance. The audit also supported TfL's view that the existing pedestrian crossing is in a good accessible location.

The proposals to provide a riverside walk along the western boundary of the development site, which will increase access to Moor Mead Gardens and revitalise the River Crane as an amenity space are supported.

TfL understands that the applicants have been in discussion with the Royal Mail Group concerning the re-provision and improvement of the pedestrian access from the station under London Road. This is an aspiration of the Twickenham Station SPD and is supported by TfL as a potential relief to the disruption caused to the bus services on event days. TfL acknowledges that the applicants have made passive provision within the development's design which will not obstruct the later construction of a walking route and requests further information on how this link can be incorporated into match day queue management. TfL notes that this land may be under Network Rail ownership. As discussed with the council at the meeting, TfL requests extension of the red line boundary to incorporate the route and may expect the development to bring forward this necessary improvement.

TfL accepts that there will be no coach parking provided on site.

### **Car Parking and Traffic Impact**

TfL notes that the residential scheme is promoted as being car free. It is acknowledged that apart from provision of 5 disabled spaces, there will be no dedicated car parking for the residential and commercial elements of the scheme. TfL understands that as a condition of the planning consent, residents will not be eligible for parking permits in the surrounding controlled parking zones. Given the proximity of the site to the station and interchange and supported by the high PTAL, this approach is welcomed by TfL as it accords with London Plan policy 3C.23 '*Parking strategy*' and the draft replacement London Plan policy 6.13 *Parking*.

TfL accepts the *Office of Rail Regulations* requirement to retain the existing 37 commuter car parking spaces in the station. TfL notes that 2 of these spaces are

for disabled users. Given that this proposal includes considerable investment in accessibility improvements at the station, TfL recommends that the applicants increase the proportion of disabled car parking to at least 10%, in line with TfL best practice and used at step free London Underground stations.

In line with the aspirations of the draft replacement London Plan policy 6.13 *Parking*, TfL requires 20% of car park spaces to have provision for electric vehicle charging. Given that there are no specific standards for station car parks, TfL suggest that at least 3 spaces have active provision, with another 4 spaces enabled for passive provision.

TfL welcomes the Car Park Management plan included as part of the Transport Statement. In addition, TfL requests that the disabled spaces, electric vehicle spaces, and the 1 car club space proposed, be clearly marked on the site layout plans.

TfL agrees that due to the car free nature of the development, the impact of the scheme on the local road network is likely to be insignificant and therefore detailed highway modelling will not be necessary. TfL would wish for the developer to demonstrate that any residual car parking outside of the controlled parking hours will be monitored and kept to an absolute minimum via the Travel Plan and Subsequent Car Parking Monitoring. TfL understands that the applicant will be undertaking night time parking beat surveys in accordance with the Lambeth methodology to assess the on street capacity within the surrounding area and will include the results within the finalised Transport Statement.

## **Buses**

The initial assessment provided shows a maximum 14% mode share for buses. Given the scale of the development and the frequency of local bus services it is TfL's view that this development will have a limited impact on bus service capacity. Therefore TfL deems the current service levels as appropriate and confirms there is no justification for significant route adjustments or increased services to this site as a result of this development.

As part of the proposal for the redevelopment of Twickenham station there will be improved interchange facilities requiring the relocation of the southbound bus stop serving routes 267 and 281, so that it is directly outside of the new station entrance. TfL acknowledges that the northbound stop cannot be moved opposite this new stop due to the constraints of the London Road Bridge and the already narrow pavement. The bus stop relocation is welcomed in principle as this will increase its effective capacity to meet additional demand from the development. Further discussions with London Buses infrastructure provision will be required at a later date.

## **Taxis**

TfL supports the proposed taxi arrangements and encourages the applicant to improve wayfinding to the taxi rank with good signage. However, in discussions



with the council it has been identified that at night it would more desirable if a taxi space was to be situated in front of the main station entrance in a visible and overlooked location. The proposed location, shared surface design, and controlled timings of this taxi space should be set out clearly within the transport statement. In addition, TfL requests the main taxi rank be covered by CCTV and be well-lit in order to increase security.

## **Walking**

TfL recognises that within the proposal the applicant is making significant improvements to the station step free access and the proposals will increase the station concourse space by 530sqm. This will go a significant way to improve queue management on Twickenham stadium event days.

TfL has assessed the additional information provided within section 9 of the transport statement which was submitted following the pre-application meeting. This section analyses the existing queue management system and notes that the system has been refined over the years. TfL and the council expect the applicant to provide written confirmation from South West Trains that the measures being put forward in relation to queue management are appropriate and will improve the existing situation. TfL suggests that this information is appended to the transport statement.

In order to promote walking, the development should include a wayfinding strategy consistent with the Legible London strategy. TfL will expect the existing Legible London pilot marker located outside the station entrance to be relocated to the front of the proposed station entrance at the developer's cost.

## **Cycling**

TfL supports the 250 cycle parking spaces proposed at the station. This is consistent with London Plan (2008) policy *3C.22 Improving conditions for cycling* and the draft replacement London Plan policy *6.9 Cycling*. However, the residential cycle parking levels are not consistent with the draft replacement London Plan policy *6.9 Cycling*, which requires provision of 2 spaces per 3 or 4 bed unit. TfL will therefore expect additional cycle parking spaces to be provided in line with this policy.

As part of the application submission a full description of cycling facilities should be provided within the transport statement including; access, location within the development; design; and how the site links to the wider cycle network in the area. The provision of showering and changing and locker facilities within the retail units and station staff areas are also encouraged in order to promote increased levels of cycle use amongst employees.

## **Travel Plan**

TfL welcomes the submission of a station travel plan and accompanying residential travel plan. TfL's Smarter Travel unit have assessed these plans and both have passed the initial ATTrBuTE assessment. However, there are additional elements which will need to be included to ensure the plans are acceptable to TfL. The detailed comments have been attached for your information and action.

The applicants should refer to TfL's workplace and residential travel planning guidance documents, which are available at:

<http://www.tfl.gov.uk/corporate/projectsandschemes/workplacetravelplanning/7680.aspx>

TfL expects the final travel plans to be secured, monitored, reviewed, and enforced through the Section 106 agreement.

## **Servicing and Construction**

TfL welcomes the draft Delivery and Servicing plan (DSP) provided. In particular, TfL supports the restrictions on timings of vehicle movements to avoid conflict with peak time users of the station. TfL recommends this restriction is extended to include all day on event days. In addition, according to the TfL guidance '*Managing Freight Effectively: Delivery and Servicing plans*', several aspects required of a DSP are absent including; swept path analysis, specified off street loading bays for servicing and delivery vehicles, and how the restricted hours will be enforced and managed in practice. TfL notes that there will not be a concierge/drop-off facility included within this scheme, which makes the provision of a specified delivery bay even more necessary.

It is clear that a proportion of the construction vehicles required for this site will access London Road from the TLRN A316 Chertsey Road. Within the developing Construction Logistics Plan (CLP) provided TfL would expect phased drawings indicating construction routes for plant and vehicles, and the traffic management layout with signs for the works. In addition, the number, type and size of construction vehicles required for the works, the programme of works and detailed access designs with vehicle swept paths should be provided. In line with TfL guidance '*Building a better future for freight: Construction Logistics Plans*', TfL requests that the applicant utilise selected operators that are committed to best practice and are a member of TfL's Freight Operator Recognition Scheme (FORS).

During construction, the applicant has stated that a number of night time closures of the bus lane will be necessary. TfL requests that in order to minimise disruption discussions with London Buses should be held at the earliest opportunity.

## **Mitigation/Section 106 Contributions**

It is TfL's view that the proposed development will have little impact on the surrounding highways and bus network. However, in the interests of improving the station interchange, the proposals will offer step free station access and redevelopment in line with the National Stations Improvements Programme and Network Rail's 'Access for all' initiative, relocation of the southbound bus stop and provision of several pedestrian access improvements including a larger station concourse area. TfL also advises that once the assessment has been progressed further advice can be given as to any potential mitigation measures that will be required in addition to those suggested above. This may include a requirement to fund/provide the pedestrian link under London Road Bridge.

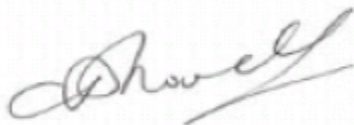
### **Summary**

Overall, subject to the submission and review of a robust transport assessment which addresses all the issues raised above and appropriate transport mitigation measures identified and funded by the developer, TfL sees no reason why the transport aspects of the planning application could not be supported 'in principle'. TfL understands that application is expected to be submitted in mid October 2010.

I hope this information provides a useful basis upon which to progress the design and preparation of the planning application and supporting transport assessment and look forward to hearing from you shortly.

Should you have any queries about the content of this letter, please contact Lee Campbell or Hannah Bishop (e-mail: [Leecampbell2@tfl.gov.uk](mailto:Leecampbell2@tfl.gov.uk) or [hannah.bishop@tube.tfl.gov.uk](mailto:hannah.bishop@tube.tfl.gov.uk), t: 020 7126 1658).

Yours sincerely,



Colin Lovell  
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Copy to: All attendees

## **Appendix B**

### Analysis of Station Movements

Appendix A

|       |   | Station       |                |                |     |       | Station       |                |                |     |     |
|-------|---|---------------|----------------|----------------|-----|-------|---------------|----------------|----------------|-----|-----|
|       |   | In to Station | Out of Station | Combined Flows |     |       | In to Station | Out of Station | Combined Flows |     |     |
| 07:00 | - | 07:05         | 4              | 16             | 20  | 16:00 | -             | 16:05          | 23             | 1   | 24  |
| 07:05 | - | 07:10         | 10             | 1              | 11  | 16:05 | -             | 16:10          | 34             | 14  | 48  |
| 07:10 | - | 07:15         | 68             | 28             | 96  | 16:10 | -             | 16:15          | 27             | 84  | 111 |
| 07:15 | - | 07:20         | 44             | 26             | 70  | 16:15 | -             | 16:20          | 39             | 10  | 49  |
| 07:20 | - | 07:25         | 79             | 21             | 100 | 16:20 | -             | 16:25          | 28             | 6   | 34  |
| 07:25 | - | 07:30         | 44             | 3              | 47  | 16:25 | -             | 16:30          | 38             | 59  | 97  |
| 07:30 | - | 07:35         | 129            | 5              | 134 | 16:30 | -             | 16:35          | 63             | 18  | 81  |
| 07:35 | - | 07:40         | 158            | 32             | 190 | 16:35 | -             | 16:40          | 22             | 56  | 78  |
| 07:40 | - | 07:45         | 90             | 79             | 169 | 16:40 | -             | 16:45          | 33             | 85  | 118 |
| 07:45 | - | 07:50         | 103            | 44             | 147 | 16:45 | -             | 16:50          | 49             | 32  | 81  |
| 07:50 | - | 07:55         | 160            | 39             | 199 | 16:50 | -             | 16:55          | 21             | 106 | 127 |
| 07:55 | - | 08:00         | 118            | 16             | 134 | 16:55 | -             | 17:00          | 28             | 8   | 36  |
| 08:00 | - | 08:05         | 113            | 10             | 123 | 17:00 | -             | 17:05          | 40             | 79  | 119 |
| 08:05 | - | 08:10         | 164            | 42             | 206 | 17:05 | -             | 17:10          | 83             | 29  | 112 |
| 08:10 | - | 08:15         | 100            | 88             | 188 | 17:10 | -             | 17:15          | 117            | 168 | 285 |
| 08:15 | - | 08:20         | 127            | 32             | 159 | 17:15 | -             | 17:20          | 64             | 29  | 93  |
| 08:20 | - | 08:25         | 115            | 113            | 228 | 17:20 | -             | 17:25          | 43             | 91  | 134 |
| 08:25 | - | 08:30         | 144            | 165            | 309 | 17:25 | -             | 17:30          | 34             | 50  | 84  |
| 08:30 | - | 08:35         | 63             | 33             | 96  | 17:30 | -             | 17:35          | 49             | 12  | 61  |
| 08:35 | - | 08:40         | 107            | 59             | 166 | 17:35 | -             | 17:40          | 49             | 107 | 156 |
| 08:40 | - | 08:45         | 43             | 311            | 354 | 17:40 | -             | 17:45          | 33             | 104 | 137 |
| 08:45 | - | 08:50         | 122            | 52             | 174 | 17:45 | -             | 17:50          | 53             | 53  | 106 |
| 08:50 | - | 08:55         | 45             | 368            | 413 | 17:50 | -             | 17:55          | 29             | 164 | 193 |
| 08:55 | - | 09:00         | 48             | 50             | 98  | 17:55 | -             | 18:00          | 26             | 143 | 169 |
| 09:00 | - | 09:05         | 35             | 34             | 69  | 18:00 | -             | 18:05          | 44             | 15  | 59  |
| 09:05 | - | 09:10         | 48             | 32             | 80  | 18:05 | -             | 18:10          | 61             | 128 | 189 |
| 09:10 | - | 09:15         | 68             | 251            | 319 | 18:10 | -             | 18:15          | 29             | 174 | 203 |
| 09:15 | - | 09:20         | 45             | 9              | 54  | 18:15 | -             | 18:20          | 42             | 82  | 124 |
| 09:20 | - | 09:25         | 35             | 21             | 56  | 18:20 | -             | 18:25          | 53             | 236 | 289 |
| 09:25 | - | 09:30         | 29             | 18             | 47  | 18:25 | -             | 18:30          | 4              | 22  | 26  |
| 09:30 | - | 09:35         | 56             | 2              | 58  | 18:30 | -             | 18:35          | 29             |     | 29  |
| 09:35 | - | 09:40         | 28             | 47             | 75  | 18:35 | -             | 18:40          | 48             | 74  | 122 |
| 09:40 | - | 09:45         | 25             | 135            | 160 | 18:40 | -             | 18:45          | 30             | 277 | 307 |
| 09:45 | - | 09:50         | 34             | 67             | 101 | 18:45 | -             | 18:50          | 29             | 71  | 100 |
| 09:50 | - | 09:55         | 21             | 115            | 136 | 18:50 | -             | 18:55          | 45             | 153 | 198 |
| 09:55 | - | 10:00         | 27             | 9              | 36  | 18:55 | -             | 19:00          | 32             | 107 | 139 |

 Flow used in scenario 1  
 Flow used in scenario 2  
 combined flow

Example 1: Scenario -1 for flows on Concourse AM peak

Outbound flow = 368 = 368  
(08:50-08:55)

Inbound flow = 45/5 = 9  
(08:50-08:55)

Example 2: Scenario -2 for flows on Concourse AM peak

Outbound flow = 368 = 368  
(08:50-08:55)

Inbound flow = 164/5 = 33  
(08:05 and 08:10)

Appendix B

|       |         | ATG & WAG     |                |                |       |         | ATG & WAG     |                |                |
|-------|---------|---------------|----------------|----------------|-------|---------|---------------|----------------|----------------|
|       |         | In to Station | Out of Station | Combined Flows |       |         | In to Station | Out of Station | Combined Flows |
| 07:00 | - 07:05 | 5             | 2              | 7              | 16:00 | - 16:05 | 23            | 1              | 24             |
| 07:05 | - 07:10 | 12            | 2              | 14             | 16:05 | - 16:10 | 34            | 14             | 48             |
| 07:10 | - 07:15 | 66            | 27             | 93             | 16:10 | - 16:15 | 27            | 80             | 107            |
| 07:15 | - 07:20 | 44            | 26             | 70             | 16:15 | - 16:20 | 39            | 14             | 53             |
| 07:20 | - 07:25 | 75            | 21             | 96             | 16:20 | - 16:25 | 28            | 5              | 33             |
| 07:25 | - 07:30 | 48            | 3              | 51             | 16:25 | - 16:30 | 38            | 55             | 93             |
| 07:30 | - 07:35 | 132           | 5              | 137            | 16:30 | - 16:35 | 63            | 22             | 85             |
| 07:35 | - 07:40 | 155           | 32             | 187            | 16:35 | - 16:40 | 22            | 55             | 77             |
| 07:40 | - 07:45 | 88            | 77             | 165            | 16:40 | - 16:45 | 37            | 86             | 123            |
| 07:45 | - 07:50 | 104           | 46             | 150            | 16:45 | - 16:50 | 40            | 34             | 74             |
| 07:50 | - 07:55 | 160           | 51             | 211            | 16:50 | - 16:55 | 21            | 104            | 125            |
| 07:55 | - 08:00 | 123           | 3              | 126            | 16:55 | - 17:00 | 28            | 6              | 34             |
| 08:00 | - 08:05 | 96            | 7              | 103            | 17:00 | - 17:05 | 39            | 79             | 118            |
| 08:05 | - 08:10 | 148           | 41             | 189            | 17:05 | - 17:10 | 89            | 29             | 118            |
| 08:10 | - 08:15 | 133           | 91             | 224            | 17:10 | - 17:15 | 111           | 168            | 279            |
| 08:15 | - 08:20 | 138           | 29             | 167            | 17:15 | - 17:20 | 64            | 29             | 93             |
| 08:20 | - 08:25 | 109           | 124            | 233            | 17:20 | - 17:25 | 44            | 90             | 134            |
| 08:25 | - 08:30 | 139           | 120            | 259            | 17:25 | - 17:30 | 35            | 50             | 85             |
| 08:30 | - 08:35 | 64            | 39             | 103            | 17:30 | - 17:35 | 49            | 12             | 61             |
| 08:35 | - 08:40 | 138           | 103            | 241            | 17:35 | - 17:40 | 49            | 100            | 149            |
| 08:40 | - 08:45 | 31            | 331            | 362            | 17:40 | - 17:45 | 36            | 107            | 143            |
| 08:45 | - 08:50 | 104           | 85             | 189            | 17:45 | - 17:50 | 55            | 58             | 113            |
| 08:50 | - 08:55 | 41            | 358            | 399            | 17:50 | - 17:55 | 27            | 160            | 187            |
| 08:55 | - 09:00 | 43            | 36             | 79             | 17:55 | - 18:00 | 28            | 144            | 172            |
| 09:00 | - 09:05 | 40            | 43             | 83             | 18:00 | - 18:05 | 43            | 16             | 59             |
| 09:05 | - 09:10 | 48            | 45             | 93             | 18:05 | - 18:10 | 61            | 127            | 188            |
| 09:10 | - 09:15 | 21            | 190            | 211            | 18:10 | - 18:15 | 29            | 170            | 199            |
| 09:15 | - 09:20 | 38            | 18             | 56             | 18:15 | - 18:20 | 50            | 86             | 136            |
| 09:20 | - 09:25 | 32            | 55             | 87             | 18:20 | - 18:25 | 60            | 235            | 295            |
| 09:25 | - 09:30 | 25            | 8              | 33             | 18:25 | - 18:30 | 5             | 23             | 28             |
| 09:30 | - 09:35 | 61            | 1              | 62             | 18:30 | - 18:35 | 31            |                | 31             |
| 09:35 | - 09:40 | 34            | 48             | 82             | 18:35 | - 18:40 | 50            | 77             | 127            |
| 09:40 | - 09:45 | 20            | 149            | 169            | 18:40 | - 18:45 | 29            | 274            | 303            |
| 09:45 | - 09:50 | 27            | 36             | 63             | 18:45 | - 18:50 | 30            | 71             | 101            |
| 09:50 | - 09:55 | 25            | 124            | 149            | 18:50 | - 18:55 | 44            | 160            | 204            |
| 09:55 | - 10:00 | 29            | 9              | 38             | 18:55 | - 19:00 | 33            | 107            | 140            |

Flow used in scenario 1  
 Flow used in scenario 2  
 combined flow

Example 1: Scenario -1 for flows at ticket barrier for AM peak

Outbound flow = 358 = 358  
(08:50-08:55)

Inbound flow = 41/5 = 8  
(08:50-08:55)

Example : Scenario -2 for flows at ticket barrier for AM peak



Outbound flow =358 = 358  
(08:50-08:55)

Inbound flow = 160/5 = 32  
(07:50 and 07:55)



Appendix C



| PLATFORM 4 (Towards London Waterloo - Fast Trains) & 5 (Towards Reading, Chiswick, Wimbledon, Shepperton and Windsor & Eton Riverside) |         |               |                |                | PLATFORM 4 (Towards London Waterloo - Fast Trains) & 5 (Towards Reading, Chiswick, Wimbledon, Shepperton and Windsor & Eton Riverside) |         |               |                |                |
|--|---------|---------------|----------------|----------------|--|---------|---------------|----------------|----------------|
|  |         | In to Station | Out of Station | Combined Flows |  |         | In to Station | Out of Station | Combined Flows |
| 07:00  | - 07:05 | 3             | 16             | 19             | 16:00  | - 16:05 | 24            | 17             | 41             |
| 07:05  | - 07:10 | 8             | 1              | 9              | 16:05  | - 16:10 | 15            | 3              | 18             |
| 07:10  | - 07:15 | 61            | 19             | 80             | 16:10  | - 16:15 | 33            | 65             | 98             |
| 07:15  | - 07:20 | 30            | 26             | 56             | 16:15  | - 16:20 | 36            | 20             | 56             |
| 07:20  | - 07:25 | 11            | 4              | 15             | 16:20  | - 16:25 | 11            | 8              | 19             |
| 07:25  | - 07:30 | 30            | 6              | 36             | 16:25  | - 16:30 | 23            | 61             | 84             |
| 07:30  | - 07:35 | 61            | 31             | 92             | 16:30  | - 16:35 | 32            | 20             | 52             |
| 07:35  | - 07:40 | 40            |                | 40             | 16:35  | - 16:40 | 29            | 100            | 129            |
| 07:40  | - 07:45 | 163           | 46             | 209            | 16:40  | - 16:45 | 33            | 23             | 56             |
| 07:45  | - 07:50 | 110           |                | 110            | 16:45  | - 16:50 | 53            | 56             | 109            |
| 07:50  | - 07:55 | 120           | 66             | 186            | 16:50  | - 16:55 | 6             | 55             | 61             |
| 07:55  | - 08:00 | 173           | 3              | 176            | 16:55  | - 17:00 | 29            | 9              | 38             |
| 08:00  | - 08:05 | 35            | 2              | 37             | 17:00  | - 17:05 | 16            | 72             | 88             |
| 08:05  | - 08:10 | 128           | 46             | 174            | 17:05  | - 17:10 | 74            | 16             | 90             |
| 08:10  | - 08:15 | 130           | 109            | 239            | 17:10  | - 17:15 | 25            | 76             | 101            |
| 08:15  | - 08:20 | 190           | 81             | 271            | 17:15  | - 17:20 | 58            | 37             | 95             |
| 08:20  | - 08:25 | 84            | 146            | 230            | 17:20  | - 17:25 | 44            | 107            | 151            |
| 08:25  | - 08:30 | 143           | 103            | 246            | 17:25  | - 17:30 | 40            | 67             | 107            |
| 08:30  | - 08:35 | 204           | 42             | 246            | 17:30  | - 17:35 | 51            | 17             | 68             |
| 08:35  | - 08:40 | 113           | 80             | 193            | 17:35  | - 17:40 | 54            | 111            | 165            |
| 08:40  | - 08:45 | 78            | 328            | 406            | 17:40  | - 17:45 | 49            | 88             | 137            |
| 08:45  | - 08:50 | 151           | 82             | 233            | 17:45  | - 17:50 | 61            | 56             | 117            |
| 08:50  | - 08:55 | 39            | 388            | 427            | 17:50  | - 17:55 | 50            | 185            | 235            |
| 08:55  | - 09:00 | 53            | 79             | 132            | 17:55  | - 18:00 | 48            | 162            | 210            |
| 09:00  | - 09:05 | 34            | 36             | 70             | 18:00  | - 18:05 | 61            | 46             | 107            |
| 09:05  | - 09:10 | 40            | 31             | 71             | 18:05  | - 18:10 | 75            | 142            | 217            |
| 09:10  | - 09:15 | 12            | 160            | 172            | 18:10  | - 18:15 | 57            | 167            | 224            |
| 09:15  | - 09:20 | 67            | 46             | 113            | 18:15  | - 18:20 | 24            | 71             | 95             |
| 09:20  | - 09:25 | 26            | 36             | 62             | 18:20  | - 18:25 | 20            | 199            | 219            |
| 09:25  | - 09:30 | 36            | 41             | 77             | 18:25  | - 18:30 | 41            | 67             | 108            |
| 09:30  | - 09:35 | 68            |                | 68             | 18:30  | - 18:35 | 46            | 32             | 78             |
| 09:35  | - 09:40 | 48            | 57             | 105            | 18:35  | - 18:40 | 30            | 76             | 106            |
| 09:40  | - 09:45 | 16            | 105            | 121            | 18:40  | - 18:45 | 29            | 240            | 269            |
| 09:45  | - 09:50 | 31            | 50             | 81             | 18:45  | - 18:50 | 28            | 74             | 102            |
| 09:50  | - 09:55 | 41            | 122            | 163            | 18:50  | - 18:55 | 41            | 163            | 204            |
| 09:55  | - 10:00 | 31            | 67             | 98             | 18:55  | - 19:00 | 18            | 103            | 121            |


 Flow used in scenario 1  
 Flow used in scenario 2

 combined flow

Appendix C

| PLATFORM 3 (Towards London Waterloo - Slow Trains) |  |           |         |                | PLATFORM 3 (Towards London Waterloo - Slow Trains) |  |           |         |                |
|--|--|-----------|---------|----------------|--|--|-----------|---------|----------------|
|  |  | downwards | Upwards | Combined Flows |  |  | downwards | Upwards | Combined Flows |
| 07:00 - 07:05                                      |  | 1         | 1       | 2              | 16:00 - 16:05                                      |  | 6         | 1       | 7              |
| 07:05 - 07:10                                      |  |           |         |                | 16:05 - 16:10                                      |  | 3         |         | 3              |
| 07:10 - 07:15                                      |  | 9         | 9       | 18             | 16:10 - 16:15                                      |  | 12        | 13      | 25             |
| 07:15 - 07:20                                      |  | 15        |         | 15             | 16:15 - 16:20                                      |  | 4         | 2       | 6              |
| 07:20 - 07:25                                      |  | 32        | 8       | 40             | 16:20 - 16:25                                      |  | 8         |         | 8              |
| 07:25 - 07:30                                      |  | 14        |         | 14             | 16:25 - 16:30                                      |  | 15        |         | 15             |
| 07:30 - 07:35                                      |  | 15        |         | 15             | 16:30 - 16:35                                      |  | 7         | 4       | 11             |
| 07:35 - 07:40                                      |  | 23        |         | 23             | 16:35 - 16:40                                      |  | 18        | 7       | 25             |
| 07:40 - 07:45                                      |  | 42        | 27      | 69             | 16:40 - 16:45                                      |  | 8         | 32      | 40             |
| 07:45 - 07:50                                      |  | 21        |         | 21             | 16:45 - 16:50                                      |  | 1         | 1       | 2              |
| 07:50 - 07:55                                      |  | 44        | 8       | 52             | 16:50 - 16:55                                      |  | 6         | 1       | 7              |
| 07:55 - 08:00                                      |  | 19        | 1       | 20             | 16:55 - 17:00                                      |  | 10        | 6       | 16             |
| 08:00 - 08:05                                      |  | 6         |         | 6              | 17:00 - 17:05                                      |  | 19        | 7       | 26             |
| 08:05 - 08:10                                      |  | 30        |         | 30             | 17:05 - 17:10                                      |  | 5         | 36      | 41             |
| 08:10 - 08:15                                      |  | 22        | 30      | 52             | 17:10 - 17:15                                      |  | 1         | 3       | 4              |
| 08:15 - 08:20                                      |  | 5         | 1       | 6              | 17:15 - 17:20                                      |  | 3         |         | 3              |
| 08:20 - 08:25                                      |  | 39        | 18      | 57             | 17:20 - 17:25                                      |  | 15        | 2       | 17             |
| 08:25 - 08:30                                      |  | 13        |         | 13             | 17:25 - 17:30                                      |  | 14        | 4       | 18             |
| 08:30 - 08:35                                      |  | 2         |         | 2              | 17:30 - 17:35                                      |  | 6         | 2       | 8              |
| 08:35 - 08:40                                      |  | 17        | 2       | 19             | 17:35 - 17:40                                      |  | 18        | 2       | 20             |
| 08:40 - 08:45                                      |  | 23        | 108     | 131            | 17:40 - 17:45                                      |  | 4         | 29      | 33             |
| 08:45 - 08:50                                      |  | 6         | 2       | 8              | 17:45 - 17:50                                      |  | 3         | 8       | 11             |
| 08:50 - 08:55                                      |  | 16        |         | 16             | 17:50 - 17:55                                      |  | 12        | 1       | 13             |
| 08:55 - 09:00                                      |  | 26        | 3       | 29             | 17:55 - 18:00                                      |  | 12        | 12      | 24             |
| 09:00 - 09:05                                      |  | 7         | 4       | 11             | 18:00 - 18:05                                      |  | 11        |         | 11             |
| 09:05 - 09:10                                      |  | 7         |         | 7              | 18:05 - 18:10                                      |  | 5         | 2       | 7              |
| 09:10 - 09:15                                      |  | 10        | 35      | 45             | 18:10 - 18:15                                      |  | 8         | 35      | 43             |
| 09:15 - 09:20                                      |  | 4         | 1       | 5              | 18:15 - 18:20                                      |  | 8         | 4       | 12             |
| 09:20 - 09:25                                      |  | 10        | 2       | 12             | 18:20 - 18:25                                      |  | 5         |         | 5              |
| 09:25 - 09:30                                      |  | 14        | 6       | 20             | 18:25 - 18:30                                      |  | 23        | 9       | 32             |
| 09:30 - 09:35                                      |  | 5         | 2       | 7              | 18:30 - 18:35                                      |  | 20        | 7       | 27             |
| 09:35 - 09:40                                      |  | 3         | 1       | 4              | 18:35 - 18:40                                      |  | 16        | 4       | 20             |
| 09:40 - 09:45                                      |  | 14        | 33      | 47             | 18:40 - 18:45                                      |  | 25        | 31      | 56             |
| 09:45 - 09:50                                      |  | 2         | 2       | 4              | 18:45 - 18:50                                      |  | 8         | 3       | 11             |
| 09:50 - 09:55                                      |  | 12        |         | 12             | 18:50 - 18:55                                      |  | 25        | 16      | 41             |
| 09:55 - 10:00                                      |  | 7         | 4       | 11             | 18:55 - 19:00                                      |  | 22        | 4       | 26             |

 Flow used in scenario 1  
 Flow used in scenario 2

 combined flow

Example: Scenario -1 AM peak  
 Stairway -1 downwards flow = 23/5 = 5  
 (08:40- 08:45)  
  
 Stairway -1 upwards flow = 108 = 108  
 (08:40- 08:45)

Example: Scenario -2 for AM peak  
 Stairway -1 downwards flow = 44/5 = 9  
 (07:50- 07:55)  
  
 Stairway -1 upwards flow = 108 = 108  
 (08:40- 08:45)

Appendix D

| Time          | Train Arrival Time | PLATFORM 3<br>(Towards London Waterloo - Slow Trains) |           | Total |
|---------------|--------------------|---|-----------|-------|
|               |                    | Boarding  | Alighting |       |
| 07:00 - 07:05 |                    |   |           |       |
| 07:05 - 07:10 |                    |   |           |       |
| 07:10 - 07:15 | 07:11              | 40  | 14        | 54    |
| 07:15 - 07:20 |                    |   |           |       |
| 07:20 - 07:25 | 07:20              | 64  | 12        | 76    |
| 07:25 - 07:30 |                    |   |           |       |
| 07:30 - 07:35 |                    |   |           |       |
| 07:35 - 07:40 |                    |   |           |       |
| 07:40 - 07:45 | 07:41              | 66  | 25        | 91    |
| 07:45 - 07:50 |                    |   |           |       |
| 07:50 - 07:55 | 07:51              | 105   | 9         | 114   |
| 07:55 - 08:00 |                    |   |           |       |
| 08:00 - 08:05 |                    |   |           |       |
| 08:05 - 08:10 |                    |   |           |       |
| 08:10 - 08:15 | 08:11              | 53  | 64        | 117   |
| 08:15 - 08:20 | 08:19              | 104   | 7         | 111   |
| 08:20 - 08:25 |                    |   |           |       |
| 08:25 - 08:30 |                    |   |           |       |
| 08:30 - 08:35 |                    |   |           |       |
| 08:35 - 08:40 |                    |   |           |       |
| 08:40 - 08:45 | 08:41              | 55  | 108       | 163   |
| 08:45 - 08:50 |                    |   |           |       |
| 08:50 - 08:55 |                    |   |           |       |
| 08:55 - 09:00 | 08:59              | 51  | 18        | 69    |
| 09:00 - 09:05 |                    |   |           |       |
| 09:05 - 09:10 |                    |   |           |       |
| 09:10 - 09:15 | 09:12              | 32  | 45        | 77    |
| 09:15 - 09:20 |                    |   |           |       |
| 09:20 - 09:25 |                    |   |           |       |
| 09:25 - 09:30 | 09:28              | 31  | 13        | 44    |
| 09:30 - 09:35 |                    |   |           |       |
| 09:35 - 09:40 |                    |   |           |       |
| 09:40 - 09:45 | 09:41              | 22  | 39        | 61    |
| 09:45 - 09:50 |                    |   |           |       |
| 09:50 - 09:55 |                    |   |           |       |
| 09:55 - 10:00 | 09:56              | 19  | 4         | 23    |
|               |                    |   |           |       |
|               |                    |   |           |       |
| 16:00 - 16:05 |                    |   |           |       |
| 16:05 - 16:10 |                    |   |           |       |
| 16:10 - 16:15 | 16:10              | 25  | 17        | 42    |
| 16:15 - 16:20 |                    |   |           |       |
| 16:20 - 16:25 |                    |   |           |       |
| 16:25 - 16:30 |                    |   |           |       |
| 16:30 - 16:35 |                    |   |           |       |
| 16:35 - 16:40 |                    |   |           |       |
| 16:40 - 16:45 | 16:41              | 41  | 29        | 70    |
| 16:45 - 16:50 |                    |   |           |       |
| 16:50 - 16:55 |                    |   |           |       |
| 16:55 - 17:00 | 16:56              | 9   | 8         | 17    |
| 17:00 - 17:05 |                    |   |           |       |
| 17:05 - 17:10 |                    |   |           |       |
| 17:10 - 17:15 | 17:10              | 24  | 58        | 82    |
| 17:15 - 17:20 |                    |   |           |       |
| 17:20 - 17:25 |                    |   |           |       |
| 17:25 - 17:30 | 17:28              | 32  | 9         | 41    |
| 17:30 - 17:35 |                    |   |           |       |
| 17:35 - 17:40 |                    |   |           |       |
| 17:40 - 17:45 | 17:41              | 55  | 70        | 125   |
| 17:45 - 17:50 |                    |   |           |       |
| 17:50 - 17:55 |                    |   |           |       |
| 17:55 - 18:00 | 17:55              | 18  | 20        | 38    |
| 18:00 - 18:05 |                    |   |           |       |
| 18:05 - 18:10 |                    |   |           |       |
| 18:10 - 18:15 | 18:10              | 24  | 41        | 65    |
| 18:15 - 18:20 |                    |   |           |       |
| 18:20 - 18:25 |                    |   |           |       |
| 18:25 - 18:30 | 18:25              | 35  | 10        | 45    |
| 18:30 - 18:35 |                    |   |           |       |
| 18:35 - 18:40 |                    |   |           |       |
| 18:40 - 18:45 | 18:40              | 50  | 49        | 99    |
| 18:45 - 18:50 |                    |   |           |       |
| 18:50 - 18:55 |                    |   |           |       |
| 18:55 - 19:00 | 18:55              | 53  | 7         | 60    |


 Flow used in scenario 1  
 Flow used in scenario 2  
 combined flow

Twickenham Station Client: Capita

Pax Boarding /Alighting Trains at Platform 4&5 Summary Date: Thursday 18 Oct 2007

| Appendix D    |                    |   |           |                    |          |   |          |   |  |       |
|---------------|--------------------|---|-----------|--------------------|----------|---|----------|---|--|-------|
|               |                    | PLATFORM 5<br>(Towards Reading, Chiswick, Wembley, Shepperton and Windsor & Eton Riverside) |           |                    |          | PLATFORM 4<br>(Towards London Waterloo - Fast Trains) |          | Total people on Platforms 4 & 5 by minute periods |  | Total |
| Time          | Train Arrival Time | Boarding  | Alighting | Train Arrival Time | Boarding | Alighting   | Boarding | Alighting   |  |       |
| 07:00 - 07:05 | 07:04              | 4   | 18        |                    |          |   | 4        | 18  |  | 22    |
| 07:05 - 07:10 | 07:08              | 19  | 1         |                    |          |   | 19       | 1   |  | 20    |
| 07:10 - 07:15 |                    |   |           | 07:11              | 35       | 12  | 35       | 12  |  | 47    |
| 07:15 - 07:20 | 07:17              | 4   | 21        | 07:15              | 12       |   | 16       | 21  |  | 37    |
| 07:20 - 07:25 | 07:21              | 15  | 23        | 07:23              | 140      | 24  | 155      | 47  |  | 202   |
| 07:25 - 07:30 |                    |   |           |                    |          |   |          |   |  |       |
| 07:30 - 07:35 |                    |   |           | 07:33              | 99       | 11  | 99       | 11  |  | 110   |
| 07:35 - 07:40 | 07:35              | 36  | 24        |                    |          |   |          |   |  |       |
|               | 07:38              | 6   |           |                    |          |   | 42       | 24  |  | 66    |
| 07:40 - 07:45 | 07:41              | 40  | 33        | 07:41              | 140      | 17  | 180      | 50  |  | 230   |
| 07:45 - 07:50 | 07:49              | 12  | 31        |                    |          |   | 12       | 31  |  | 43    |
| 07:50 - 07:55 | 07:52              | 37  | 18        | 07:53              | 174      | 11  | 211      | 29  |  | 240   |
| 07:55 - 08:00 |                    |   |           |                    |          |   |          |   |  |       |
| 08:00 - 08:05 | 08:04              | 55  | 3         | 08:03              | 167      |   | 222      | 3   |  | 225   |
| 08:05 - 08:10 | 08:08              | 10  |           | 08:09              | 110      | 26  | 120      | 26  |  | 146   |
| 08:10 - 08:15 | 08:11              | 50  | 56        |                    |          |   | 50       | 56  |  | 106   |
| 08:15 - 08:20 | 08:17              | 25  | 36        | 08:18              | 218      | 36  | 243      | 72  |  | 315   |
| 08:20 - 08:25 | 08:22              | 37  | 93        | 08:23              | 83       | 57  | 120      | 150   |  | 270   |
| 08:25 - 08:30 | 08:28              | 18  | 92        |                    |          |   | 18       | 92  |  | 110   |
| 08:30 - 08:35 | 08:34              | 88  | 78        | 08:33              | 158      | 38  | 246      | 116   |  | 362   |
| 08:35 - 08:40 |                    |   |           |                    |          |   |          |   |  |       |
| 08:40 - 08:45 | 08:40              | 38  | 252       | 08:41              | 104      | 37  | 142      | 289   |  | 431   |
| 08:45 - 08:50 | 08:48              | 15  | 108       |                    |          |   | 15       | 108   |  | 123   |
| 08:50 - 08:55 | 08:53              | 25  | 312       | 08:53              | 141      | 50  | 166      | 362   |  | 528   |
| 08:55 - 09:00 | 08:59              | 10  | 60        |                    |          |   | 10       | 60  |  | 70    |
| 09:00 - 09:05 |                    |   |           |                    |          |   |          |   |  |       |
| 09:05 - 09:10 | 09:05              | 32  | 43        |                    |          |   | 32       | 43  |  | 75    |
| 09:10 - 09:15 | 09:12              | 11  | 164       | 09:11              | 86       | 31  | 97       | 195   |  | 292   |
| 09:15 - 09:20 | 09:18              | 6   | 36        |                    |          |   | 6        | 36  |  | 42    |
| 09:20 - 09:25 | 09:24              | 15  | 81        | 09:23              | 61       | 32  | 76       | 113   |  | 189   |
| 09:25 - 09:30 |                    |   |           |                    |          |   |          |   |  |       |
| 09:30 - 09:35 |                    |   |           |                    |          |   |          |   |  |       |
| 09:35 - 09:40 | 09:35              | 38  | 43        |                    |          |   | 38       | 43  |  | 81    |
| 09:40 - 09:45 | 09:40              | 16  | 112       | 09:41              | 84       | 18  | 100      | 130   |  | 230   |
| 09:45 - 09:50 | 09:46              | 1   | 38        |                    |          |   | 1        | 38  |  | 39    |
| 09:50 - 09:55 | 09:52              | 35  | 157       | 09:53              | 38       | 21  | 73       | 178   |  | 251   |
| 09:55 - 10:00 |                    |   |           |                    |          |   |          |   |  |       |
| 16:00 - 16:05 | 16:04              | 26  | 24        |                    |          |   | 26       | 24  |  | 50    |
| 16:05 - 16:10 |                    |   |           |                    |          |   |          |   |  |       |
| 16:10 - 16:15 | 16:10              | 18  | 53        | 16:11              | 47       | 16  | 65       | 69  |  | 134   |
| 16:15 - 16:20 | 16:16              | 26  | 20        |                    |          |   | 26       | 20  |  | 46    |
| 16:20 - 16:25 |                    |   |           | 16:23              | 53       | 18  | 53       | 18  |  | 71    |
| 16:25 - 16:30 | 16:26              | 17  | 52        |                    |          |   | 17       | 52  |  | 69    |
| 16:30 - 16:35 | 16:30              | 9   | 17        |                    |          |   | 9        | 17  |  | 26    |
| 16:35 - 16:40 | 16:35              | 13  | 28        | 16:35              | 45       | 5   |          |   |  |       |
|               | 16:39              | 7   | 70        |                    |          |   | 20       | 98  |  | 118   |
| 16:40 - 16:45 |                    |   |           | 16:41              | 33       | 21  | 33       | 21  |  | 54    |
| 16:45 - 16:50 | 16:46              | 12  | 28        |                    |          |   | 12       | 28  |  | 40    |
| 16:50 - 16:55 | 16:51              | 26  | 91        | 16:53              | 44       | 14  | 70       | 105   |  | 175   |
| 16:55 - 17:00 |                    |   |           |                    |          |   |          |   |  |       |
| 17:00 - 17:05 | 17:00              | 17  | 90        |                    |          |   | 17       | 90  |  | 107   |
| 17:05 - 17:10 | 17:05              | 43  | 32        |                    |          |   |          |   |  |       |
|               | 17:10              | 14  | 89        |                    |          |   | 57       | 121   |  | 178   |
| 17:10 - 17:15 |                    |   |           | 17:11              | 55       | 26  | 55       | 26  |  | 81    |
| 17:15 - 17:20 | 17:17              | 18  | 33        |                    |          |   | 18       | 33  |  | 51    |
| 17:20 - 17:25 | 17:21              | 32  | 81        | 17:23              | 73       | 20  | 105      | 101   |  | 206   |
| 17:25 - 17:30 | 17:25              | 10  | 54        |                    |          |   | 10       | 54  |  | 64    |
| 17:30 - 17:35 | 17:33              | 40  | 15        |                    |          |   | 40       | 15  |  | 55    |
| 17:35 - 17:40 | 17:36              | 2   | 108       |                    |          |   | 2        | 108   |  | 110   |
| 17:40 - 17:45 | 18:40              | 26  | 36        | 17:41              | 43       | 31  | 69       | 67  |  | 136   |
| 17:45 - 17:50 | 17:48              | 32  | 47        |                    |          |   | 32       | 47  |  | 79    |
| 17:50 - 17:55 | 17:51              | 36  | 141       | 17:53              | 91       | 25  | 127      | 166   |  | 293   |
| 17:55 - 18:00 | 17:56              | 25  | 128       |                    |          |   | 25       | 128   |  | 153   |
| 18:00 - 18:05 | 18:03              | 60  | 47        |                    |          |   | 60       | 47  |  | 107   |
| 18:05 - 18:10 | 18:06              | 13  | 112       |                    |          |   | 13       | 112   |  | 125   |
| 18:10 - 18:15 | 18:12              | 53  | 56        | 18:11              | 93       | 48  | 145      | 105   |  | 251   |
| 18:15 - 18:20 | 18:16              | 38  | 47        |                    |          |   | 38       | 47  |  | 85    |
| 18:20 - 18:25 | 18:22              | 23  | 170       | 18:23              | 8        | 36  | 31       | 212   |  | 243   |
| 18:25 - 18:30 | 18:26              | 5   | 134       |                    |          |   | 5        | 134   |  | 139   |
| 18:30 - 18:35 |                    |   |           |                    |          |   |          |   |  |       |
| 18:35 - 18:40 | 18:36              | 71  | 51        |                    |          |   |          |   |  |       |
|               | 18:39              | 4   | 77        |                    |          |   | 75       | 128   |  | 203   |
| 18:40 - 18:45 | 18:41              | 31  | 164       | 18:41              | 78       | 53  | 109      | 217   |  | 326   |
| 18:45 - 18:50 | 18:48              | 32  | 63        |                    |          |   | 32       | 63  |  | 95    |
| 18:50 - 18:55 | 18:51              | 14  | 123       | 18:53              | 69       | 24  | 83       | 147   |  | 230   |
| 18:55 - 19:00 | 18:51              | 14  | 123       |                    |          |   | 14       | 123   |  | 137   |

Flow used in scenario 1  
Flow used in scenario 2  
combined flow

| Twickenham Passenger survey data for AM |   | Appendix E   |   |   |     |     |     |      |      |     |    |   |   |   |   |                               |      |      |      |     |     |     |     |     |  |                                      |  |  |  |
|---|---|--|---|---|-----|-----|-----|------|------|-----|----|---|---|---|---|-------------------------------|------|------|------|-----|-----|-----|-----|-----|--|--------------------------------------|--|--|--|
|   |   | Observed passenger alighting/boarding from platforms |   |   |     |     |     |      |      |     |    |   |   |   |   | Observed pax flow on platform |      |      |      |     |     |     |     |     |  | Calculated transfer flow on platform |  |  |  |
|   |   | Platforms  |   |   |     |     |     |      |      |     |    |   |   |   |   | Platform                      |      |      |      |     |     |     |     |     |  | Platform                             |  |  |  |
|   |   | 1  |   | 2 |     | 3   |     | 4    |      | 5   |    | 1 |   | 3 |   | 4                             |      | 5    |      | 2-3 |     | 3-2 |     | 5-4 |  | 4-5                                  |  |  |  |
| A                                       | B | A  | B | A | B   | A   | B   | A    | B    | 1   | 2  | 3 | 4 | 5 | 1 | 2                             | 3    | 4    | 5    | 2-3 | 3-2 | 5-4 | 4-5 |     |  |                                      |  |  |  |
| 07:00 - 07:05                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 0    | 18  | 4  | 0 | 0 | 0 | 0 | 0                             | 0    | 22   | 0    | 0   | 3   | 0   |     |     |  |                                      |  |  |  |
| 07:05 - 07:10                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 0    | 1   | 19 | 0 | 0 | 0 | 0 | 0                             | 0    | 20   | 0    | 0   | 0   | 0   |     |     |  |                                      |  |  |  |
| 07:10 - 07:15                           | 0 | 0  | 0 | 0 | 14  | 40  | 12  | 35   | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 54   | 47   | 0    | 0   | 0   | 0   | 2   |     |  |                                      |  |  |  |
| 07:15 - 07:20                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 12   | 21   | 4   | 0  | 0 | 0 | 0 | 0 | 0                             | 12   | 25   | 0    | 0   | 0   | 3   | 0   |     |  |                                      |  |  |  |
| 07:20 - 07:25                           | 0 | 0  | 0 | 0 | 12  | 64  | 24  | 140  | 23   | 15  | 0  | 0 | 0 | 0 | 0 | 0                             | 76   | 164  | 38   | 0   | 0   | 3   | 3   |     |  |                                      |  |  |  |
| 07:25 - 07:30                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 0    | 0    | 0   | 0   | 0   | 0   |     |  |                                      |  |  |  |
| 07:30 - 07:35                           | 0 | 0  | 0 | 0 | 0   | 0   | 11  | 99   | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 110  | 0    | 0    | 0   | 0   | 0   | 2   |     |  |                                      |  |  |  |
| 07:35 - 07:40                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 24   | 42  | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 66   | 0    | 0   | 0   | 3   | 0   |     |  |                                      |  |  |  |
| 07:40 - 07:45                           | 0 | 0  | 0 | 0 | 25  | 68  | 17  | 140  | 33   | 40  | 0  | 0 | 0 | 0 | 0 | 0                             | 91   | 157  | 73   | 0   | 0   | 5   | 2   |     |  |                                      |  |  |  |
| 07:45 - 07:50                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 31   | 12  | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 43   | 0    | 0   | 0   | 4   | 0   |     |  |                                      |  |  |  |
| 07:50 - 07:55                           | 0 | 0  | 0 | 0 | 9   | 105 | 11  | 174  | 18   | 37  | 0  | 0 | 0 | 0 | 0 | 0                             | 114  | 188  | 55   | 0   | 0   | 3   | 2   |     |  |                                      |  |  |  |
| 07:55 - 08:00                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 0    | 0    | 0   | 0   | 0   | 0   |     |  |                                      |  |  |  |
| 08:00 - 08:05                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 167  | 3    | 55  | 0  | 0 | 0 | 0 | 0 | 0                             | 167  | 58   | 0    | 0   | 0   | 0   | 0   |     |  |                                      |  |  |  |
| 08:05 - 08:10                           | 0 | 0  | 0 | 0 | 0   | 0   | 26  | 110  | 0    | 10  | 0  | 0 | 0 | 0 | 0 | 0                             | 136  | 10   | 0    | 0   | 0   | 0   | 4   |     |  |                                      |  |  |  |
| 08:10 - 08:15                           | 0 | 0  | 0 | 0 | 64  | 53  | 0   | 0    | 0    | 56  | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 0    | 0    | 0   | 0   | 8   | 0   |     |  |                                      |  |  |  |
| 08:15 - 08:20                           | 0 | 0  | 0 | 0 | 7   | 10  | 36  | 218  | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 111  | 254  | 61   | 0   | 0   | 0   | 5   |     |  |                                      |  |  |  |
| 08:20 - 08:25                           | 0 | 0  | 0 | 0 | 0   | 0   | 57  | 63   | 93   | 37  | 0  | 0 | 0 | 0 | 0 | 0                             | 140  | 130  | 0    | 0   | 0   | 13  | 8   |     |  |                                      |  |  |  |
| 08:25 - 08:30                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 92   | 18  | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 110  | 0    | 0   | 0   | 13  | 0   |     |  |                                      |  |  |  |
| 08:30 - 08:35                           | 0 | 0  | 0 | 0 | 0   | 0   | 38  | 158  | 78   | 88  | 0  | 0 | 0 | 0 | 0 | 0                             | 196  | 166  | 0    | 0   | 0   | 11  | 5   |     |  |                                      |  |  |  |
| 08:35 - 08:40                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 0    | 0    | 0   | 0   | 0   | 0   |     |  |                                      |  |  |  |
| 08:40 - 08:45                           | 0 | 0  | 0 | 0 | 108 | 55  | 37  | 0    | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 163  | 0    | 0    | 0   | 0   | 0   | 5   |     |  |                                      |  |  |  |
| 08:45 - 08:50                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 108  | 15   | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 0    | 0    | 0   | 0   | 15  | 0   |     |  |                                      |  |  |  |
| 08:50 - 08:55                           | 0 | 0  | 0 | 0 | 0   | 0   | 50  | 141  | 312  | 25  | 0  | 0 | 0 | 0 | 0 | 0                             | 191  | 337  | 0    | 0   | 0   | 44  | 7   |     |  |                                      |  |  |  |
| 08:55 - 09:00                           | 0 | 0  | 0 | 0 | 18  | 51  | 0   | 0    | 60   | 10  | 0  | 0 | 0 | 0 | 0 | 0                             | 69   | 0    | 70   | 0   | 0   | 8   | 0   |     |  |                                      |  |  |  |
| 09:00 - 09:05                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 0    | 0    | 0   | 0   | 0   | 0   |     |  |                                      |  |  |  |
| 09:05 - 09:10                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 43   | 32  | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 75   | 0    | 0   | 0   | 6   | 0   |     |  |                                      |  |  |  |
| 09:10 - 09:15                           | 0 | 0  | 0 | 0 | 45  | 32  | 31  | 86   | 164  | 11  | 0  | 0 | 0 | 0 | 0 | 0                             | 77   | 117  | 175  | 0   | 0   | 23  | 4   |     |  |                                      |  |  |  |
| 09:15 - 09:20                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 36   | 6   | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 42   | 0    | 0   | 0   | 5   | 0   |     |  |                                      |  |  |  |
| 09:20 - 09:25                           | 0 | 0  | 0 | 0 | 0   | 0   | 32  | 61   | 81   | 15  | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 93   | 96   | 0   | 0   | 11  | 4   |     |  |                                      |  |  |  |
| 09:25 - 09:30                           | 0 | 0  | 0 | 0 | 13  | 31  | 0   | 0    | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 44   | 0    | 0    | 0   | 0   | 0   | 0   |     |  |                                      |  |  |  |
| 09:30 - 09:35                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 0    | 0    | 0   | 0   | 0   | 0   |     |  |                                      |  |  |  |
| 09:35 - 09:40                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 43   | 38  | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 81   | 0    | 0   | 0   | 6   | 0   |     |  |                                      |  |  |  |
| 09:40 - 09:45                           | 0 | 0  | 0 | 0 | 39  | 22  | 18  | 84   | 112  | 16  | 0  | 0 | 0 | 0 | 0 | 0                             | 61   | 102  | 128  | 0   | 0   | 16  | 3   |     |  |                                      |  |  |  |
| 09:45 - 09:50                           | 0 | 0  | 0 | 0 | 0   | 0   | 0   | 0    | 38   | 1   | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 39   | 0    | 0   | 0   | 5   | 0   |     |  |                                      |  |  |  |
| 09:50 - 09:55                           | 0 | 0  | 0 | 0 | 0   | 0   | 21  | 38   | 157  | 35  | 0  | 0 | 0 | 0 | 0 | 0                             | 0    | 69   | 192  | 0   | 0   | 22  | 3   |     |  |                                      |  |  |  |
| 09:55 - 10:00                           | 0 | 0  | 0 | 0 | 4   | 19  | 0   | 0    | 0    | 0   | 0  | 0 | 0 | 0 | 0 | 0                             | 23   | 0    | 0    | 0   | 0   | 0   | 0   |     |  |                                      |  |  |  |
|   | 0 | 0  | 0 | 0 | 357 | 642 | 421 | 1851 | 1933 | 698 | 0  | 0 | 0 | 0 | 0 | 0                             | 1000 | 2271 | 2631 | 0   | 0   | 271 | 59  |     |  |                                      |  |  |  |

Flow used in scenario 1

Flow used in scenario 2

combined flow

A Alighting

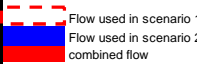
B Boarding

Addition of transfer passenger

14% passenger transfer

Example:- The calculation are based on the following example for arrival of train at 8:10, 8:25 and 8:40  
 At 8:10 the train arrives on Platform 1 of which 7 passengers will transfer to 8:25 train  
 At 8:25 the train arrives on Platform 2 of which 20 passengers will transfer to 8:40 train

| Twickenham Passenger survey data for PM |   | Appendix E |   |   |   |   |     |     |     |     |      |          | Observed passenger alighting/boarding from platforms |    |     |      |          | Observed pax flow on platform |     |     |    |  | Cal transfer flow on platform |  |  |  |
|---|---|------------|---|---|---|---|-----|-----|-----|-----|------|----------|--|----|-----|------|----------|-------------------------------|-----|-----|----|--|-------------------------------|--|--|--|
|   |   | Platforms  |   |   |   |   |     |     |     |     |      | Platform |  |    |     |      | Platform |                               |     |     |    |  |                               |  |  |  |
|   |   | 1          |   | 2 |   | 3 |     | 4   |     | 5   |      | 1        | 2  | 3  | 4   | 5    | 2-3      | 3-2                           | 5-4 | 4-5 |    |  |                               |  |  |  |
|   |   | A          | B | A | B | A | B   | A   | B   | A   | B    | 1        | 2  | 3  | 4   | 5    | 2-3      | 3-2                           | 5-4 | 4-5 |    |  |                               |  |  |  |
| 16:00                                   | - | 16:05      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 0    | 0        | 24   | 26 | 0   | 0    | 0        | 3                             | 0   |     |    |  |                               |  |  |  |
| 16:05                                   | - | 16:10      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 0    | 0        | 0  | 0  | 0   | 0    | 0        | 0                             | 0   |     |    |  |                               |  |  |  |
| 16:10                                   | - | 16:15      | 0 | 0 | 0 | 0 | 17  | 25  | 16  | 47  | 53   | 18       | 0  | 0  | 42  | 63   | 71       | 0                             | 7   | 2   |    |  |                               |  |  |  |
| 16:15                                   | - | 16:20      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 0    | 0        | 20   | 26 | 0   | 0    | 0        | 3                             | 0   |     |    |  |                               |  |  |  |
| 16:20                                   | - | 16:25      | 0 | 0 | 0 | 0 | 0   | 0   | 18  | 53  | 0    | 0        | 0  | 0  | 0   | 0    | 71       | 0                             | 0   | 3   |    |  |                               |  |  |  |
| 16:25                                   | - | 16:30      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 52   | 17       | 0  | 0  | 0   | 0    | 0        | 7                             | 0   |     |    |  |                               |  |  |  |
| 16:30                                   | - | 16:35      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 17   | 9        | 0  | 0  | 0   | 0    | 26       | 0                             | 2   | 0   |    |  |                               |  |  |  |
| 16:35                                   | - | 16:40      | 0 | 0 | 0 | 0 | 0   | 5   | 45  | 98  | 20   | 0        | 0  | 0  | 50  | 118  | 0        | 14                            | 1   |     |    |  |                               |  |  |  |
| 16:40                                   | - | 16:45      | 0 | 0 | 0 | 0 | 29  | 41  | 21  | 33  | 0    | 0        | 0  | 0  | 70  | 54   | 0        | 0                             | 3   |     |    |  |                               |  |  |  |
| 16:45                                   | - | 16:50      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 28   | 12       | 0  | 0  | 0   | 0    | 40       | 0                             | 4   | 0   |    |  |                               |  |  |  |
| 16:50                                   | - | 16:55      | 0 | 0 | 0 | 0 | 0   | 0   | 14  | 44  | 91   | 26       | 0  | 0  | 0   | 58   | 117      | 0                             | 13  | 2   |    |  |                               |  |  |  |
| 16:55                                   | - | 17:00      | 0 | 0 | 0 | 0 | 8   | 9   | 0   | 0   | 0    | 0        | 0  | 0  | 17  | 0    | 0        | 0                             | 0   | 0   |    |  |                               |  |  |  |
| 17:00                                   | - | 17:05      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 90   | 17       | 0  | 0  | 0   | 0    | 0        | 13                            | 0   | 0   |    |  |                               |  |  |  |
| 17:05                                   | - | 17:10      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 121  | 57       | 0  | 0  | 0   | 0    | 0        | 17                            | 0   | 0   |    |  |                               |  |  |  |
| 17:10                                   | - | 17:15      | 0 | 0 | 0 | 0 | 58  | 24  | 26  | 55  | 0    | 0        | 0  | 0  | 82  | 81   | 0        | 0                             | 0   | 4   |    |  |                               |  |  |  |
| 17:15                                   | - | 17:20      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 33   | 18       | 0  | 0  | 0   | 0    | 51       | 0                             | 5   | 0   |    |  |                               |  |  |  |
| 17:20                                   | - | 17:25      | 0 | 0 | 0 | 0 | 0   | 0   | 20  | 73  | 81   | 32       | 0  | 0  | 0   | 93   | 113      | 0                             | 11  | 3   |    |  |                               |  |  |  |
| 17:25                                   | - | 17:30      | 0 | 0 | 0 | 0 | 9   | 32  | 0   | 0   | 54   | 10       | 0  | 0  | 41  | 0    | 64       | 0                             | 8   | 0   |    |  |                               |  |  |  |
| 17:30                                   | - | 17:35      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 15   | 40       | 0  | 0  | 0   | 0    | 55       | 0                             | 2   | 0   |    |  |                               |  |  |  |
| 17:35                                   | - | 17:40      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 108  | 2        | 0  | 0  | 0   | 0    | 110      | 0                             | 15  | 0   |    |  |                               |  |  |  |
| 17:40                                   | - | 17:45      | 0 | 0 | 0 | 0 | 70  | 55  | 31  | 43  | 36   | 26       | 0  | 0  | 125 | 74   | 62       | 0                             | 5   | 4   |    |  |                               |  |  |  |
| 17:45                                   | - | 17:50      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 47   | 32       | 0  | 0  | 0   | 0    | 79       | 0                             | 7   | 0   |    |  |                               |  |  |  |
| 17:50                                   | - | 17:55      | 0 | 0 | 0 | 0 | 0   | 0   | 25  | 91  | 141  | 36       | 0  | 0  | 0   | 116  | 177      | 0                             | 20  | 4   |    |  |                               |  |  |  |
| 17:55                                   | - | 18:00      | 0 | 0 | 0 | 0 | 20  | 18  | 0   | 0   | 128  | 25       | 0  | 0  | 38  | 0    | 153      | 0                             | 18  | 0   |    |  |                               |  |  |  |
| 18:00                                   | - | 18:05      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 47   | 60       | 0  | 0  | 0   | 0    | 107      | 0                             | 7   | 0   |    |  |                               |  |  |  |
| 18:05                                   | - | 18:10      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 112  | 13       | 0  | 0  | 0   | 0    | 125      | 0                             | 16  | 0   |    |  |                               |  |  |  |
| 18:10                                   | - | 18:15      | 0 | 0 | 0 | 0 | 41  | 24  | 49  | 93  | 56   | 53       | 0  | 0  | 65  | 142  | 109      | 0                             | 8   | 7   |    |  |                               |  |  |  |
| 18:15                                   | - | 18:20      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 47   | 38       | 0  | 0  | 0   | 0    | 85       | 0                             | 7   | 0   |    |  |                               |  |  |  |
| 18:20                                   | - | 18:25      | 0 | 0 | 0 | 0 | 0   | 36  | 8   | 176 | 23   | 0        | 0  | 0  | 44  | 199  | 0        | 25                            | 5   |     |    |  |                               |  |  |  |
| 18:25                                   | - | 18:30      | 0 | 0 | 0 | 0 | 10  | 35  | 0   | 0   | 134  | 5        | 0  | 0  | 45  | 0    | 139      | 0                             | 19  | 0   |    |  |                               |  |  |  |
| 18:30                                   | - | 18:35      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 0    | 0        | 0  | 0  | 0   | 0    | 0        | 0                             | 0   | 0   |    |  |                               |  |  |  |
| 18:35                                   | - | 18:40      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 128  | 75       | 0  | 0  | 0   | 0    | 0        | 0                             | 18  | 0   |    |  |                               |  |  |  |
| 18:40                                   | - | 18:45      | 0 | 0 | 0 | 0 | 49  | 50  | 53  | 78  | 164  | 31       | 0  | 0  | 99  | 131  | 195      | 0                             | 23  | 7   |    |  |                               |  |  |  |
| 18:45                                   | - | 18:50      | 0 | 0 | 0 | 0 | 0   | 0   | 0   | 0   | 83   | 32       | 0  | 0  | 0   | 0    | 95       | 0                             | 9   | 0   |    |  |                               |  |  |  |
| 18:50                                   | - | 18:55      | 0 | 0 | 0 | 0 | 0   | 24  | 69  | 123 | 14   | 0        | 0  | 0  | 93  | 137  | 0        | 0                             | 17  | 3   |    |  |                               |  |  |  |
| 18:55                                   | - | 19:00      | 0 | 0 | 0 | 0 | 7   | 53  | 0   | 0   | 123  | 14       | 0  | 0  | 60  | 0    | 137      | 0                             | 17  | 0   |    |  |                               |  |  |  |
|   |   |            | 0 | 0 | 0 | 0 | 318 | 366 | 338 | 732 | 2410 | 807      | 0  | 0  | 684 | 1070 | 3217     | 0                             | 0   | 337 | 47 |  |                               |  |  |  |


A Alighting  
B Boarding



| CAPITA SYMONDS     |         | Job No. CS 26494 F29          |              |    |
|--------------------|---------|-------------------------------|--------------|----|
| Twickenham Station |         | Main Job No. Capita Symonds   |              |    |
| Car Park Count     |         | Date Thursday 18 October 2007 |              |    |
| Appendix H         |         |                               |              |    |
| IN at start        |         |                               | 29           |    |
| Times              | Inbound | Outbound                      | Accumulation |    |
| 07:00              | 07:15   | 11                            | 10           | 30 |
| 07:15              | 07:30   | 10                            | 7            | 33 |
| 07:30              | 07:45   | 15                            | 12           | 36 |
| 07:45              | 08:00   | 16                            | 9            | 43 |
| 08:00              | 08:15   | 13                            | 9            | 47 |
| 08:15              | 08:30   | 9                             | 7            | 49 |
| 08:30              | 08:45   | 4                             | 5            | 48 |
| 08:45              | 09:00   | 6                             | 7            | 47 |
| 09:00              | 09:15   | 8                             | 6            | 49 |
| 09:15              | 09:30   | 13                            | 14           | 48 |
| 09:30              | 09:45   | 7                             | 5            | 50 |
| 09:45              | 10:00   | 5                             | 6            | 49 |
| 10:00              | 10:15   | 3                             | 4            | 48 |
| 10:15              | 10:30   | 4                             | 5            | 47 |
| 10:30              | 10:45   | 2                             | 4            | 45 |
| 10:45              | 11:00   | 6                             | 2            | 49 |
| 11:00              | 11:15   | 1                             | 4            | 46 |
| 11:15              | 11:30   | 2                             | 3            | 45 |
| 11:30              | 11:45   | 2                             |              | 47 |
| 11:45              | 12:00   | 4                             | 6            | 45 |
| 12:00              | 12:15   | 1                             | 1            | 45 |
| 12:15              | 12:30   | 1                             | 2            | 44 |
| 12:30              | 12:45   | 5                             | 4            | 45 |
| 12:45              | 13:00   | 3                             | 2            | 46 |
| 13:00              | 13:15   | 3                             | 2            | 47 |
| 13:15              | 13:30   | 1                             | 1            | 47 |
| 13:30              | 13:45   | 4                             | 3            | 48 |
| 13:45              | 14:00   | 2                             | 4            | 46 |
| 14:00              | 14:15   | 3                             | 6            | 43 |
| 14:15              | 14:30   | 5                             | 4            | 44 |
| 14:30              | 14:45   | 3                             | 3            | 44 |
| 14:45              | 15:00   | 3                             | 6            | 41 |
| 15:00              | 15:15   | 4                             | 1            | 44 |
| 15:15              | 15:30   | 4                             | 2            | 46 |
| 15:30              | 15:45   | 2                             | 2            | 46 |
| 15:45              | 16:00   | 3                             | 2            | 47 |
| 16:00              | 16:15   | 8                             | 5            | 50 |
| 16:15              | 16:30   | 8                             | 10           | 48 |
| 16:30              | 16:45   | 11                            | 10           | 49 |
| 16:45              | 17:00   | 6                             | 3            | 52 |
| 17:00              | 17:15   | 4                             | 12           | 44 |
| 17:15              | 17:30   | 5                             | 3            | 46 |
| 17:30              | 17:45   | 10                            | 13           | 43 |
| 17:45              | 18:00   | 7                             | 5            | 45 |
| 18:00              | 18:15   | 12                            | 15           | 42 |
| 18:15              | 18:30   | 18                            | 19           | 41 |
| 18:30              | 18:45   | 9                             | 9            | 41 |
| 18:45              | 19:00   | 17                            | 14           | 44 |
| IN at end          |         |                               | 44           |    |

## **Appendix C**

### PTAL Calculation

# PTAI Study Report File Summary

## PTAI Run Parameters

PTAI Run 20102806123623  
Description 20102806123623  
Run by user PTAL web application  
Date and time 28/06/2010 12:36

## Walk File Parameters

Walk File PLSQLTest  
Day of Week M-F  
Time Period AM Peak  
Walk Speed 4.8 kph  
BUS Walk Access Time (mins) 8  
BUS Reliability Factor 2.0  
LU LRT Walk Access Time (mins) 12  
LU LRT Reliability Factor 0.75  
NATIONAL\_RAIL Walk Access Time (mins) 12  
NATIONAL\_RAIL Reliability Factor 0.75

Coordinates: 516071, 173685

| Mode | Stop | Route | Distance<br>(metres) | Frequency<br>(vph) | Weight | Walk<br>time<br>(mins) | SWT<br>(mins) | TAT<br>(mins) | EDF | AI |
|------|------|-------|----------------------|--------------------|--------|------------------------|---------------|---------------|-----|----|
|------|------|-------|----------------------|--------------------|--------|------------------------|---------------|---------------|-----|----|

|                         |                               |  |        |      |     |      |       |       |      |      |
|-------------------------|-------------------------------|--|--------|------|-----|------|-------|-------|------|------|
| BUS                     | TWICKENHAM<br>YORK STREET     | R70                                    | 528.56 | 6.0  | 0.5 | 6.61 | 7.0   | 13.61 | 2.2  | 1.1  |
| BUS                     | TWICKENHAM<br>YORK STREET     | R68                                    | 528.56 | 4.0  | 0.5 | 6.61 | 9.5   | 16.11 | 1.86 | 0.93 |
| BUS                     | TWICKENHAM<br>YORK STREET     | 490                                    | 528.56 | 5.0  | 0.5 | 6.61 | 8.0   | 14.61 | 2.05 | 1.03 |
| BUS                     | TWICKENHAM<br>YORK STREET     | H22                                    | 528.56 | 5.0  | 0.5 | 6.61 | 8.0   | 14.61 | 2.05 | 1.03 |
| BUS                     | TWICKENHAM<br>RUGBY<br>TAVERN | 267                                    | 28.61  | 6.0  | 0.5 | 0.36 | 7.0   | 7.36  | 4.08 | 2.04 |
| BUS                     | TWICKENHAM<br>ARRAGON<br>ROAD | 290                                    | 228.9  | 3.0  | 0.5 | 2.86 | 12.0  | 14.86 | 2.02 | 1.01 |
| BUS                     | TWICKENHAM<br>RUGBY<br>TAVERN | 281                                    | 28.61  | 7.5  | 1.0 | 0.36 | 6.0   | 6.36  | 4.72 | 4.72 |
| BUS                     | TWICKENHAM<br>YORK STREET     | 33                                     | 528.56 | 7.5  | 0.5 | 6.61 | 6.0   | 12.61 | 2.38 | 1.19 |
| BUS                     | TWICKENHAM<br>ARRAGON<br>ROAD | 110                                    | 228.9  | 3.0  | 0.5 | 2.86 | 12.0  | 14.86 | 2.02 | 1.01 |
| LT SAP Points Not Found |                               |  |        |      |     |      |       |       |      |      |
| NATIONAL_RAIL           | TWICKENHAM<br>BR              | SHEPPERTON to<br>LONDON<br>WATERLOO BR | 9.18   | 1.0  | 0.5 | 0.11 | 30.75 | 30.86 | 0.97 | 0.49 |
| NATIONAL_RAIL           | TWICKENHAM<br>BR              | READING to<br>LONDON<br>WATERLOO BR    | 9.18   | 0.33 | 0.5 | 0.11 | 91.66 | 91.77 | 0.33 | 0.16 |

|               |               |  |      |      |     |      |       |       |      |      |
|---------------|---------------|--|------|------|-----|------|-------|-------|------|------|
| NATIONAL_RAIL | TWICKENHAM BR | WINDSOR AND ETON RIVERSIDE to LONDON WATERLOO BR | 9.18 | 2.0  | 0.5 | 0.11 | 15.75 | 15.86 | 1.89 | 0.95 |
| NATIONAL_RAIL | TWICKENHAM BR | LONDON WATERLOO BR to LONDON WATERLOO BR         | 9.18 | 2.0  | 0.5 | 0.11 | 15.75 | 15.86 | 1.89 | 0.95 |
| NATIONAL_RAIL | TWICKENHAM BR | KINGSTON to LONDON WATERLOO BR                   | 9.18 | 0.33 | 0.5 | 0.11 | 91.66 | 91.77 | 0.33 | 0.16 |
| NATIONAL_RAIL | TWICKENHAM BR | LONDON WATERLOO BR to LONDON WATERLOO BR         | 9.18 | 2.0  | 0.5 | 0.11 | 15.75 | 15.86 | 1.89 | 0.95 |
| NATIONAL_RAIL | TWICKENHAM BR | LONDON WATERLOO BR to READING                    | 9.18 | 2.3  | 1.0 | 0.11 | 13.79 | 13.91 | 2.16 | 2.16 |
| NATIONAL_RAIL | TWICKENHAM BR | TWICKENHAM BR to LONDON WATERLOO BR              | 9.18 | 0.33 | 0.5 | 0.11 | 91.66 | 91.77 | 0.33 | 0.16 |
| NATIONAL_RAIL | TWICKENHAM BR | READING to LONDON WATERLOO BR                    | 9.18 | 0.67 | 0.5 | 0.11 | 45.53 | 45.64 | 0.66 | 0.33 |
| NATIONAL_RAIL | TWICKENHAM BR | ALDERSHOT to LONDON WATERLOO BR                  | 9.18 | 0.67 | 0.5 | 0.11 | 45.53 | 45.64 | 0.66 | 0.33 |
| NATIONAL_RAIL | TWICKENHAM BR | TWICKENHAM BR to LONDON WATERLOO BR              | 9.18 | 0.67 | 0.5 | 0.11 | 45.53 | 45.64 | 0.66 | 0.33 |